



Food and Agriculture
Organization of the
United Nations



FAO'S WORK ON CLIMATE CHANGE

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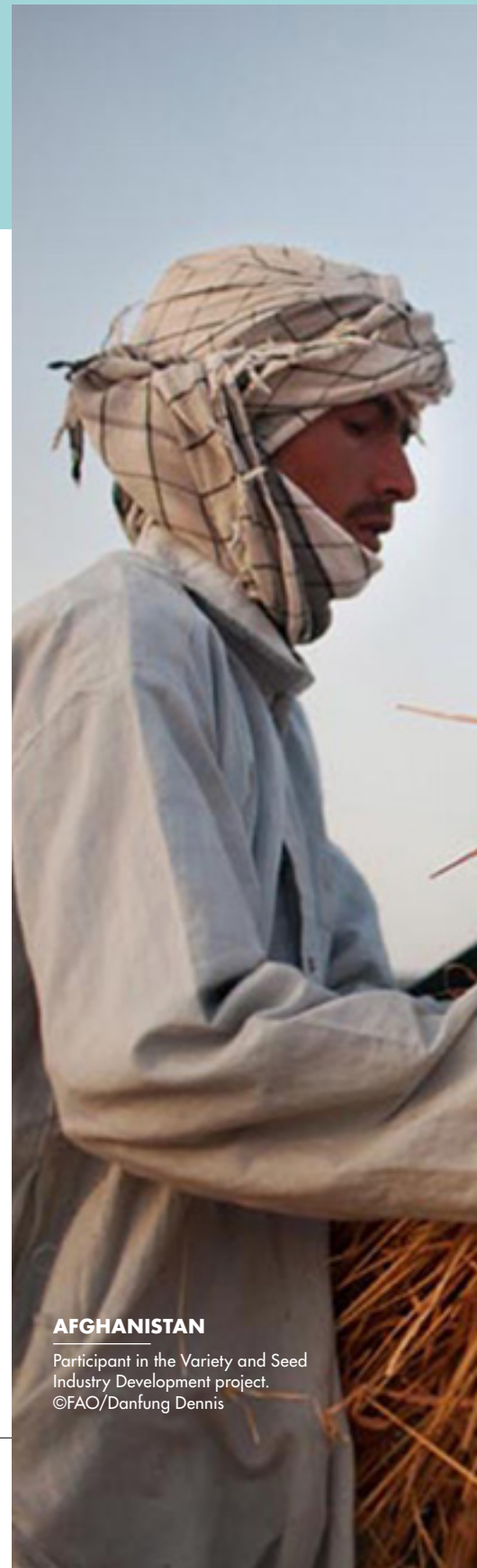
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Cover photo: INDIA – Cradle of green. ©FAO/Anupam Anand



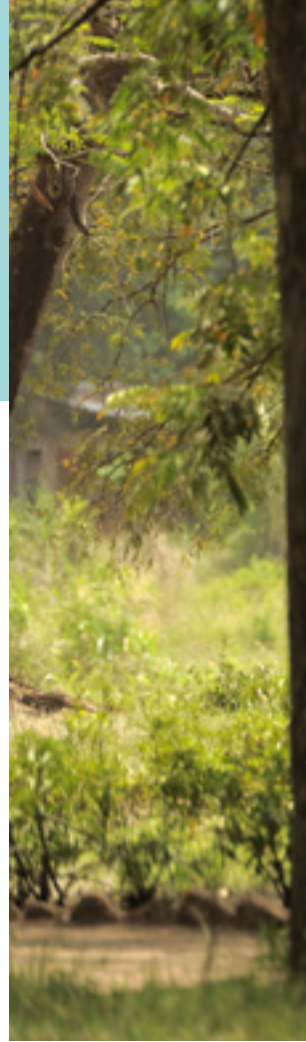
AFGHANISTAN

Participant in the Variety and Seed
Industry Development project.
©FAO/Danfong Dennis



**ZERO HUNGER
IS NOT POSSIBLE
WITHOUT
TACKLING
CLIMATE CHANGE**

INTRODUCTION



Promoting sustainable agriculture and achieving food security go hand in hand with efforts to meet climate commitments and realize the Sustainable Development Goals.

TANZANIA

Men taking part in an FAO project to strengthen resilience of farms in Kiroka to climate change.
©FAO/Daniel Hayduk

“WE HAVE A WINDOW OF OPPORTUNITY TO STABILIZE GLOBAL AVERAGE TEMPERATURES TO SAFE LEVELS, BUT WE MUST ACT NOW.”

José Graziano da Silva
FAO Director-General

In three short months between September and December 2015, world leaders made historic commitments to tackle the great challenges facing our planet, promising to build a sustainable future for humankind through the 2030 Agenda for Sustainable Development, and pledging action to address climate change in the UNFCCC's Paris Agreement (COP 21).

Today, these great challenges persist. The October 2018 report of the Intergovernmental Panel on Climate Change (IPCC) tops a series of recent studies that calls for urgent action to avert the disastrous

consequences of global warming. Focusing on the scenario of a global temperature rise this century of 1.5 °C above pre-industrial levels, the report notes that 122 million additional people could experience extreme poverty by 2030, mainly due to higher food prices and declining health. The IPCC report sounds the loudest alarm bell yet for concerted action to respond to the existential threat that predominantly faces poor rural populations in developing countries.

FOOD SECURITY AND CLIMATE CHANGE

Climate change is already having profound consequences on people's



lives and our planet's diversity of life. Sea levels are rising and oceans are warming. Longer, more intense droughts threaten freshwater supplies and crops, endangering efforts to feed a growing world population. The livelihoods of farmers, fishers and foresters, who have contributed least to climate change, are already suffering most from extreme weather events that damage infrastructure, wipe out harvests, compromise fish stocks, erode natural resources and endanger species. Between 2006 and 2016, agriculture bore the brunt of 26 percent of the total damage and loss caused by climate-related disasters in developing countries.

Without action, the changing climate will seriously place food production at risk in countries and regions that are already highly food insecure. It will affect food availability by reducing the productivity of crops, livestock and fisheries, and hinder access to food by disrupting the livelihoods of millions of rural people who depend on agriculture for their incomes. It will expose both urban and rural poor to higher and more volatile food prices. Inevitably, it will cause distress migration and jeopardize progress towards the Sustainable Development Goals.

These effects are already apparent. The 2018 edition of *The State of Food*

Security and Nutrition in the World (SOFI) cites the changing climate as a key driver behind the sudden rise in the global number of hungry people – up 17 million to 821 million in 2017.

While no other sector is more vulnerable to extreme and volatile weather events, food and agriculture provide numerous opportunities to adapt to, mitigate and build resilience to climate change. Realizing the commitments that countries made to transform food systems and promote sustainable agriculture approaches can still deliver a world without hunger and malnutrition by 2030. ■

FOOD AND AGRICULTURE IN THE CLIMATE CHANGE AGENDA

It is becoming increasingly clear that the goals of achieving food security, promoting sustainable agriculture (SDG2), and taking climate action (SDG13) are interconnected and need to be addressed in a coordinated way.

The adoption of the The Koronivia Joint Work on Agriculture by COP 23 in 2017 marked an important turning point for the status of agriculture in the international climate discourse. Following the decision by 90 percent of countries to include the agricultural sectors (crops, livestock, fisheries, aquaculture and forestry) as a priority in their Nationally Determined Contributions (NDCs) under the Paris Agreement, Koronivia re-emphasizes the importance of agriculture and food

security in the climate change agenda. Countries agreed to work together to address issues related to soil, livestock, and nutrient and water management, as well as on the food security and socio-economic impacts of climate change across the agricultural sectors. FAO is working to support countries in the development and implementation of this joint work through webinars and workshops allowing agriculture experts under the UNFCCC to informally share their views on how to develop and implement the decision.

THE FOOD-AGRICULTURE-CLIMATE NEXUS

FAO's Strategy on Climate Change focuses on enhancing capacities to implement NDCs, supporting countries to both adapt to and mitigate the effects of climate change through research-based programmes and projects geared towards adapting smallholder production and making the livelihoods of rural populations more resilient. The Strategy moves away from a reactive response to crises to proactively preventing and

AGRICULTURE HAS A MAJOR ROLE TO PLAY IN RESPONDING TO CLIMATE CHANGE

The capacity of the agricultural sectors to respond to climate change has far-reaching impacts on the livelihoods of the majority of people in many developing countries and on national economies. More than 3 billion people, 80 percent of the poor, live in rural areas, with around 2.5 billion dependent on agriculture for their livelihoods. Farmers, pastoralists, fisherfolk and community foresters, whose work is inextricably linked to climate, require greater access to technologies, markets, information and credit for investment to adapt their production practices to the changing climate, build resilience and continue to contribute to national economic growth.



“PROFOUND, SYSTEMIC CHANGES IN CLIMATE PATTERNS CALL FOR PROFOUND, SYSTEMIC CHANGES IN OUR SOCIETIES AND FOOD SYSTEMS.”

Maria-Helena Semedo
FAO Deputy Director-General for Climate and Natural Resources

anticipating them, supporting people before, during and after shocks.

SUSTAINABLE AGRICULTURE SOLUTIONS

While it contributes around 24 percent of global greenhouse gas emissions, the agriculture sector – soils, forests and oceans – has great potential to offer emissions efficiency gains, absolute reductions and carbon sinks, while supporting resilience-building and socio-economic development.

FORESTS – Tropical deforestation and forest degradation through agricultural expansion, conversion to pastureland, destructive logging, forest fires, and other causes account for 11 percent of the world's greenhouse gas emissions. Agroforestry and reducing deforestation is one of the most cost-effective and immediate solutions to curb climate change while increasing food security.

The world's forests currently store an estimated 296 gigatonnes of carbon in both above- and below-ground biomass, a number that can be significantly increased.

LIVESTOCK – Livestock supply chains account for 14.5 percent of global anthropogenic greenhouse gas emissions. Cattle are responsible for about two-thirds of that figure. FAO estimates that through improved management practices, emissions from livestock production, methane in particular, could be reduced by about 30 percent. In addition, improved management of agricultural land can remove up to 63 gigatonnes of carbon from the atmosphere.

SOILS – About 33 percent of our global soils are moderately to highly degraded, unable to provide key ecosystem services, such as food production or water storage. We can unlock the full

potential of soils by restoring degraded land and improving soil health. Increasing soil organic carbon can raise food production by 17.6 megatonnes per year and help maintain productivity in drier conditions. While the degradation of the world's soils has released roughly 78 gigatonnes of carbon into the atmosphere, the rehabilitation of agricultural and degraded soils can remove up to 51 gigatonnes of carbon from the atmosphere.

FOOD LOSSES/WASTE – Currently, one-third of the food we produce is lost or wasted. Food losses and waste are responsible for 8 percent of total GHG emissions, costing up to USD 2.6 trillion per year, including USD 700 billion of environmental costs and USD 900 billion of social costs. Reducing food losses and waste makes economic and environmental sense. ■

KEY MESSAGES

CLIMATE CHANGE IS PUTTING OUR FOOD SECURITY AND THE LIVELIHOODS OF MANY PEOPLE AT RISK. THE THREAT IS REAL AND RESPONDING TO IT IS URGENT.

Achieving Zero Hunger will depend on how fast we scale up climate action in agriculture

Climate change is already affecting agriculture production and food security. Without urgent action millions more people will suffer hunger and poverty. To stand any chance of achieving Zero Hunger by 2030, we must accelerate and scale up actions that strengthen the resilience and adaptive capacity of food systems and people's livelihoods in response to climate variability and extremes.

Agriculture must transform from being part of the climate change problem to becoming part of its solution

The agriculture sector is responsible for almost a quarter of global greenhouse gas emissions, but has great potential to store vast quantities of carbon in soils, forests and oceans. We can make significant reductions in emissions by adopting smarter, integrated

TANZANIA

Small-scale farmers preparing trench excavation and fertilization on a 300-acre grape production project.
©FAO/IFAD/WFP/Eliza Deacon

farming systems and better forest governance and land-use planning, and shifting to approaches that safeguard biodiversity, use natural resources sustainably and promote ecosystem services. Adopting best practices in livestock feeding and manure management, and making better use of technologies such as biogas generators and energy-saving devices are also part of the transformation to sustainable agriculture.





Strengthening resilience can prevent a climatic shock from becoming a crisis

About a quarter of the total damage and loss caused by climate-related disasters in developing countries occurs in agriculture. It is time to strengthen the resilience of

farmers, foresters and fisherfolk through social protection and other programmes, moving from a reactive response to crises to proactively preventing and anticipating them, supporting people before, during and after shocks. Those with resilient livelihoods are better able to prevent and reduce the impact of climate change and the risk of disasters on their lives.

Forests are one of the most cost-effective solutions to curb climate change

The ability of forests to store large amounts of carbon in their trees, undergrowth and soils represents our best way of confronting climate change. While tropical deforestation

KEY MESSAGES

and forest degradation account for 11 percent of the world's greenhouse gas emissions, afforestation, sustainable forest management and reducing deforestation make forests one of the most cost-effective and immediate solutions to curb climate change. To fully exploit the magic of forests, it will be crucial to address the drivers of deforestation and degradation; ensure responsible governance and legitimate tenure of forests and land; and put in place effective systems for forest monitoring and reporting.

Soils are our allies in the fight against hunger and climate change

Making up the greatest pool of terrestrial organic carbon, soil helps to supply clean water and food, prevent desertification and provide resilience to flood and drought, while mitigating climate change through carbon sequestration. Today, however, a third of our global soils are moderately to highly degraded, unable to provide key ecosystem services. By sustainably managing soils, restoring degraded land and improving soil health, we can unlock the full potential of soils to not only respond to climate change but to maintain biodiversity

CAMBODIA

Man on a boat in Koh Rong, an island in the Sihanoukville Province.
©FAO/Selvaggia Cognetti de Martiis



and help eliminate hunger, food insecurity and malnutrition in the world.

Oceans and inland waters are critical to global food security and the regulation of the world's climate

Covering 71 percent of our planet's surface, oceans are the Earth's life-support

system, providing free goods and services, from the food we eat to the oxygen we breathe. With about one-third of human-induced emissions ending up in the oceans, they act as the planet's largest active carbon sink. Climate change, ocean acidification and changes in waterbodies' physical and chemical characteristics are adding to the sense of urgency to ensure resilient socio-ecological systems. ■

FACTS AND FIGURES

➔ World hunger is on the rise: **the estimated number of undernourished people increased from 804 million in 2016 to 821 million in 2017.** Much of the increase in hunger can be traced to a rise in conflicts, often exacerbated by climate-related shocks.

➔ According to a recent IPCC report, **if temperatures rise by 1.5 °C this century above pre-industrial levels, 122 million additional people could experience extreme poverty by 2030,** mainly due to higher food prices and declining health.

➔ Between 2006 and 2016, **26 percent of the total damage and loss caused by climate-related disasters in developing countries was in the agriculture sector.**

➔ Between 2006 and 2016, **30 percent of the agricultural losses caused by disasters were due to drought,** costing over USD 29 billion.

➔ **In developing countries, up to 83 percent of all damage and loss caused by drought,** which climate change is expected to intensify, is absorbed by agriculture.

➔ **The IPCC warns that declining crop yields may**

already be a fact, and that decreases of 10–25 percent may be widespread by 2050.

➔ **Increasing soil organic carbon by improved land management techniques can raise food production by 17.6 megatonnes per year** and help maintain productivity in drier conditions.

➔ While the degradation of the world's soils has released roughly 78 gigatonnes of carbon into the atmosphere, **the rehabilitation of agricultural and degraded soils can remove up to 51 gigatonnes of carbon from the atmosphere.**

➔ **Climate change is expected to bring additional burdens on water systems already stressed.** This will intensify competition for water, affecting regional water, energy, fisheries and food security.

➔ **Livestock supply chains account for 14.5 percent of global anthropogenic greenhouse gas emissions.** Cattle (beef, milk) are responsible for about two-thirds of that figure.

➔ **FAO estimates that the potential to reduce emissions from livestock production, in particular methane, is about 30 percent of baseline emissions.**

➔ **By 2055, species redistribution prompted by rising ocean temperatures may reduce potential catches of many fish in the tropics by 40–60 percent,** and in high latitudes by 30–70 percent.

➔ Tropical deforestation and forest degradation through agricultural expansion, conversion to pastureland, destructive logging, forest fires, and other causes **accounts for 11 percent of the world's greenhouse gas emissions.**

➔ Since 1990 over 20 countries have demonstrated that **it is possible to improve food security while maintaining or increasing forest cover.**

➔ **The world's forests store an estimated 296 gigatonnes of carbon** in both above- and below-ground biomass

➔ **Fisheries and aquaculture make a minor contribution to global emissions** but offer significant opportunities to reduce fuel consumption and emissions.

➔ **Currently, one-third of the food we produce is lost or wasted.** This costs up to USD 2.6 trillion per year, including USD 700 billion in environmental costs and USD 900 billion in social costs. ■

SUPPORTING COUNTRIES TO ADAPT TO AND MITIGATE CLIMATE CHANGE

FAO provides guidance and support on climate change adaptation and mitigation to countries around the world.

AGRICULTURE IS HIGHLY VULNERABLE TO CLIMATE CHANGE

Agriculture – including crops, livestock, fisheries, aquaculture and forestry – absorbs around 26 percent of the total damage and losses of climate-related natural disasters, such as droughts and floods, in the developing world. As climate change will only increase the intensity and frequency of these events, agriculture must be integrated into national adaptation policies and plans and investments to protect livelihoods, maintain ecosystems and feed growing populations.

UNDERSTANDING THE IMPACTS OF CLIMATE CHANGE

National climate planning can only work when countries have the capabilities to forecast

climate-linked changes and trigger alerts in agriculture, assess vulnerabilities and understand and support communities' ability to adapt. To make this possible, FAO provides methods and tools for assessing climate impacts, providing early warning, monitoring natural resources, and tracking GHG emissions. These tools help the shift to sustainable food and agriculture – which can both help adapt to new climate regimes and minimize climate change itself. Many adaptation measures have mitigation co-benefits, while some of the tools can be used to look at mitigation opportunities, such as identifying degraded lands that can be rehabilitated and so become carbon sinks.

FAO METHODS AND TOOLS HELP IN THE BATTLE AGAINST CLIMATE CHANGE.



PHILIPPINES

The Assisted Natural Reforestation project provides increased resources and opportunities to local residents.

©FAO

FAO SUPPORT TO COUNTRIES INCLUDES:

- Working with countries to develop policies, including National Adaptation Plans, and enabling environments that support farmers, foresters and fisherfolk to accelerate the adoption of tools and practices that reduce risk and disaster impacts and enhance the adaptation capacities and the resilience of production systems to climate-related shocks and change.
- Developing climate change

impact and vulnerability assessments for crops, livestock, fisheries, aquaculture and forestry, as well as those who depend on these sectors for their livelihoods.

- Supporting countries to analyse the nexus between climate change, climate risks and poverty to effectively strengthen resilient livelihoods.
- Assisting countries to formulate multisectoral pro-poor development policies, strategies and programmes that integrate climate change and support the

rural poor, especially women and youth, to increase their resilience and adaptability to climate change impacts.

- Adopting a comprehensive approach to strengthening resilience and reducing poverty in rural areas through risk-informed and shock-responsive social protection systems.
- Working with countries to monitor, report and reduce emissions from agricultural sectors using Nationally Appropriate Mitigation Actions (NAMAs),

SUPPORTING COUNTRIES TO ADAPT TO AND MITIGATE CLIMATE CHANGE

FAO SUPPORTS COUNTRIES TO STRENGTHEN LIVELIHOODS AND FOOD SYSTEMS AND REDUCE PEOPLE'S EXPOSURE TO CRISES.

including deforestation and forest degradation (REDD+), as well as to enhance carbon sequestration in soils and through conservation, management and expansion of forests.

- Promoting engagement and investments of private sector and small-scale forest and farm producers in climate-friendly forest and land-use activities.
- Supporting improved natural resource management, e.g. sustainable and integrated land and water management, inland fisheries, soil conservation, and resilient crops, trees, fish varieties and livestock breeds.
- Improving weather and climate forecasting, predicting changes in aquatic ecosystems (e.g. salinity, oxygen, and pH), and communicating these to farmers.
- Enhancing early warning systems, rapid reaction mechanisms and contingency planning for natural disasters, as well as for transboundary plant pests and diseases and developing disaster risk reduction management capabilities.
- Developing the capacity of countries to enhance their transparency framework for action and support in the agricultural sectors; including support to develop their Nationally Determined Contributions and





GUATEMALA

A female forester.

© FAO/Luis Sánchez Díaz

incorporating agriculture in their National Adaptation Plans.

- ➔ Enabling women farmers to have access to land and resources, information and technologies to help their communities cope with the impacts of climate change.
- ➔ Helping to scale up climate investment for the agricultural sectors by assisting countries to access funding from the Green Climate Fund, the Global Environment Facility, and other sources.

LEAVING NO ONE BEHIND IN THE CLIMATE CHANGE AGENDA

The poor and most marginalized people are disproportionately affected by hazards and crises, often exacerbated by climate change. FAO provides policy guidance and support to countries to strengthen livelihoods and food systems and reduce people's exposure to crises, particularly the most vulnerable. These actions help build more resilient and inclusive rural economies and foster sustainable agricultural practices. Women are more vulnerable to climate change because they face discrimination and inequalities in accessing land and water, markets, technologies and credit. This makes it particularly difficult for them to adapt to climate change. ■

DATA, METHODS AND TOOLS

The following section looks at the methods and tools FAO provides.

FOR INVENTORIES AND MEASUREMENT OF EMISSIONS

Taking stock of GHG emissions from the agricultural sectors allows countries to monitor progress against their NDCs and climate action commitments, assess their status, and consider potential areas of action.

Ex-Ante Carbon-balance Tool (EX-ACT). This system provides *ex ante* estimates of the impact of land use and land-use changes, and natural resource management on GHG emissions and carbon balance. EX-ACT is a powerful tool that can ensure agricultural investments are climate-proofed. www.fao.org/tc/exact

FAOSTAT. FAOSTAT includes a global inventory of GHG emissions from all agricultural activities, including crop production, livestock, and forestry and land-use changes. faostat3.fao.org/browse/G1/*/E

Global Forest Resources Assessments (FRA). FRA 2015 is the most comprehensive

assessment of forests to date. It examines the status and recent trends for about 100 variables covering the extent, condition, use, and value of forests and other wooded land. Additionally, FAO assists countries to strengthen their national forest monitoring systems. Such data provide a basis for identifying vulnerability to climate change and assessing progress in adaptation and mitigation. www.fao.org/forest-resources-assessment

Global Livestock Environmental Assessment Model (GLEAM). This model supports the assessment of adaptation and mitigation scenarios in the livestock sector. It calculates livestock production, GHG emissions and mitigation potential using IPCC Tier 2 methods. A user-friendly version is available for download to support governments, project planners, producers, industry, and civil society organizations. www.fao.org/gleam

Livestock Environmental Assessment and Performance (LEAP) Partnership. This multi-stakeholder partnership develops harmonized metrics and methodologies to measure environmental performance and

GHG emissions in livestock supply chains. www.fao.org/partnerships/leap

Learning tool on Nationally Appropriate Mitigation Actions (NAMAs) in the agriculture, forestry, and other land-use sectors. Through this tool, FAO supports developing countries to identify, develop and implement NAMAs in the context of national sustainable development, thus contributing to national and global climate change mitigation goals. www.slideshare.net/FAOoftheUN/tag/namatool

Open Foris. Open Foris is a set of open-source software tools to facilitate flexible and efficient data collection, analysis, and reporting. Its modules can be used for forest inventories, land use and land-use change assessment, and climate change reporting. www.openforis.org

FOR ASSESSING IMPACTS, RISKS AND VULNERABILITIES

Understanding the vulnerability of people's food security to climate change is essential to identify appropriate adaptation measures and so reduce both vulnerabilities and impacts.

Agricultural Stress Index System (ASIS). The development of early warning systems is essential to reduce the impacts of extreme weather events. Using



ERITREA

A man using technology to detect and control desert locust outbreaks.

©FAO/Keith Cressman

data on vegetation and land surface temperature, ASIS detects hotspots where crops may be affected by drought. It contributes to the food security monitoring work of Global Information and Early Warning Systems on Food and Agriculture (GIEWS).

www.fao.org/giews

Assessment tool for the potential impact of climate change on breed distribution.

Livestock breeds raised in certain environments have acquired characteristics that enable them to thrive in local conditions and meet the needs of the people that keep them. This means that a changing climate can affect the ability to raise certain breeds in certain

areas. This tool models potential future habitats for 8 800 livestock breeds, allowing more informed decision-making on breed management as climate change alters habitats.

www.fao.org/breed-distribution-model

Analysis and Mapping of Impacts under Climate Change for Adaptation and Food Security (AMICAF).

Aimed at strengthening household food security through livelihood adaptation approaches, the assessment was implemented in the Philippines and Peru, and is now ongoing in Indonesia and Paraguay. Funded by the Ministry of Agriculture, Forestry and Fisheries of Japan, its main objective is ▶

FAO IS A KEY PARTNER IN CREATING RESILIENT AGRICULTURAL DEVELOPMENT TO BOOST FOOD SECURITY.

DATA, METHODS AND TOOLS

to connect climate change impact assessment, food insecurity vulnerability analysis and livelihood adaptation approaches. www.fao.org/climatechange/amicaf

AquaCrop. AquaCrop is a crop model that simulates the yield response to water of herbaceous crops in different agro-ecological conditions. It is particularly suited to addressing conditions where water is a key limiting factor in crop production. It allows the simulation of the impact of different climate change scenarios in crop yield. www.fao.org/aquacrop

Global assessment of fisheries and aquaculture compliance with the Code of Conduct for Responsible Fisheries.

Implementation of the Code is monitored through global questionnaires sent to all FAO Members twice a year. A progress report is prepared, which can be used by Members to improve their performance and address their preparedness for and adaptation to climate change. www.fao.org/fishery/code

Global early warning system for transboundary plant pests and diseases. The Desert Locust early warning system monitors locusts, weather and ecological conditions, and provides forecasts and alerts to countries as part of a strategy

to reduce the frequency, duration, and magnitude of plagues. The system can be adapted to other transboundary plant pests and diseases. www.fao.org/ag/locusts

Land Degradation Assessment in Drylands: the LADA-WOCAT toolset facilitates a participatory process with land users and experts for: (a) National and local assessment of land degradation and existing land management practices (including impact of climate change); (b) selection of sustainable land management (SLM) practices that are well adapted to the local context; (c) assessment, documentation and sharing. www.fao.org/nr/lada and www.wocat.net

Land resource planning (LRP) Toolbox is a freely accessible online source for a range of stakeholders, directly or indirectly involved in land-use planning. It contains a comprehensive number of existing tools and approaches that facilitate access and assist with the selection of those tools that meet the requirements of different stakeholders, operating in various sectors. www.fao.org/land-water/land/land-governance/land-resources-planning-toolbox

Modelling System for Agricultural Impacts of Climate Change (MOSAICC). This system



allows interdisciplinary climate change impact assessments on agriculture through simulations. It allows for a better integration of scientific information in the design of agricultural development projects and policy. www.fao.org/in-action/mosaicc

Nuclear and isotopic techniques for better adaptation and resilience to climate change.

Nuclear and isotopic techniques are important tools to measure the impact of climate change, so that agriculture can better adapt and be more resilient to climate change, from controlling soil erosion and land degradation to improving soil fertility and water use efficiency. www.naweb.iaea.org/nafa/index.html

Self-evaluation and Holistic Assessment of climate Resilience of farmers and



VIET NAM

Researchers for the National Forest Assessment (NFA) measuring tree thickness for comparison with other forests. ©FAO/Joan Manuel Baliellas

and online platforms and to address climate change in the agriculture and land sector effectively. Apart from offering relevant resources, the CL-Hub will be an interactive platform for sharing knowledge and exchanging experiences to develop capacity on development activities related to climate change and agriculture.

Analyses of Nationally Determined Contributions.

In addition to a global NDC analysis developed by FAO last year, the Organization is currently developing a series of regional-level analyses of the NDCs to identify the current commitments, gaps and opportunities in the agricultural sectors for enhancing mitigation and adaptation ambitions in the next round of NDCs.

FAO also facilitates knowledge sharing and exchange of experience among countries on their NDC journey through a Thematic Working Group on Agriculture, Food Security and Land Use, under the NDC Partnership. As part of this role, FAO has been appointed as the in-country facilitator for Mozambique, to support the country in its climate actions within the agricultural sectors. ■

Pastoralists (SHARP). This tool helps farmers and pastoralists assess and prioritize the resilience of their livelihoods. SHARP is used for monitoring and evaluation, as well as a learning method, integrated into agropastoral/farmer field schools in sub-Saharan Africa. The tool provides immediate results in the field and can analyse results online in more detail.

www.fao.org/in-action/sharp

WaPOR. The FAO portal on Water Productivity through Open access of Remotely sensed derived data (WaPOR) monitors and reports on agriculture water productivity over Africa and the Near East. It is a vital new tool to address water scarcity and adapt to changing weather patterns.

www.fao.org/in-action/remote-sensing-for-water-productivity/wapor#/home

World Agriculture Watch aims at supporting country-based initiatives to develop information systems centred on family farmers and to generate appropriate typologies to characterize the diversity of farming types to allow for an adequate targeting of investments to adapt to climate change, increase resilience and reduce poverty.

Climate and Land Hub (CL-Hub). To further support countries in turning their climate commitments into action, FAO is also developing an online knowledge platform called Climate and Land Hub (CL-Hub). The CL-Hub platform offers a 'one-stop shop' of knowledge products helping countries and other stakeholders to navigate a rapidly proliferating landscape of virtual networks

FAO ACTION AREAS

Without urgent action, climate change will jeopardize progress towards the key Sustainable Development Goals of ending hunger and poverty by 2030

In response to increasing demands, FAO's climate change portfolio has expanded. Since 2009, over 300 projects and programmes have addressed climate change adaptation and mitigation in the agricultural sectors. Through its extensive network of professionals, FAO supports countries on a wide range of climate-related issues, from policy design to improved practices and capacity development.

ERADICATING HUNGER AND ACHIEVING FOOD SECURITY

The Food and Agriculture Organization of the United Nations estimates that 821 million people in the world today are chronically undernourished. After declining for over a decade, global hunger is on the rise in part due

to climate change. At the same time, almost 80 percent of the poor live in rural areas where people depend on agriculture, fisheries or forestry as their main source of income and food.

If temperatures continue to rise, eradicating hunger and poverty while ensuring the sustainability of our natural resource base to achieve the 2030 Agenda for Sustainable Development will be at risk.

The signs of increasing food insecurity and high levels of different forms of malnutrition are a clear warning that there is an urgent need for considerable additional work to ensure we leave no one behind on the road towards achieving the SDGs.

Climate resilience and food security in rural Mali

Mali, a country that has always had high rainfall variability, is currently experiencing some of the most extreme impacts of climate change. Over the past 50 years, a period in which the country's population has grown threefold, Mali's climate has been prone to dry years and prolonged drought, which have contributed to the vulnerability of rural communities and the degradation of the fragile ecosystems they depend on.



Facts and figures

- ➔ Under scenarios where the average temperature increases between 2.71 °C and 4.51 °C and rainfall decreases of up to 11 percent, crop yields in Mali may decrease by 5.5 percent and forage yields may fall by 20 percent by 2025.
- ➔ Temperature variability will certainly have a negative impact on Mali's major food crops (millet, sorghum, rice and maize) and on livestock, which is the country's second-most important export commodity.



MALI

An FAO project integrating climate resilience in agricultural production for food security in rural areas.
©FAO

An FAO project funded by the GEF has worked to strengthen Malian farmers' capacities to adapt to climate change. Launched in 2012, the project has built on an expanding network of Farmer Field School (FFS) initiatives to incorporate climate change adaptation concerns, strategies and tools in the agriculture, forestry and pastoralist sectors.

Impact

This project has enabled farmers to share knowledge on how to diversify production, improve soil

health and fertility, determine the toleration limits of different species to temperature and rainfall, and choose more resilient seeds and varieties. Through agricultural adaptation measures carried out over 123 000 hectares, the project has helped improve the climate resilience of 41 000 smallholder farmers. The project has reported increases in average crop yields of between 21 percent and 77 percent for sorghum, millet, rice, corn, sesame and cotton. Increases in yields of 97 percent were reported for hybrid sorghum seeds.

Putting agriculture at the heart of adaptation in Kenya

In Kenya, climate change is threatening the agriculture sector, the country's main source of livelihood and the Kenyan economy's beating heart.

In response, the Integrating Agriculture into National Adaptation Plans (NAP-Ag), a partnership between FAO and the United Nations Development Programme (UNDP), supported county-level consultations on Kenya's Climate-Smart

FAO ACTION AREAS

Agriculture Framework Programme, aiming to mainstream climate change into national development planning and budgeting. These consultations have engaged government representatives to establish baselines, targets, and provisions for local guidance.

Facts and Figures

- ➔ Agriculture employs over 40 percent of Kenya's population, rising to over 70 percent in rural areas.
- ➔ Agriculture directly contributes 26 percent of Gross Domestic Product (GDP), and another 27 percent of GDP indirectly through links with other sectors.

Impact

The NAP-Ag Programme addressed key agriculture issues within the National Adaptation Plan 2015–2030 (NAP), one of the first NAPs to be developed in Africa, and an example for other countries as they map out their adaptation journeys.

SUSTAINABLE MANAGEMENT OF AGRICULTURE, FORESTRY AND FISHERIES

FAO's vision for Sustainable Food and Agriculture includes a world in which food is nutritious and accessible for everyone and natural resources are managed in a way that maintains ecosystem

PHILIPPINES

A panoramic view of a man-made forest.
©FAO/Noel Celis



functions to support current as well as future human needs. In this vision, farmers, pastoralists, fisherfolk, foresters and other rural dwellers have the opportunity to actively participate in and benefit from economic development, as well as having decent employment conditions and working in a fair price environment. Rural men, women, and communities live in security, and have control over their livelihoods and equitable access to resources which they use in an efficient way.

Exposure to more complex, frequent and intense climate extremes and weather variability is threatening to erode and reverse

gains made in ending hunger and malnutrition.

In addition to conflict, climate variability and extremes are among the key drivers behind the recent uptick in global hunger and one of the leading causes of severe food crises. The cumulative effect of changes in climate is undermining all dimensions of food security – food availability, access, utilization and stability.

Knowing your forests to store more carbon

FAO, the UN Development Programme and UN Environment established a collaborative partnership known as the



CLIMATE VARIABILITY AND EXTREMES ARE ONE OF THE LEADING CAUSES OF THE RECENT RISE IN WORLD HUNGER.

UN Programme on Reducing Emissions from Deforestation and Forest Degradation, and the conservation and enhancement of forest carbon stocks (UN-REDD+) in 2008 to support countries wishing to participate in reducing emissions from deforestation and forest degradation. The programme supports partner countries in strengthening and innovating their National Forest Monitoring Systems, constructing Forest Reference Emission Levels, improving governance and advancing national policy and institutional systems to safeguard forests and mitigate climate change. Marking ten years of work, the UN-REDD+ Programme

has collaborated with 64 countries on climate- and forest-related goals, and represents a flagship programme for the UN Delivering as One.

Facts and figures

- ➔ Some 34 governments have now been able to submit critical baseline data on forest carbon stores and forest-related greenhouse gas emissions to the United Nations Framework Convention on Climate Change (UNFCCC).
- ➔ Together, those 34 countries account for 1.4 billion hectares of forests – 36 percent of the planet's forest area.
- ➔ These data are an essential basis for developing countries to tailor their REDD+ actions and contribute to the fight against climate change by halting deforestation and forest degradation under the UNFCCC's REDD+ scheme.

Impact

Technical expertise and support from FAO, provided through the UN-REDD Programme, has helped countries identify drivers of deforestation and forest degradation, while making significant advances in modernizing forest monitoring. FAO support for new technologies, satellite data and open-source

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ETHIOPIA

A farmer watering cattle as part of the Pastoral Community Development Programme.
©FAO/IFAD/WFP/Michael Tewelde

ENTERIC METHANE RESEARCH SHOWS HUGE EMISSION SAVINGS, LIVELIHOOD GAINS

2017 research from the Enteric Methane Project shows potential for huge reduction in emission intensity through herd and health management, nutrition and feeding management strategies, genetics, and other strategies.

URUGUAY: Reductions of up to 42 percent alongside an 80 percent increase in beef production

ETHIOPIA: Reductions of up to 65 percent alongside an increase in beef production of up to 225 percent

BANGLADESH: Reductions of up to 17.5 percent alongside an increase in milk production of 27 percent (subsistence) and 24 percent (commercial)

Based on these findings, FAO works with countries to identify investment opportunities for implementation at scale.

software allows countries to collect an unprecedented wealth of data on forests and generate detailed maps, statistics and studies on forest use that were not previously possible.

Low-carbon livestock production

While the livestock sector provides high-value food and other economic and social functions, it is the world's largest user of agricultural land, through grazing and the use of feed crops. Growing populations, higher incomes and urbanization are translating into increased demand for meat, milk and eggs, particularly in developing countries. The livestock sector plays a major role in climate change, management of land and water, and biodiversity.

Facts and figures

- ➔ Meet, eggs and milk are key for food security around the world providing 34 percent of global protein consumption and essential micronutrients.
- ➔ More than one billion people depend directly or indirectly on the livestock sector for their livelihoods.
- ➔ Currently, livestock contributes to almost two-thirds of agricultural GHG emissions and 78 percent of agricultural methane emissions.

Impacts

FAO supports countries in the sustainable development of livestock that contributes to food security and poverty alleviation while reducing its environmental footprint and resource use. For example, regenerative grazing practices and improved husbandry have the potential to reverse carbon losses and reduce emissions.

FAO facilitates and is actively involved in partnerships, including The Global Agenda for Sustainable Livestock, which aims to spark action to improve the sector's use of natural resources.

Other work includes a project on reducing enteric methane, in collaboration with the Global Research Alliance on Agricultural. Funded by the Climate and Clean Air Coalition and New Zealand, the project targets resource-use efficiency that results in increased livestock productivity, greater food security and reduced enteric methane emissions per unit of product.

Forest and landscape restoration

Restoring degraded forest and other lands can bring significant gains in carbon stocks, and



increase the resilience and adaptive capacity of local people to the threats of climate change.

To meet this ambitious challenge, FAO – through the Forest and Landscape Restoration Mechanism – facilitates a cross-sectoral platform that brings together key government and development partners, with a view to accelerating the transition towards restored and sustainably productive landscapes.

Facts and figures

- ➔ Today, an estimated 2 billion hectares of the world's land is degraded.
- ➔ Efforts to restore the

productivity and the supply of ecosystem goods and services from these degraded areas have increased in recent years.

- ➔ Rwanda has committed to restoring 2 million hectares of degraded land by 2020 as its pledge for the Bonn Challenge to be able to sustainably feed its growing population.
- ➔ Global and regional processes that support land restoration include the Agadir Commitment for the Mediterranean region (2017), the Bonn Challenge, the New York Declaration on Forests, Aichi Biodiversity Targets, the SDGs and the Paris Agreement.

Impacts

FAO's Forest and Landscape Restoration Mechanism has shown results in three continents. In Africa, FAO and partners organized a Forest and Landscape Investment Forum to promote investments in forest and landscapes, including climate change mitigation and adaptation. In Lebanon, innovative restoration models have helped reduce erosion accelerated by intense weather events. In Uganda, the integration of restoration activities in the national Forest Investment Programme allows for greater climate change mitigation action. ▶

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Helping to maintain carbon in the soil

Soil organic carbon represents the largest terrestrial carbon reservoir. Through photosynthesis, plants take up carbon from the atmosphere and store it. When soil organic carbon is decomposed, it is released from soils as greenhouse gases. Maintaining and, wherever possible, increasing soil organic carbon stocks is thus a measure to mitigate climate change. Also, the sustainable management of soils helps adapt to a changing climate due to the multiple benefits that soil organic carbon provides to ensure productivity through effective nutrient cycling, water retention and improved soil structure. FAO and the Global Soil Partnership are working closely with countries to support their efforts in sustainably managing their soils through a range of activities that include producing a Global Soil Organic Carbon Map (GSOCmap) launched in 2017.

Facts and figures

- FAO manages the Secretariat of the Global Soil Partnership, a broad constituency with 194 countries actively participating in all meetings.
- The Global Soil Information System, established by the Partnership, monitors and

forecasts the condition of the Earth's soil resources.

- The first-ever Global Soil Carbon Map identifies degraded areas, sets restoration targets and explores sequestration potential as a way to mitigate and adapt to climate change.
- The Global Soil Laboratory Network has 187 soil laboratories in more than 100 countries.
- Nine regional soil partnerships are well established and have consolidated implementation plans. They work in close collaboration with FAO regional and national offices in establishing an interactive consultative process with national soil entities.

Impacts

FAO and the Global Soil Partnership are also supporting countries in the Implementation of the Voluntary Guidelines of Sustainable Soil Management to increase the resilience of soils and natural resource systems to the effects of climate change, while simultaneously reducing GHG emissions from soils. The International Network of Black Soils was launched in 2017 to foster the technical cooperation between countries with black soils to monitor, protect and sustainably manage this very rich source of soil organic carbon.



**SAFEGUARDING
SOIL ORGANIC
CARBON STOCKS
IS CRUCIAL FOR
CLIMATE CHANGE
MITIGATION.**



DEMOCRATIC REPUBLIC OF THE CONGO

A farmer prepares the soil before transplanting rice plants in his field near the village of Kamangu.
©FAO/Olivier Asselin

REDUCING RURAL POVERTY IN THE FACE OF CLIMATE CHANGE

We can end extreme poverty in our lifetime. Since 1990, the world has halved the number of extreme poor. However, there are still about 737 million people living on under USD 1.90 a day and if temperatures rise by 1.5 degrees we can expect that 122 million additional people could experience extreme poverty by 2030, mainly due to higher food prices and declining health. Countries have committed themselves to ending hunger and extreme poverty by 2030. Investing in agriculture has been, and still is, an effective approach but it is not the only one. FAO is taking a broader view to tackling rural poverty especially in the face of climate change.

PROEZA: an integrated approach to fighting extreme poverty and climate change in Paraguay

In Paraguay, more than two-thirds of the extreme poor are self-employed in agriculture and climate-sensitive activities. Many of them are indigenous people, who live in remote areas, lack resources and ownership rights, and depend on natural resources – such as wood and charcoal – to meet their basic needs. This makes them extremely vulnerable to climate change and other shocks. FAO and the Government of Paraguay have formulated the Poverty, Reforestation, Energy and Climate Change (PROEZA) project to improve the resilience of poor

and extreme poor households to climate change, through risk-informed social protection, while combatting deforestation, and mitigating greenhouse gas emissions. (PROEZA) is an innovative example of how to use social protection for climate risk management. By “topping-up” Paraguay’s Social Cash Transfer Programme (Tekoporã) with financial and technical incentives, beneficiaries of the programme will be supported in establishing sustainable agroforestry practices and improvements in the efficiency of household biomass.

Facts and Figures

- ➔ The Green Climate Fund approved USD 90 million for the project.
- ➔ It will support the transition to sustainable forest management to reduce forest loss and improve the lives of around 17 000 extreme poor families (nearly 87 300 people) in eight departments of Eastern Paraguay.
- ➔ Firewood and charcoal are used to dry grains for export, produce ceramics, and as the primary energy source in the bottling industry.
- ➔ Agricultural expansion and fuelwood harvesting are contributing to one of the highest deforestation rates in the world. In fact, land-use change has

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EL SALVADOR

Farmer tending seedlings in a coffee nursery as part of the Sustainable Agriculture on Hillsides project.
©FAO/Giuseppe Bizzarri

CLIMATE CHANGE ADAPTATION IS ONLY POSSIBLE IF EFFORTS TO REDUCE POVERTY ARE COMBINED WITH CLIMATE KNOWLEDGE AND IMPROVED PRODUCTIVE PRACTICES.

led to increased greenhouse gas emissions in the country, and major biodiversity loss from the Atlantic Forest – considered the region’s most important biome for biodiversity.

Impact

PROEZA consists of three mutually reinforcing components. The first one specifically targets extreme poor households, as they are highly dependent on natural resources for their daily domestic needs and food security. Adaptation to climate change is only possible if efforts to reduce poverty are combined with climate knowledge and improved productive practices, which is why PROEZA tops up Tekoporā and supports the establishment of climate-smart agroforestry production systems, combining income generation with environmental protection. These systems will enhance the resilience of vulnerable households by providing firewood and income in the short run, and by accumulating capital – in the growing tree stock – in the long run. In addition, conditional cash transfers for environmental services will be set up – serving as environmental services incentive payments – until new farming models are sustainable.

RECLIMA: Greening the dry corridor of Central America

El Salvador is one of the most vulnerable countries to climate risks in the world. According to the Intergovernmental Panel on Climate Change, the increase in temperatures may reduce the yields of the country's major crops by 20 percent by 2050, mainly due to drought. In this context, the Green Climate Fund approved a USD 127.7 million FAO-designed project that aims to improve the climate resilience of farming systems in El Salvador's Dry Corridor while benefitting 225 000 people, 20 000 of whom belong to indigenous communities.

Facts and figures

- ➔ RECLIMA will involve 50 000 family farmers in 114 municipalities - almost 15 percent of all family farmers in the country.
- ➔ The project will work with a third of the population most vulnerable to climate change in El Salvador's Dry Corridor, an area that suffers severe droughts, floods and tropical storms.

Impact

RECLIMA will promote a transformation in the food systems of El Salvador's Dry Corridor to help eradicate hunger, poverty and address the challenges of climate



change. This will include an attempt to reduce and/or capture over 4 million tonnes of carbon over a five-year period.

The project will work with family farmers in order to transform their productive practices, improving their basic infrastructure and technical knowledge to build fully resilient and sustainable food systems. In particular, the project seeks to boost resilience in agricultural productive systems covering more than 56 000 hectares, promoting the adoption of adaptation and risk-reduction measures such as the use of seeds tolerant to drought.

EFFICIENT AGRICULTURAL AND FOOD SYSTEMS

Recent developments in food systems and value chains have yielded positive results and

advancements in feeding the world, but at the same time have created serious side effects on our natural resource base, our health and nutrition.

The extensive use of chemical fertilizers and pesticides has degraded our soils. The monoculture cropping for increased productivity of staple crops has hindered biodiversity and affected the diversity of our diets. Long energy-intensive value chains and modern retail systems, with food travelling all around the world, contribute to an increased carbon footprint.

FAO supports countries to make sure food systems are sustainable, to promote healthy balanced diets and to raise awareness of the need to reduce food losses and waste for effective climate action.

Strengthening food value chains while saving carbon in Ecuador

FAO's Global Environment Facility (GEF)-funded project in the Napo region has been working towards strengthening the cocoa value chain to support local livelihoods dependent on the crop. The province of Napo, located in the central area of Ecuador, stands out for its traditional approaches, where the local family farmers have been using the Chakra agroforestry system for sustainable production of fine aroma cocoa. The Chakra is a traditional agroforestry system that maintains high agrobiodiversity in an agro-ecological manner. To make the most of the limited but valuable production of cocoa, the Kichwa indigenous community of Napo has developed various partnerships with the private

FAO ACTION AREAS

sector. The cocoa is exported in great volumes and takes the form of gourmet chocolate bars, fine cocoa powder, and liquor.

Facts and figures

➔ The Chakra agroforestry system for sustainable production of fine aroma cocoa is implemented in 1 200 hectares of forest area in Napo, Ecuador.

➔ The project is directly benefitting the 1 150 farmer families of Napo that are involved in the production, processing, and marketing processes.

Impact

The sustainable agroforestry approaches supported by the project, like the Chakra system, led to 11 000 tonnes of CO₂ equivalent carbon sequestration by 2017, underscoring the improving resilience of local production systems against climate change. The project has also supported introduction of various policies and programmes that have had a positive impact on reducing the deforestation rate in the region by 15 percent, from 2 735 deforested hectares per year to a current rate of 2 308 hectares per year.

Cutting emissions from energy use in agriculture

Globally, agrifood chains consume about 30 percent of available

energy, mostly in post-harvest operations and in the form of fossil fuels. The challenge is to disconnect the development of agrifood chains from the use of fossil fuels without compromising food security.

Facts and figures

➔ Energy used in agrifood chains represent about 30 percent of their GHG emissions. In addition, about 40 percent of the energy used in agrifood chains is through food loss and waste.

➔ At the same time, nearly one in five people (1.4 billion) around the world do not have access to modern electricity services, and approximately 3 billion people rely on traditional biomass for cooking and heating, with adverse effects on health, the environment and economic development.

Impact

FAO's Energy-Smart Food Programme aims to ensure adequate supply of modern energy services along agrifood chains by improving energy efficiency; increasing renewable energy, in particular sustainable development of bioenergy; contributing to the development of a bio-economy; and implementing the above through a water–energy–food nexus approach.

RESILIENT LIVELIHOODS TO REACH FOOD SECURITY

As the magnitude, frequency and severity of disasters and crises increase – exacerbated by climate change and other drivers – poor households, communities and governments are increasingly challenged to adapt, cope and recover from extreme events, making them more vulnerable to future shocks.

To ensure that livelihoods and development gains are not wiped out by disasters and crises, actions need to be accelerated and scaled up to strengthen resilience and adaptive capacity of food systems, people's livelihoods, and nutrition in response to climate variability and extremes.

Building resilience in disaster stricken Haiti

The FAO-GEF project, Strengthening Climate Resilience and Reducing Disaster Risk in Agriculture to Improve Food Security in Haiti post-Earthquake, was designed to help farmers to produce more food, increase their incomes and improve the resilience of their livelihoods in the face of disasters. Sustainable and climate-resilient practices, such as the cultivation of drought-tolerant varieties of

staple crops, conservation farming, agroforestry, tree planting, and contour and slope farming have been introduced and validated by farmers using the Farmer Field School (FFS) approach in combination with other innovative communication techniques.

Facts and figures

- ➔ By 2017, the project had reached 5 000 households and succeeded in promoting the adoption of conservation agriculture and the cultivation of Beseba, a drought tolerant local lima bean variety.
- ➔ About 150 lead farmers have become engaged as extension agents; 12 artisanal seed producer groups have been created and equipped;
- ➔ Some 256 tonnes of climate-resilient crop varieties and 1.7 million sweet potato and cassava cuttings have been distributed; and 346 000 seedlings of fruit and forest trees have been planted.

Impact

The project also established 130 locally adapted model farms that focus on climate-smart agricultural production and 20 FFS for innovative adaptive agricultural systems. At the policy level, a technical

compendium on climate change adaptation and disaster risk management practices was created; Haiti's National Action Plan for Adaptation to Climate Change (NAPA) was revised and updated; technical assistance was provided for the creation of the Climate Change Directorate; and ten Community Disaster Risk Management Plans were developed and validated by recipients. The project supported farmers in acquiring the knowledge needed to improve the production of market garden crops and other climate-resilient staple crops. The comprehensive approach adopted in Haiti has improved food security, increased the resilience of household livelihoods and safeguarded the environment.

Making fisheries and aquaculture resilient to a changing climate

FAO supports its Members and partners to mitigate and adapt effectively to the impacts of climate change in fisheries, aquaculture and aquatic ecosystems. It does so through policy development, promoting sustainable management and adaptation action, practical demonstration and capacity development. The Voluntary Guidelines for Securing

Sustainable Small-Scale Fisheries in the Context of Food Security and Poverty Eradication address ways of building resilience to climate change and variability in the small-scale fisheries sector. FAO advances knowledge through global, regional and national assessments on the vulnerability of fisheries and aquaculture sectors.

FAO's Blue Growth Initiative (BGI) promotes approaches for fisheries and aquaculture practices to reconcile economic growth with the need to manage aquatic resources sustainably while maintaining social rights and responsibilities. The BGI facilitates climate change mitigation and adaptation through the restoration and management of oceans and inland waters, improving energy use along the value chain for fisheries and aquaculture products, and supporting innovative technologies and financing to ensure the sustainability of these interventions. The provision of overall guidance on climate change adaptation and mitigation is also ensured through the development of guidelines, knowledge products and field manuals. ■

FINANCING AGRICULTURE'S POTENTIAL

“IT IS TIME TO ACT. INVESTING IN SUSTAINABLE AND CLIMATE-RESILIENT AGRICULTURE IS A FUNDAMENTAL PART OF THE SOLUTION.”

José Graziano da Silva
FAO Director-General

Investment in the 2030 Agenda and the Paris Agreement has yet to reach the level needed to make sustainability a reality – a figure estimated by the UN Conference on Trade and Development at USD 2.5 trillion each year for developing countries alone.

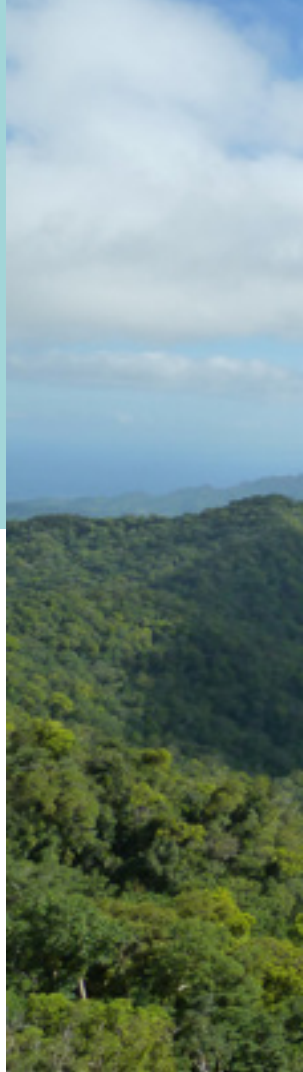
Change is happening, however. The Global Environment Facility (GEF) has funded action on sustainability for over two decades, giving out USD 17 billion in grants and mobilizing an additional USD 88 billion in financing. They have been joined by the Green Climate Fund (GCF) – the UN Framework Convention on Climate Change’s financing mechanism for developing countries and the Addis Ababa Action Agenda to help the global financial system invest in the right places.

Putting this extra investment into sustainable food and agricultural systems is likely to deliver great returns. Agricultural investment has long been an effective and sustainable way to reduce hunger and poverty, but it also holds massive potential to deliver climate and other benefits.

FIJI

A forest ecosystem conservation project funded by the Global Environment Facility and implemented by FAO.
©FAO/Rudolf Hahn

FAO assists countries to mobilize agricultural financing from the GEF. Over the past 12 years, the FAO-GEF partnership has helped deliver more than 180 projects in over 120 countries across continents. These projects have benefitted more than 4.6 million women and men, created over 350 000 jobs in rural communities, safeguarded biodiversity in 189 vulnerable marine ecosystems, and saved close to a thousand crop varieties and animal species and breeds from extinction. Importantly, in 90 of these projects, indigenous peoples and





local communities have been actively involved in project design and implementation. In April 2018, the FAO-GEF portfolio, which is spread across all of the GEF's five focal areas, was valued at USD 732 million. In its new GEF-7 Programme, FAO has become the lead agency for the implementation of the Dryland Sustainable Landscapes Impact Programme, which will deliver multiple benefits for biodiversity, sustainable livelihoods, combatting land degradation, and sustainable forest management. Along with the World Bank, FAO will also be a key partner in the

Food Systems, Land Use and Restoration Impact Programme.

FAO was accredited to the Green Climate Fund (GCF) in 2016. Since then FAO has significantly scaled up its support, which is increasingly producing results for member countries. The first FAO-led project was approved for Paraguay in March 2018 for a total project cost of over USD 90 million, while the second was approved for El Salvador in October 2018 for a total project cost of more than USD 127 million. FAO is leading several other full-scale GCF projects for

submission in 2018/19, including in Benin, Kyrgyzstan, Pakistan, the Philippines and Sudan.

FAO is also a delivery partner under the GCF Readiness and Preparatory Support Programme, supporting its member countries to develop the policies, plans and capacities needed to scale up climate action. FAO places a particular emphasis on supporting countries with their National Adaptation Plans (NAPs), REDD+ readiness and the identification of strategic priorities and project ideas in the agricultural sectors. As of September 2018, FAO was serving as the delivery partner on ten approved GCF readiness projects for a total of about USD 7 million, with many more being prepared across all regions for submission in late-2018 and 2019.

Around 90 percent of commitments under the Paris Agreement include the agricultural sectors, which shows how crucial funding change in these sectors is to fighting climate change. FAO has the know-how to support countries to access and utilize large-scale climate finance. ■

CLIMATE ACTION FOR FOOD SYSTEMS' TRANSFORMATION

Agriculture is both part of problem but also a key element of the solution. Linking up climate action with development perspective and implementation of the SDGs is the cornerstone of transformation.

Focusing support on the most vulnerable – small-scale farmers, women and youth – and consolidating different approaches in a tailor-made and comprehensive manner will help to address poverty, hunger, food security and climate change simultaneously.

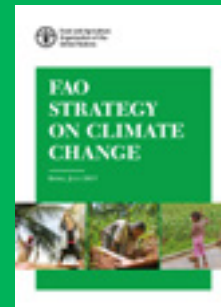
Transformation must happen across food systems and along the entire food chain to tackle all elements and issues. Scaling up already existing innovative and efficient solutions is the basis for this transformation, but, at the same time, our actions must be more ambitious and robust to ensure we do not miss the point of no return to prevent the worst effects of climate change on poverty and hunger.

Uniquely positioned to support countries in transformative action, FAO is fully committed to meet the challenges and forge deeper

engagement with all partners and stakeholders in advancing implementation of the SDGs and making our society more resilient towards climate change.

Climate action is channelled and coordinated under different streams such as Nationally Determined Contributions (NDCs) and National Adaptation Plans (NAPs), which now need to be better linked with National Agriculture Investment Plans (NAIPs) and implementation frameworks for SDGs in order to ensure we address climate change, development challenges and agricultural transformation in a holistic and comprehensive way.

Such integrated approaches and thinking must happen at different levels to guarantee resources and available options are used in the most effective and efficient way. Streamlining actions and creating synergies and innovative solutions to transform our food systems supports both national and international climate and development agendas. ■



FAO STRATEGY ON CLIMATE CHANGE. FAO, 2017

The world has a window of opportunity to stabilize global average temperatures to safe levels. FAO's new climate change strategy refocuses its work to serve global processes targeting mitigation of and adaptation to climate change. Built on decades of accumulated global experience and expertise, the strategy translates FAO's core mandate into strategic choices and action priorities at the global, regional, national and local levels with the central goal of supporting countries in achieving their commitments in the face of climate change.

LATEST PUBLICATIONS



The State of Food Security and Nutrition in the World 2018: Building climate resilience for food security and nutrition

The international community is committed to ending hunger and all forms of malnutrition worldwide by 2030. While much progress has been made, conflict and human-induced and natural disasters are causing setbacks. This year's *The State of Food Security and Nutrition in the World* warns that the long-term declining trend in undernourishment seems to have come to a halt and may have reversed, largely on account of the above-mentioned factors. Meanwhile, though progress continues to be made in reducing child malnutrition, rising overweight and obesity are a concern in most parts of the world.



The State of Agricultural Commodity Markets 2018: Agricultural trade, climate change and food security

This report focuses on the intersection between agricultural trade, climate change and food security, providing an important contribution on how to strengthen the mutually supportive role of trade rules and climate interventions.



Climate-Smart Agriculture Case Studies 2018

This publication is a compilation of the success stories

covering different regions' landscapes where on-the-ground climate-smart agriculture (CSA) work has been implemented in recent years. Climate change affects all agricultural sectors, from mussel production along Chile's coastline to floating gardens in Bangladesh. These successful projects and initiatives enable communities to be better prepared to safeguard their livelihoods and boost household incomes, and identify synergies between adaptation and mitigation.



Impacts of Climate Change on Fisheries and Aquaculture: Synthesis of current knowledge, adaptation and mitigation options

This publication is a synthesis of current knowledge on climate change implications for marine fisheries, inland fisheries and aquaculture. It provides the fundamentals of observed and projected changes in the climate system and their consequences for the marine and freshwater systems. The technical paper recognizes the importance of contextualizing the topic of climate change in fisheries and aquaculture in terms of poverty alleviation and the existing policy commitments such as UN Agenda 2030 and the Paris Climate Agreement, and on our current and expected socio-economic dependencies on the sector.

LATEST PUBLICATIONS



From reference levels to results reporting: REDD+ under the UNFCCC

This publication provides a status report on progress and achievements related to the monitoring, reporting and verification of REDD+ activities, as well as an update on activities related to countries' submissions of their Forest Reference (Emission) Levels. The report also summarizes experiences with the technical assessment process, and offers an overview of initial REDD+ results reporting and technical analyses of those reports.



The State of the World's Forests 2018: Forest pathways to sustainable development

Launched on 6 July, this year's edition provides new information on the interlinkages between

forests and trees and the Sustainable Development Goals, shedding light on their significance for water quality, climate, biodiversity, future energy needs and designing sustainable cities.



Climate-Smart Agriculture training manual

This manual provides agricultural extension

agents with a range of information and strategies to achieve climate-smart outcomes, including sustainable agricultural practices (e.g. zero-tillage, drip irrigation), and how to communicate about climate change.



Impacts of climate change on farming systems and livelihoods in the Near East and North Africa

This report draws out the major trends affecting agriculture in

the NENA region and the general implications for small-scale farmers before delving into an integrated analysis at the farming system level. Using temperature and precipitation data from the RICCAR (2017) report, this study has developed Climate Impacted Farming System (CIFS) maps that demonstrate what the projected temperature and precipitation changes will be for the farming systems of the region by the mid-century (2046–2060) in a moderate and worst-case scenario.



Strengthening National Forest Monitoring Systems for REDD+

This companion to FAO's Voluntary

Guidelines on National Forest Monitoring analyses UNFCCC decisions and IPCC methodological recommendations, focusing on Satellite Land Monitoring Systems, National Forest Inventories, and REDD+ reporting.



From reference levels to results reporting: REDD+ under the UNFCCC – 2018 update

According to this paper, countries have improved transparency in their measurement, reporting and verification of REDD+ activities, including in uncertainty assessment, with some 83 percent of them providing uncertainty estimates around their emission factors.



Roadmap for the establishment of forest reference levels and the national forest monitoring system

The REDD+ implementation process seen through the lens of the Government of Kenya's efforts to establish a national programme.



The charcoal transition: Greening the charcoal value chain to mitigate climate change and improve local livelihoods

This publication sets out the actions that policymakers and other stakeholders can take to develop a climate-smart charcoal sector.



The linkages between migration, agriculture, food security and rural development

This report looks into the drivers that push people from rural areas to migrate. The main goal of this title is to deepen understanding of the relations that exist between agriculture, food security and rural development.



Feeding people, protecting the planet

How to feed the world without degrading land and water resources,

eroding biodiversity and contributing to climate change is among the greatest challenges of our times. FAO works with the Global Environment Facility (GEF) to support Members in addressing the critical nexus between agriculture and the environment. This booklet highlights a few success stories emanating from FAO's work with the GEF over the past two decades and presents an opportunity for Members to further leverage FAO's comparative advantages to create GEF-eligible development projects.



Tackling climate change through livestock: A global assessment of emissions and

mitigation opportunities

Relying on life cycle assessment, statistical analysis and scenario-building, this report provides a comprehensive global assessment of the livestock sector's greenhouse gas emissions and its climate change mitigation potential.

LATEST PUBLICATIONS



Strengthening sector policies for better food security and nutrition results – Climate change

This guide includes background information on how climate change and variability affect agriculture and food security and nutrition, and how the agricultural sectors and dietary patterns contribute to GHG emissions.



Soil organic carbon: The hidden potential

This publication highlights how better information

and food practices may be implemented to support ending hunger, adapting to and mitigating climate change and achieving overall sustainable development.



Catalysing dialogue and cooperation to scale up agroecology: Outcome of the FAO regional seminars on agroecology

seminars on agroecology

With its focus on equity and the rights of women, youth, and indigenous peoples, agroecology is strongly supported by many stakeholders as a holistic approach to transforming food systems, as demonstrated in this publication



Tackling Climate Change through the Empowerment of Rural Women

This booklet introduces the key gender-related challenges, existing data and evidence and international commitments, and highlights extensive related FAO work aimed at achieving sustainable and inclusive agricultural development for food security and nutrition under a changing climate.



Tracking adaptation in agricultural sectors

This paper outlines a framework and proposes

comprehensive indicators

for Tracking Adaptation in Agricultural Sectors (TAAS) at national level, taking into account linkages between different agricultural sectors and local systems.



Transforming food and agriculture: 20 interconnected actions to guide decision-makers

This publication proposes 20 interconnected actions to strengthen food security, generate decent employment, spur rural development, conserve natural resources and respond to climate change, all part of the 2030 Agenda.



Addressing agriculture, forestry and fisheries in national adaptation plans – Supplementary guidelines

An overview of how climate change impacts agricultural sectors, this publication guides governments through agricultural adaptation

planning, including enhanced water conservation measures, improved pest management, and regular monitoring.



Analysis and systematization on Intended Nationally Determined Contributions (INDC) in Latin America and

Caribbean (LAC) countries based on the United Nations Framework Convention on Climate Change

This document reaffirms the relevance of classic adaptation and mitigation activities such as reforestation, but calls for a more complex agenda that takes into account rural poverty and food security and nutrition.



The Koronivia joint work on agriculture and the convention bodies: An overview

This overview provides a better understanding of the roles, responsibilities and past activities of subsidiary and constituted bodies, in order to orient future work, showing

that agriculture is inherent in the work of the United Nations Framework Convention on Climate Change.



Benefits of farm level disaster risk reduction practices in agriculture: Preliminary findings

FAO is

conducting a comprehensive study across regions to assess the benefit from applying disaster risk reduction good practices in agriculture. The study identifies practices that help to reduce the vulnerability of households and communities to natural hazards. The study uses a systematic approach to quantify, on a case-by-case basis, how much damage and loss can be reduced in the agriculture sector through the implementation of DRR good practices at farm level, compared with usual practices.



Voluntary guidelines to support the integration of genetic diversity into national climate

change adaptation planning

These voluntary guidelines address the genetic resource dimension of adaptation planning. They were developed under the aegis of FAO's Intergovernmental Commission on Genetic Resources for Food and Agriculture and approved by the FAO Conference in 2015. They aim to assist countries in managing genetic resources as a vital reservoir and tool to adapt agriculture and build resilience into agricultural and food production systems.



Understanding the drought impact of El Niño on the global agricultural areas – Available

methodologies and their relevance for the sector

During El Niño episodes, the normal patterns of tropical precipitation and atmospheric circulation become disrupted, triggering extreme climate events around the globe and affecting the intensity and frequency of hurricanes. Disasters create poverty traps that increase the prevalence of food insecurity and malnutrition. ■

FAO'S WORK ON CLIMATE CHANGE

United Nations
Climate Change
Conference 2018



The Food and Agriculture Organization of the United Nations (FAO) estimates that 821 million people in the world today are chronically hungry. The 2018 edition of *The State of Food Security and Nutrition in the World* (SOFI) cites the changing climate as a key driver behind this sudden rise in the global number of hungry people in the world.

While no other sector is more vulnerable to extreme and volatile weather events, food and agriculture provide numerous opportunities to adapt to, mitigate and build resilience to climate change. Realizing the commitments that countries made to

transform food systems and promote sustainable agriculture approaches can still deliver a world without hunger and malnutrition by 2030.

This publication presents FAO's key messages on climate change and food security. It includes examples of FAO's support to countries so they are better able to adapt to the impacts of climate change in the agricultural sectors. It also brings together FAO's most up-to-date knowledge on climate change, including the tools and methodologies used to support countries' climate commitments and action plans.