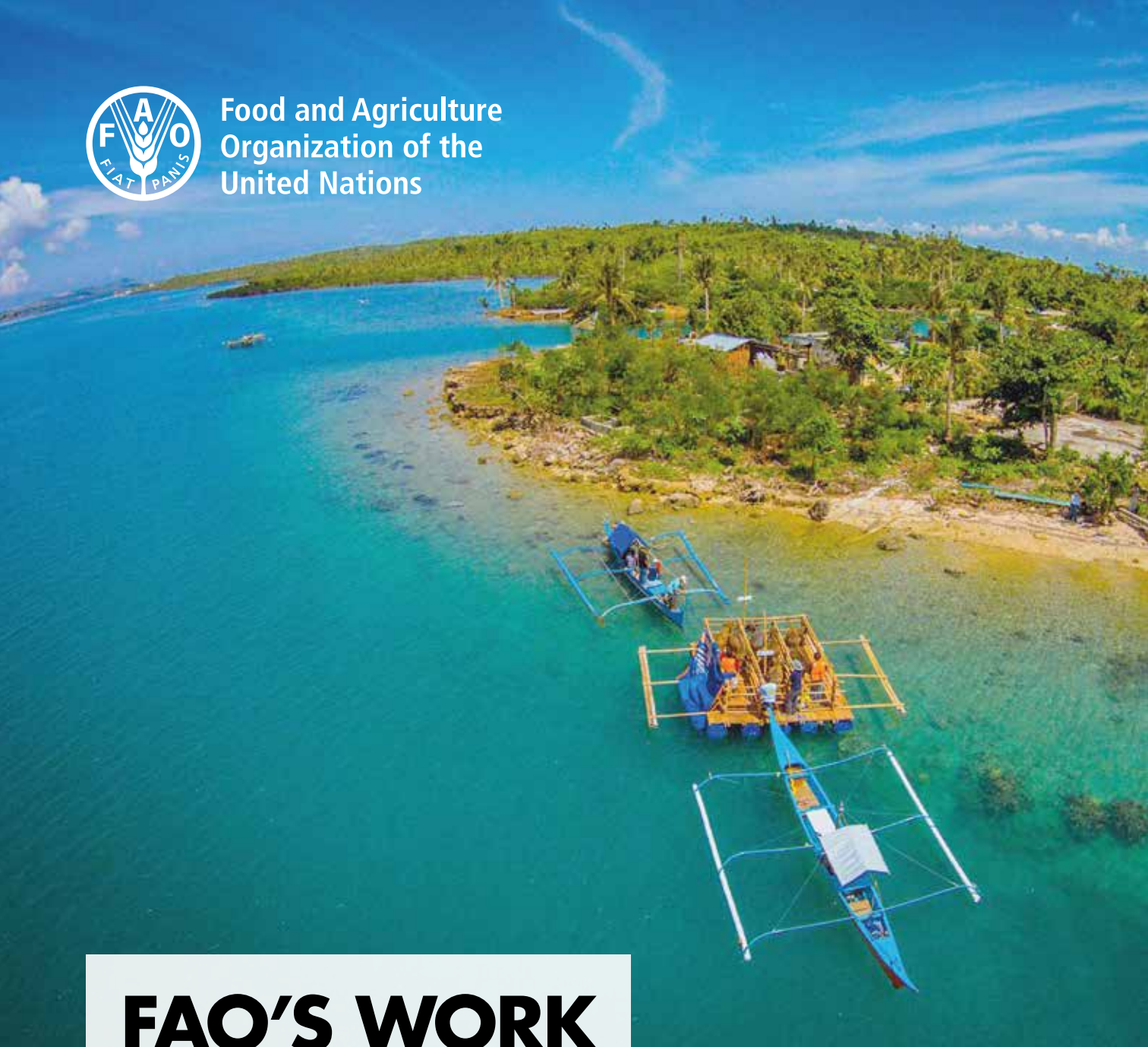




Food and Agriculture
Organization of the
United Nations



FAO'S WORK ON CLIMATE CHANGE

United Nations
Climate Change
Conference 2017

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SENEGAL

Farmers working in a green beans plot in the vast area of Koer Abunday, where several vegetable gardens are farmed to provide to the community and to the local market.

©FAO/Marco Longari





**WE CANNOT
ATTAIN
ZERO HUNGER
WITHOUT
TACKLING
CLIMATE CHANGE.**

A boat passing by homes flooded by Cyclone Aila, which swept through Bangladesh in May 2009, flattening homes, killing livestock and damaging crops.
©FAO/M. Uz Zaman

INTRODUCTION

"WE MUST NOT LOSE SIGHT OF THE URGENCY OF THIS CHALLENGE: PROTECTING FOOD SECURITY FROM THE IMPACTS OF CLIMATE CHANGE, WHILE MAKING AGRICULTURE MORE PRODUCTIVE AND MORE RESILIENT AT THE SAME TIME."

JOSÉ GRAZIANO DA SILVA,
FAO Director-General

Actions to make agriculture sustainable are among the most effective measures to help nations adapt to and mitigate climate change.

The Food and Agriculture Organization of the United Nations (FAO) estimates that 815 million people in the world today are chronically hungry. After declining for over a decade, in 2017 global hunger is on the rise again. According to this year's estimates, the world must, by 2050, produce 49 percent more food than in 2012 as populations grow and diets 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, then progress towards eradicating hunger

and ensuring the sustainability of our natural-resource base to achieve the 2030 Agenda for Sustainable Development will be at risk.

Climate change will bring further extreme weather events, land degradation and desertification, water scarcity, rising sea levels, and shifting climates – all of which will make the rural poor the first victims, hampering efforts to feed the whole planet.

Building on decades of global experience and expertise, FAO is further integrating climate action into every facet of its work to support countries in facing these impacts. More-resilient farmers, foresters, herders and fishers can deliver





transformative change that enhances their livelihoods and shields them from the negative impacts of climate change.

Agriculture and food systems are partly responsible for climate change, but they are also part of the solution.

Appropriate actions in agriculture, forestry and fisheries can mitigate greenhouse gas emissions and promote climate adaptation – with the efforts to reduce emissions and adjust practices to the new reality often enhancing and supporting one another.

FAO's new climate change strategy, released in July 2017, focuses on: enhancing the

institutional and technical capacities of its Members; improving the integration of food security, agriculture, forestry and fisheries into the international climate agenda; and strengthening the delivery of FAO's work.

For millions of people, especially rural family farmers in developing countries, our actions can make the difference between poverty and prosperity, between hunger and food security and nutrition.

We cannot address food security and nutrition without simultaneously addressing climate change, the health of the oceans, land degradation, social inclusion, education, and gender equality,

especially in the vulnerable Small Island Developing States (SIDS).

This is why FAO is driving a global transformation to sustainable agriculture. It is helping farmers and nations set up climate-resilient systems to feed the world, now and in the future. In addition, it is exploring ways to help humanity give back what it has taken – such as restoring degraded land and overexploited natural resources to maintain ecosystems, increase food production and store carbon.

Climate change may be intensifying, but so are FAO's efforts. FAO is stepping up to the climate challenge.

KEY MESSAGES

One of the greatest dangers of climate change is the threat it poses to global food production.

Meeting global food demand in a sustainable way is achievable, but requires adequate institutional systems, policies and practices in the agriculture, crop, livestock, forestry, fisheries and aquaculture sectors. By adopting sustainable agricultural practices that are tailored to the local context, smallholders can achieve considerable productivity and income gains, while simultaneously increasing the resilience of their agricultural activities to extreme and variable weather.

Achieve Zero Hunger by tackling climate change.

Climate change already affects agriculture and food security – without urgent action, millions more people will be at risk of hunger and poverty, especially in Africa and Southeast Asia. According to the office of the United Nations High Commissioner for Refugees, climate disasters displace one person per second, which is why climate-resilient rural development matters. Climate change is disproportionately affecting the world's poorest countries, which bear the brunt of its effects.

Cultivate change – invest in smallholders to transform the rural economy.

Sustainable Development Goal 2 presents a vision for integrated approaches to eradicate hunger and malnutrition under climate change through sustainable agriculture.

Hunger, poverty and climate change can be tackled together through approaches that recognize the critical linkages between rural poverty, sustainable agriculture and strategies that promote resource-use efficiency, conserve

and restore biodiversity and natural resources, and combat the impacts of climate change.

Pursuing climate-resilient development pathways that can simultaneously contribute to reducing greenhouse gas emissions calls for long-term, pro-poor development and investment in agriculture. These are costs that smallholders cannot carry on their own.

Channelling public and private investments into agricultural sectors, including through flows of climate finance, can harness their transformative potential.

Building the resilience of people affected by increased extreme weather events in developing countries by finding better ways to adapt to climate change is crucial.

Addressing food security and inequalities in climate-sensitive areas and sustainable agricultural development are central to building resilient livelihoods, especially for SIDS. We need to move from a reactive response to crises to proactively preventing and anticipating them, supporting people before, during and after



HAITI

Agricultural and material damage in Port Salut after Hurricane Matthew. ©FAO/G. Gondolini

“IF THERE ARE NO POLICIES THAT INTEGRATE AGRICULTURE INTO CLIMATE CHANGE, THERE WILL BE MORE HUNGRY PEOPLE IN THE WORLD.”

MARIA-HELENA SEMEDO,
FAO Deputy Director-General
for Climate and Natural Resources

shocks. People with resilient livelihoods are better able to prevent and reduce the impact of climate change and the risk of disasters on their lives.

Agriculture – where the fight against hunger and climate change come together – can unlock solutions.

The agriculture sector – including forestry and fisheries – is part of the problem but can also be part of the solution to climate change.

No other sector is more sensitive to climate change than agriculture, yet no other sector holds as much potential to reduce greenhouse

gas emissions in our lifetime. This includes reduction in deforestation and degradation driven by agriculture by using smarter and more productive, integrated farming systems.

Shifting to sustainable management and use of natural resources must be central to any global strategy on combating and adapting to climate change.

Best practices and technologies in livestock feeding and manure management – as well as greater use of underused technologies such as biogas generators and energy-saving devices – could help the global livestock sector cut its outputs of global warming gases by up to 30 percent.

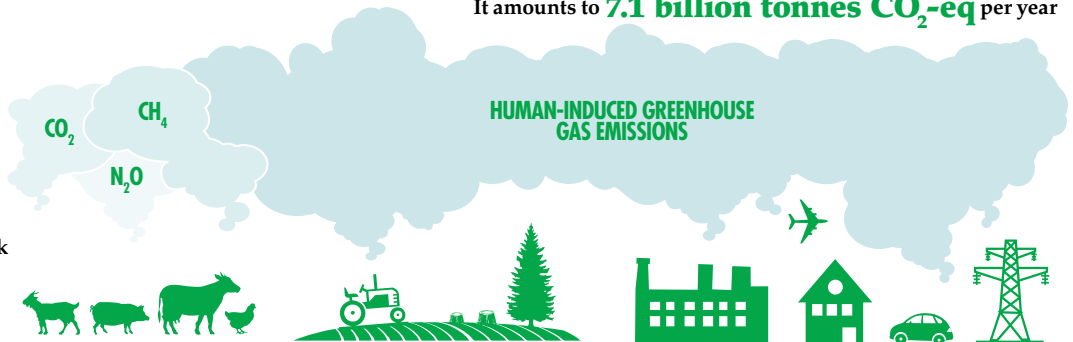
FACTS AND FIGURES

- ➔ World hunger is on the rise: the estimated number of undernourished people increased from **777 million in 2015 to 815 million in 2016**. Much of the increase in food insecurity can be traced to an increase in conflicts, often exacerbated by climate-related shocks.
- ➔ FAO estimates that the world must, by 2050, produce **49 percent more food than in 2012** as populations grow and diets change. Climate change compromises this objective.
- ➔ Between 2005 and 2015, **26 percent of the total damage** and loss caused by climate-related disasters in developing countries was in agriculture.
- ➔ During that time, **30 percent of the agricultural losses caused by disasters** were down to drought, costing over USD 29 billion.
- ➔ In developing countries, **up to 83 percent of the overall economic impact of drought**, which climate change is expected to intensify, falls on agriculture.
- ➔ The Intergovernmental Panel on Climate Change (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 million tonnes per year** and help maintain productivity in drier conditions.
- ➔ The degradation of the world's soils has released about **78 billion tonnes of carbon** into the atmosphere. However, the rehabilitation of agricultural and degraded soils can **remove up to 51 billion tonnes of carbon** from the atmosphere.
- ➔ Climate change is expected to place **additional burdens on already water-stressed systems**. This will intensify competition for water among other sectors.
- ➔ **Livestock keepers are among the most vulnerable to climate change**, which affects animals both directly, through extreme events such as droughts or heat waves, and indirectly, through reduced feed and forage yields and increased risks to animal health.
- ➔ Livestock supply chains account for **14.5 percent of global anthropogenic greenhouse gas (GHG) emissions**. Cattle (beef, dairy) 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 temperatures may reduce potential **catches of many fish in the tropics by 40–60 percent**, and in high latitudes by **30–70 percent**.
- ➔ While emissions from deforestation have fallen, deforestation and forest degradation still account for an **estimated 10–11 percent of global GHG emissions**.
- ➔ The world's forests store an estimated **296 billion tonnes of carbon** in both above- and below-ground biomass.
- ➔ Currently, **one-third of all food produced is lost or wasted**. This costs up to **USD 2.6 trillion per year**, including USD 700 billion of environmental costs and USD 900 billion of social costs.
- ➔ Global food loss and waste generate about **8 percent of total annual GHG emissions**.

LIVESTOCK'S CONTRIBUTION TO GHG EMISSIONS

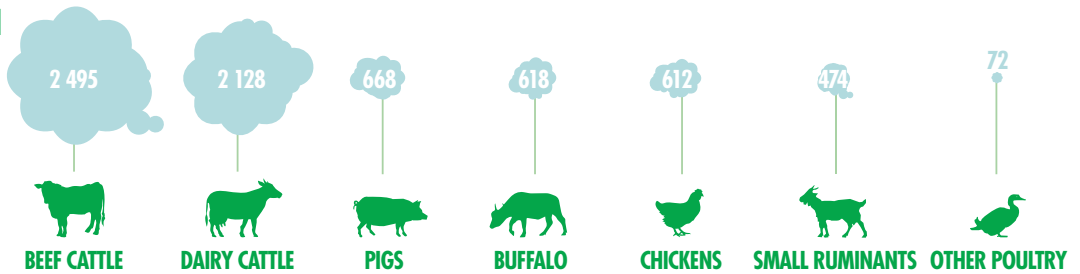
It amounts to **7.1 billion tonnes CO₂-eq** per year

14.5% of all anthropogenic GHG emissions come from livestock supply chains

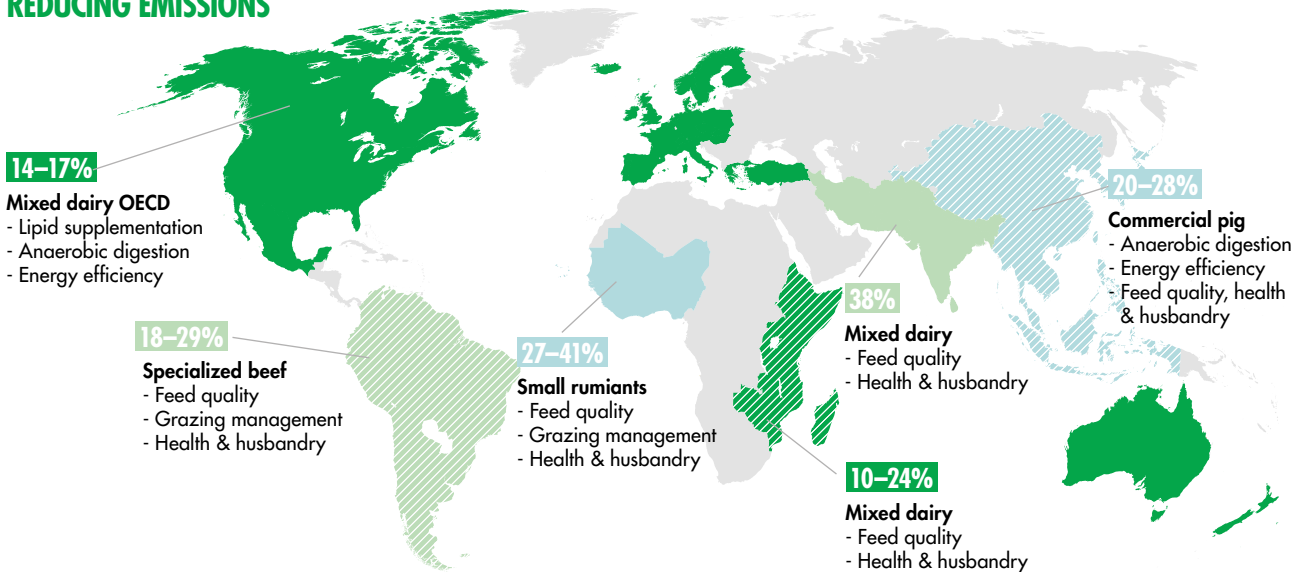


GLOBAL EMISSION INTENSITIES BY COMMODITY

Million tonnes CO₂-eq



EFFICIENT PRACTICES KEY TO REDUCING EMISSIONS



Greenhouse gas emissions in the livestock sector can be reduced by **14–41%** through adoption of feasible improvements in: feed quality, animal health and husbandry, manure management, energy-use efficiency.

SUPPORTING COUNTRIES TO ADAPT TO AND MITIGATE CLIMATE CHANGE

Agriculture is highly vulnerable to climate change

Agriculture – including crops, livestock, fisheries and forestry – absorbs about 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 increase such events, agriculture must be integrated into adaptation efforts and financing to feed growing populations, protect livelihoods and maintain ecosystems.

FAO's collaborative work to address climate risks includes:

- ➔ Working with countries to develop policies and enabling environments that support agricultural and food producers 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 and forestry, as well as for 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 and reduce emissions from deforestation and forest degradation (REDD+), as well as to enhance carbon sequestration 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 land and water management, soil conservation, and resilient crops, trees and 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.



ETHIOPIA

FAO supports various irrigation projects in the region – construction and providing improved maize and vegetable seeds for the agro-pastoralists. ©FAO/T. Legesse

Understanding how a changing climate affects the agricultural sectors is key to adaptation and mitigation

National climate planning can only work when it is possible to forecast climate-linked changes in agriculture, acknowledge vulnerabilities, and understand communities' ability to adapt. To make this possible, FAO provides methods and tools for assessing climate impacts, monitoring natural resources, and tracking GHG emissions. Such 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.

Leaving no one behind in the climate change agenda

The poor and most marginalized people are disproportionately affected by hazards and crises, often due to climate change. FAO works to build inclusive rural economies and foster sustainable agricultural practices, and to improve poor people's productivity and livelihoods while increasing their resilience and adaptability to climate change.

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

DATA, METHODS AND TOOLS

Emergency support to
crop and livestock
production and
strengthening the
Whole of Syria Food
Security and
Agriculture sector
coordination.
©FAO/L. Beshara

➔ **For inventories and measurement of emissions**

Taking stock of GHG emissions from the agricultural sectors allows countries to monitor progress against their 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 its 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/en/

FAOSTAT. FAOSTAT includes a global inventory of GHG emissions from all agricultural activities, including crop production, livestock, and forestry and land-use changes. www.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. In addition, FAO assists countries to strengthen their national forest

monitoring systems. Such data provide a basis for identifying climate vulnerability and assessing progress in adaptation and mitigation. www.fao.org/forest-resources-assessment/en/

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/in-action/enteric-methane/en/

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

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/en/

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 identifying 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 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 the Global Information and Early Warning System on Food and Agriculture (GIEWS).
www.fao.org/giews/en/

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 Peru and the Philippines, and is now ongoing in Indonesia and Paraguay. Funded by the Ministry of Agriculture, Forestry and Fisheries of Japan, its main objective is to connect climate change impact assessment, food-insecurity vulnerability

analysis and livelihood adaptation approaches.

www.fao.org/climatechange/amicaf/en

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/en/ ▶

DATA, METHODS AND TOOLS

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

Livestock breeds raised in certain environments acquire 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/en/

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/en

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: (i) National and local assessment of land degradation and existing land management practices (including impact of climate change); (ii) selection of sustainable land management practices that are well adapted to the local context; and (iii) assessment, documentation and sharing.

www.fao.org/nr/lada/ and www.wocat.net/

Land Resources Planning

Toolbox. This 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/en/



ITALY

Special Event - WaPOR: a tool to monitor water productivity, organized by FAO Land and Water Division, within the framework of the Global Framework on Water Scarcity Partners Meeting, FAO headquarters. ©FAO/G. Carotenuto

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



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/data/en/

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 for addressing water scarcity and adapting to changing weather patterns. www.fao.org/in-action/remote-sensing-for-water-productivity/wapor/en/#/home

World Agricultures Watch. This is technical observatory that 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, thereby enabling adequate targeting of investments to adapt to climate change, increase resilience and reduce poverty. www.fao.org/land-water/overview/waw/en/

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

Nuclear and isotopic techniques are important tools for measuring the impact of climate change, so that agriculture can better adapt, and be more resilient, to climate change by 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 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/

FAO ACTION AREAS

**WITHOUT
URGENT ACTION,
CLIMATE CHANGE
WILL JEOPARDIZE
PROGRESS
TOWARDS THE
KEY SUSTAINABLE
DEVELOPMENT
GOALS OF
ENDING HUNGER
AND POVERTY
BY 2030.**



ETHIOPIA

FAO's water and income diversification projects have become instrumental in tackling the negative impacts of El Niño induced drought for pastoral and agro-pastoral communities in the Afar Region of northeast Ethiopia.
©FAO/T. Legesse



FAO ACTION AREAS



In response to increasing demands, FAO's climate change portfolio has expanded. From 2009 to 2017, more than 300 projects and programmes have addressed climate change adaptation and mitigation in the agricultural sectors. Through its extensive network of professionals, FAO supports countries in a wide range of climate-related issues, from policy design to improved practices and capacity development.

PRODUCING MORE FOOD WITH LESS WATER

Water scarcity

Water scarcity and water-related issues are among the leading challenges to long-term food security, ending hunger and reducing poverty. This is reflected in country pledges under the Paris Agreement, where 88 percent mention water in the adaptation section.

Water scarcity affects more than 40 percent of the planet's population; climate change will only further reduce water availability and exacerbate the pressures in water-stressed river basins. Agriculture is a major

ADAPTING SMALL-SCALE IRRIGATION TO CLIMATE CHANGE IN CENTRAL AND WESTERN AFRICA

Central and Western Africa is one of the regions most affected by the impacts of climate change. FAO is

implementing a project there to provide tools to assist stakeholders involved in water management, from policy-makers to small-scale farmers, to design adaptation strategies in small-scale irrigation systems that respond to the specific needs of poor farmers.

This project is conducting participatory assessments on the climate change impacts, vulnerability and adaptive capacity of different rural communities in Côte d'Ivoire, the Gambia, Mali and Niger.

"In the past, the harvest could sustain households for 12 months if the

rainy season was good, but now, with the impact of climate change, fewer people manage to consume their produce beyond six months," said Manka Trawally, a farmer from Salikeni, the Gambia.

Farmers know it is time to "rethink" agriculture to cope with the impacts of climate change: adopting short-cycle rice varieties; diversifying crops; adjusting the crop calendar to take into account the impact of climate change on seasons; adapting irrigation systems to the new climate variability; or creating sustainable infrastructure able to cope with climate change.



SOMALIA

A man fills water containers for livestock, near the village of Bandar Beyla. ©FAO/K. Prinsloo

MAPPING WATER SOURCES IN DROUGHT-PRONE SOMALIA

Somali pastoralists and communities are struggling to find water as dry spells become more common in a changing climate, but new systems from FAO's Somali Water and Land Information Management (SWALIM) are helping direct them to water sources or evacuate early when disaster looms.

Most groundwater sources in the country have salinity levels above the required standard for drinking.

SWALIM worked with the national water authorities and the UN Water, Sanitation and Hygiene Cluster to develop systems for monitoring water sources, which culminated in the Water Sources Live Map.

People can use their mobile phones, increasingly in use even in remote areas, to access the map to find out where water is in dry periods.

A second system, known as Digniin – Somali for “warning” – notifies people when extreme weather is coming, allowing them to relocate if needed. Extreme weather can mean droughts but also floods.

If there is a risk of floods or water scarcity, the system sends an SMS to elders / key persons within vulnerable communities for early action to save lives.

“The SMS service helps me prepare for any disaster that is looming,” said Omar Mohamud Ali, a 33-year-old businessman with five children from Beletweyne, South Central Somalia. “In May, I received an SMS informing me about the possibility of the River Shabelle bursting its banks. I decided to relocate my family and business to Halgan village (a highland village), which saved me from floods that occurred days later.”

victim of water scarcity. Climate change will affect both rainfed and irrigated agriculture through increased crop evapotranspiration, changes in the amount of rainfall, and variations in river runoff and groundwater recharge. Irrigated agriculture provides 40 percent of food production, and up to 84 percent of the economic impact of drought falls on the sector. Even so, agriculture must produce more food with less water.

As agriculture also causes water scarcity, accounting for 70 percent

of freshwater withdrawals, actions to produce more with less water have wider benefits. Reshaping agriculture can help meet the Paris and 2030 Agenda climate goals and the Sustainable Development Goals, in particular SDG 2 (zero hunger), SDG 6 (access to clean water and sanitation), and SDG 12 (sustainable consumption).

The Global Framework on Water Scarcity in Agriculture (WASAG), launched in 2016 by FAO at the UN Climate Change Conference in Morocco, brings together key

FAO ACTION AREAS

- ▶ players from across the globe to design and implement strategies that address water scarcity, agricultural production, food security and climate change in an integrated manner. The first meeting of the partners, held at FAO headquarters in April 2017, set out a new vision and priority actions on water scarcity.

Drought

While we cannot prevent droughts, which have hit hundreds of millions of people in the last 40 years and will only worsen with climate change, we can stop them becoming famines, reversing gains in food security and poverty, and heightening social tensions and conflict.

FAO and others are responding by accelerating efforts to move away from a crisis-led response to a proactive integrated approach that builds the resilience of communities and nations in drought-prone regions.

Supporting this shift is at the heart of FAO's Strategic Objective on increasing the resilience of livelihoods to threats and crises, as well as the work of the UN Convention to Combat Desertification (UNCCD), the Sendai Framework for Disaster Risk Reduction, large parts of the 2030 Agenda, and the adaptation components of the Paris Agreement.

FAO – with the World Meteorological Organization (WMO), the UNCCD, and other partners – works with countries to implement proactive approaches through well-coordinated national drought policies and the implementation of action plans. This involves building national capacities to carry out assessments and implement preparedness plans, and upscaling climate-smart agricultural practices in drought-prone landscapes.

FAO also works with countries to help ensure an enabling environment for farmers to adopt better-adapted crops, trees, livestock and fish. This and good agricultural practices enhance the adaptation of production systems to drought, water scarcity and other climate-related shocks.

ADDRESSING HUNGER AND CLIMATE THROUGH INTEGRATED PRODUCTION SYSTEMS

In line with FAO's vision for sustainable food and agriculture, FAO promotes climate-smart agriculture (CSA) to increase productivity, build the resilience of food systems, and reduce GHG emissions whenever possible. One approach is through promoting more integrated systems of agricultural production such as agroforestry. Agroforestry uses traditional and modern land-use systems where trees are managed together with crops

AGROFORESTRY SYSTEM SHOWS ZERO HUNGER, CLIMATE ACTION PROGRESS

The Quesungual agroforestry system in Honduras, introduced as an alternative to slash-and-burn practices, supports the sustainable management of vegetation, soil and water resources on drought-prone hillsides.

The Quesungual system meets farmers' needs for fruit, timber, fuelwood and grains, and generates cash income when produce is sold.

By using this practice, yields have doubled and soil organic matter content increased from 2 percent to 3.3 percent – equivalent to an increase from 15 tonnes to 25 tonnes of carbon per hectare in the first 10 cm of the soil, bringing climate mitigation benefits. These carbon gains could offset the yearly emissions of the aviation industry if adopted in an area as large as Ecuador, according to a 2017 FAO research.

The project has also improved resistance towards erosion and landslides, enhancing the resilience of rural communities to extreme weather events such as droughts and intense rainfall.

HONDURAS

Cattle grazing in Lempira Department, where the Quesungual agroforestry system is implemented.
©FAO/O. Sierra



and/or animal production systems in agricultural settings. They are dynamic, ecologically based, natural-resource management systems that diversify and sustain production to increase social, economic and environmental benefits.

Agroforestry projects supported by FAO are ongoing in Guatemala and Honduras – both in the Dry Corridor of Central America, where a 2016 drought saw up to 90 percent loss of crop harvests and 1.6 million people facing food insecurity – and in Comoros, Nauru and Seychelles.

SUSTAINABLE FOREST AND LAND MANAGEMENT FOR CLIMATE CHANGE ADAPTATION AND MITIGATION

Reducing emissions from deforestation and forest degradation – REDD+

FAO supports countries in their REDD+ processes and in turning their related political commitments into action on the ground. The countries supported are now advancing from REDD+ readiness (including development of their national

forest monitoring systems, forest reference [emission] levels, safeguards and safeguards information system, and national REDD+ strategies/action plans) to REDD+ implementation. As such, FAO is scaling up its support on implementation of REDD+ and ability to access potential financing sources for results-based payments. FAO's support is also directed towards improving the enabling environment for REDD+, including governance, policy and legal frameworks, and tenure. ►

FAO ACTION AREAS

- ▶ There is strong stakeholder involvement in the nationally led REDD+ processes supported by FAO, involving civil society, indigenous peoples and other forest-dependent communities, and the private sector.

FAO has developed initiatives and tools used by countries on REDD+ monitoring, reporting and verification, such as the Global Forest Observations Initiative, System for Earth Observation Data Access, Processing and Analysis for Land Monitoring, and Open Foris.

On the ground, at the regional level and at a global scale, FAO is collaborating with a range of partners and programmes to combine technical capacities and strengths on REDD+. Since the start in 2008 of the United Nations Collaborative Programme on Reducing Emissions from Deforestation and Forest Degradation in Developing Countries (the UN-REDD Programme), FAO

has together with the United Nations Development Programme and UN Environment jointly supported nationally led REDD+ initiatives among the 64 partner countries across Africa, Asia and Pacific, and Latin America and the Caribbean.

Through its flexible response, the programme has been able to adjust its support to emerging country needs, and to global REDD+ developments and landmarks such as the Warsaw Framework for REDD+, the 2030 Agenda and the Paris Agreement. For more information on the UN-REDD Programme, see the website (www.unredd.org) and workspace (www.unredd.net).

Addressing deforestation in Central Africa

Central Africa is home to the second-largest tropical rainforest area in the world, at more than 240 million hectares. Despite a decline in the annual rate of natural forest loss in Africa, the region still records the highest forest losses on the planet. The 2015 Global Forest Resources Assessment revealed an annual loss of about 3.1 million hectares of natural forests in Africa between 2010 and 2015.

The Central African Forest Initiative (CAFI) aims to address the challenges in addressing poverty, food security and climate change that put pressure on tropical forests. CAFI is a collaboration between FAO, the United Nations



RWANDA

Through a joint FAO/VI Agroforest project in Rwanda in the Akagera basin, farmers learn how to protect their land and the water resources.
©FAO/M. Longari

Development Programme, the World Bank, six countries of Central Africa (Cameroon, the Central African Republic, the Congo, the Democratic Republic of the Congo, Equatorial Guinea, and Gabon), and a coalition of donors from France, Germany, Norway and the United Kingdom of Great Britain and Northern Ireland.

The participating Central African countries will develop investment frameworks to support the sustainable use and conservation of their forest resources, notably through the implementation of REDD+ activities. Through CAFI, FAO is supporting REDD+ processes

FACTS FROM FORESTS

Carbon emissions from forests dropped 25 percent between 2001 and 2015, largely due to better management and a slowdown in deforestation, but deforestation and forest degradation still account for an estimated 10–11 percent of global GHG emissions.



RESTORED AND SUSTAINABLE PRODUCTIVE LANDSCAPES IN RWANDA

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. To meet this ambitious challenge, FAO facilitates the efforts of 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.

in the Democratic Republic of the Congo and in Equatorial Guinea. These frameworks will play a vital role in climate change mitigation and poverty alleviation in the region.

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. 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 significantly increased in recent years. This is supported by global and regional processes such as the Agadir Commitment for the Mediterranean region (2017), Bonn Challenge, New York Declaration on Forests, Aichi Biodiversity Targets, the SDGs and the Paris Agreement.

FAO's Forest and Landscape Restoration Mechanism has shown results in three continents. In Africa, FAO and partners organized an 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.

FAO has also begun working with countries to produce a Global Soil Organic Carbon Map, which can be used to set targets for land restoration. This will be launched on World Soil Day in December 2017.

FAO ACTION AREAS

► **MAKING FISHERIES AND AQUACULTURE RESILIENT TO A CHANGING CLIMATE**

Oceans and freshwater aquatic systems are critical to global food security and the regulation of the world's climate. 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.

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, practical demonstration and capacity building. 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. 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.



MAKING LIVESTOCK PRODUCTION GREENER AND MORE EFFICIENT

Growing populations, higher incomes and urbanization are translating into increased demand for meat, milk and eggs, particularly in developing countries. These products 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 sector for their livelihoods.

While the sector provides high-value food and other economic and social functions, it is the world's largest

CLIMATE ACTION IN AGRICULTURE IS PART OF THE SOLUTION: IT OFFERS AN OPPORTUNITY TO TACKLE CLIMATE CHANGE WHILE FIGHTING POVERTY, HUNGER AND MALNUTRITION.

JOSÉ GRAZIANO DA SILVA,
FAO Director-General



ENTERIC METHANE RESEARCH SHOWS HUGE EMISSION SAVINGS, LIVELIHOOD GAINS

In 2017, research from the enteric methane project has shown potential for huge reductions in emission intensity through herd and health management, nutrition and feeding management strategies, genetics, and other strategies.

Uruguay: Reduction of up to 42 percent alongside an 80 percent increase in beef production.

Ethiopia: Reduction 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.

user of agricultural land, through grazing and the use of feed crops. It plays a major role in climate change, management of land and water, and biodiversity. Currently, livestock contributes to almost two-thirds of agricultural GHG emissions and 78 percent of agricultural methane emissions.

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 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.

FAO ACTION AREAS

THE LAO PEOPLE'S DEMOCRATIC REPUBLIC BACKS FAO WORK ON INTEGRATED PEST MANAGEMENT

The project, Pesticide Risk Reduction in South-East Asia, has supported governments to address pesticide misuse and overuse since 2007. In 2017, the Lao Minister of Agriculture and Forestry lauded this initiative, which has trained thousands of farmers in sustainable farming practices and strengthened pesticide regulation.

Such practices will be important for climate change adaptation across the globe, as warmer climates are expected to bring more pests.

The project has supported integrated pest management (IPM) and good agricultural practices through season-long farmer field schools.

In the last 20 years, 31 658 farmers in 842 villages have benefitted from field schools conducted by the project. Graduate farmers typically reduce pesticide inputs, obtain higher yields and make better profits compared with conventional farmers – all of which will help them adapt to climate change.

► KEEPING PLANTS HEALTHY IN A CHANGING CLIMATE

FAO provides policy and technical guidance on good management practices to increase productivity in crop production, building on ecosystem services and agricultural biodiversity. This includes approaches such as conservation agriculture, integrated pest management and agroecology – all of which have a positive impact on adaptation and mitigation to climate change.

Integrated pest management is an ecosystem approach to crop production and protection that combines different management strategies and practices to grow healthy crops and minimize the use of pesticides – a strategy that will be useful as warmer weather bring more pests.

Integrated pest management is developed through farmer field school (FFS) projects on integrated soil management, value chains, pastoralism, resilience to climate change, and moving towards a global approach of agroecology. Today, the schools are running in more than 90 countries and have assisted in improving the skills of more than 4 million farmers, pastoralists and fishers worldwide.

Agroecology applies ecological concepts and principles to farming systems and builds on the local and traditional knowledge of farmers



to create solutions based on their needs. FAO is currently developing six FFS projects on resilience to climate change, with agroecological approaches, in Africa. For example, the Burkina Faso project aims at enhancing the knowledge of 26 000 people through community-based learning and contributes to the sustainable management of 15 000 hectares of land. A new global agroecology initiative will be launched in 2018.

IMPROVED POLICY AND INVESTMENT PLANNING FOR CLIMATE CHANGE ADAPTATION

In most sub-Saharan African and South-East Asian countries, the agricultural sectors represent the highest share of gross domestic product. They are also



KENYA

A man feeding some of his surviving cattle, which he managed to save from a decimating drought thanks to a collaborative intervention programme led by FAO that provided fortified feed to mitigate drought at his home village. ©FAO/T. Karumba

PUTTING AGRICULTURE AT THE HEART OF ADAPTATION IN KENYA

Agriculture is fundamental to Kenya's economy and livelihoods. The sector employs more than 40 percent of the total population, rising to more than 70 percent in rural areas. It directly contributes 26 percent of gross domestic product (GDP), and another 27 percent of GDP indirectly through links with other sectors.

Climate change threatens all this, which is why it is crucial to ensure agriculture remains the beating heart of the country's economy by placing it front and centre in climate adaptation plans. The Integrating Agriculture in National Adaptation Plans programme is doing just that.

The programme supported county-level consultations on Kenya's Climate Smart Agriculture Framework Programme, which seeks to mainstream climate change considerations into national development planning and budgeting.

The programme also supported the addressing of key agriculture issues within the National Adaptation Plan 2015–2030 (NAP), one of the first NAPs to be developed in Africa. Given the urgent need for climate change adaptation in Kenya, this progress is as an example for other countries as they map out their adaptation paths.

the main source of livelihood for the poorest. However, these sectors are hugely exposed to the threats of climate change. National policies that encompass social, economic, agricultural and environmental policies, and include disaster risk reduction strategies, help to increase the resilience of people and their food security.

The FAO Economics and Policy Innovations for Climate-Smart Agriculture programme works with ministries to align national policies on food security, agriculture and climate change. Active in Malawi, Viet Nam and Zambia, the programme has expanded the application of the CSA approach to agricultural policy in other countries, including Kyrgyzstan, Mozambique and Tajikistan.

FAO has also worked with Bangladesh to develop an investment planning tool to address environmental degradation and climate change. The Country Investment Plan (CIP) on Environment, Forestry and Climate Change – approved by the National Environmental Council in August 2017 – identifies 43 priority investment areas needing an overall investment of USD 11 billion in the period 2016–2021.

In addition, Integrating Agriculture into National Adaptation Plans (NAP-Ag), a partnership with the United Nations Development Programme, supports 11 countries across Africa, Asia and Latin America to identify and integrate climate adaptation measures, disaster risk reduction, and gender mainstreaming into relevant national planning and budgeting processes.

FAO ACTION AREAS

▶ 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 latter means that energy used in agrifood chains represents 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, almost one out of five people (1.4 billion) around the world do not have access to modern electricity services, and about three billion people rely on traditional biomass for cooking and heating, with adverse effects on health, the environment and economic development.

The challenge is to disconnect the development of agrifood chains from the use of fossil fuels without compromising food security.

FAO's Energy-Smart Food Programme aims to ensure an 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.



INDIA

Two young girls washing themselves at the top of a rice plantation.
©FAO/G. Bizzarri

SOLAR-POWERED IRRIGATION IN INDIA SHOWING CLIMATE ACTION PROMISE

One solar cooperative in Dhundi, in the state of Gujarat in Western India, saw nine farmers switch their pumps to solar energy in 2015. An estimated 1.23 million tonnes of carbon dioxide (CO₂) have been avoided due to the project, with many other farmers now following suit.

Outside Jaipur, Rajasthan, Khema Ram transformed his farm in 2012, placing solar energy at the heart of a holistic soil, water and nutrient management approach. The solar system allowed him to shift from flood irrigation to

sprinkler and drip irrigation, and to install polyhouses that are kept cool using solar energy.

The farm has increased from 4 000 m² to 30 000 m², including the rehabilitation of barren land. In addition to the family members who work there, Ram now employs 40 people to keep the farm running, bringing jobs to the local area.

The shift to near-organic production means higher quality produce and more income.

Nevertheless, unless adequately managed, solar-powered irrigation bears the risk of fostering unsustainable water use as low energy costs have led to overabstraction of groundwater and low efficiency. These knock-on effects should always be considered when scaling up solar-powered irrigation.



SAVING FOOD AND AVOIDING WASTE TO BOOST FOOD SECURITY AND CUT EMISSIONS

Food loss and waste accounts for about 8 percent of global GHG emissions, as well as being a misuse of resources, including water, land, energy, labour and capital. Food losses also undermine adaptation and resilience measures through reduced food availability and income.

FAO has developed tools and methodologies for identifying losses, their causes and potential solutions along the entire food value chain – from production, storage and processing to distribution and consumption.

In 2011, FAO launched Save Food, a global initiative on food loss and waste reduction. The initiative includes a network of more than 900 partners from international organizations, the private sector, civil society and others with the objective of promoting awareness and the exchange of ideas and best practices on preventing food waste and loss.

FAO also produces data and information so that decision-makers can better understand where and how food losses and waste occur, and the Organization is working with partners to measure the impact of food loss and waste reductions on food security and nutrition.

MAINTAINING 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 in soils. When soil organic carbon is decomposed, it is released from soils as GHGs. Maintaining and wherever possible increasing the soil organic carbon stocks is thus a measure to mitigate climate change. Moreover, its sustainable management contributes to adapting 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. ▶

TACKLING POST-HARVEST FRUIT AND VEGETABLE LOSSES

The agriculture sector is critical for Afghanistan, Bangladesh, Bhutan, India, Maldives, Nepal, Pakistan, Sri Lanka and Timor-Leste, particularly in improving food security and nutrition.

Foods that are rich in micronutrients, such as fruits and vegetables, are particularly important. However, post-harvest losses in these sectors are high, largely as a result of improper handling, transportation and packaging, poor storage and generally weak infrastructure.

Limited awareness and knowledge among stakeholders also contribute to losses. In these Asian countries, FAO piloted good post-harvest management practices to improve quality, assure safety and reduce losses in traditional fruit and vegetable supply chains.

Core capacities were created among experts, trainers and value-chain stakeholders in good post-harvest management practices and improved technologies.

Market surveys were conducted in priority supply chains to identify major bottlenecks that contribute to losses. In all, more than 200 stakeholders and 50 trainers from Afghanistan, Bangladesh, Bhutan, Maldives, Nepal, Sri Lanka and Timor-Leste were trained in good post-harvest management practices.

FAO ACTION AREAS

► **FAO and the Global Soil Partnership**

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 for example, producing a Global Soil Organic Carbon Map (GSOCmap) following a bottom-up approach. Countries were empowered to collect the largest amount of available soil organic carbon data and produce their own maps. Regional training events and intensive technical follow-up support have been part of this initiative. The GSOCmap will be launched on World Soil Day on 5 December 2017. The GSOCmap is not only a map, but an interactive process as part of the Global Soil Information System to increase the data and information available on soil organic carbon for monitoring purposes and to also support country reporting to the United Nations Framework Convention on Climate Change.

FAO and the Global Soil Partnership are also supporting countries in the implementation of the Voluntary Guidelines for Sustainable Soil Management to increase the resilience of soils and natural-resource systems to the effects of climate change, while simultaneously regulating GHG emissions from soils. The International Network of Black

Soils is also an initiative of FAO and the Global Soil Partnership launched in 2017 to foster technical cooperation between countries with black soils to monitor, protect and sustainably manage this very rich source of soil organic carbon.

SOIL ORGANIC CARBON MANAGEMENT AT THE REGIONAL LEVEL

The Global Symposium on Soil Organic Carbon was the first major activity to link sustainable soil management to climate change mitigation, so connecting FAO, the Intergovernmental Panel on Climate Change and the United Nations Framework Convention on Climate Change. As a direct result, a working group on soil organic carbon management within the umbrella of the Global Soil Partnership was established. The goal is to produce a regional technical manual that provides recommendations and highlights success stories that take into account the local environmental, socio-economic, cultural and institutional contexts, and potential barriers to adoption. More than 150 land users as well as representatives from research institutions, governmental and non-governmental organizations from across the world have joined this initiative.

RESILIENCE TO CLIMATE-CHANGE-INDUCED DISASTER RISK AND CRISES

As the magnitude, frequency and severity of disasters and crises increase, poor households, communities and governments are increasingly challenged to adapt, cope and recover from extreme events. It is becoming increasingly difficult to ensure that development gains are not wiped out by disasters and crises.

FAO's resilience work addresses three main groups of shocks and crises, which often overlay and are influenced by climate change: (i) disasters from natural hazards, including extreme climate events; (ii) food chain crises of transboundary pest or diseases or technological threats; and (iii) protracted crises, including violent conflicts.

FAO promotes the resilience of farmers, herders, fisher folk and forest dependent communities to disasters and crises through a multihazard, cross-sectoral approach along four thematic areas that correspond closely with the Sendai Framework for Disaster Risk Reduction priorities: (i) monitor crisis and disaster risks with early warning; (ii) reduce community vulnerability to crises and disaster risk; (iii) govern crisis and disaster risk; and (iv) prepare for and respond to crises and disasters.



LAO PEOPLE'S DEMOCRATIC REPUBLIC

A farmer carrying bundles
of cut paddy. ©FAO/R. Grossman

FAO STUDY ON BENEFITS OF FARM-LEVEL DISASTER RISK REDUCTION PRACTICES IN AGRICULTURE

FAO works with governments and farmers to deliver local disaster-risk-reduction good practices in agriculture in areas prone to natural hazards and climate change. In order to better understand their benefits, FAO is developing a corporate methodology to measure the scale of damage and losses avoided through the implementation of the good practices.

This information will provide policy-makers with the evidence to make informed decisions and to direct investment towards the most successful practices that can be scaled up to improve the livelihoods of communities.

In May 2017, FAO published the preliminary results from a pilot study that assessed the benefits of 25 disaster-risk-reduction good practices implemented at the farm level in 5 countries across Africa, Asia, and South America. The report is available at:
www.fao.org/3/a-i7319e.pdf

Disaster risk reduction and preparedness perspectives are linked with long-term planning and capacity development for adaptation. People are at the centre, paying particular attention to gender equity, the right to food and nutrition, dignity, health, education, tenure of land and natural resources, legal protection and decent employment.

Two years after the Paris Agreement, FAO is translating the 2015 agenda into concrete local action. Core activities of FAO resilience programmes at local level include assisting countries in transitioning from reactive disaster management to proactive disaster risk reduction, and linking that process to climate change adaptation.

FAO's resilience programme supports countries in addressing underlying factors of vulnerability, particularly of the poor, while improving capacities to timely

deliver emergency response and recovery; also improving agroclimatic information and early warning systems that catalyse early actions. It also focuses on introducing and upscaling disaster-resilient and climate-smart agriculture (CSA) and natural-resources management practices that reduce risk exposure, diversify production and livelihood options, enhance income and ensure year-round food security.

One particular feature of the FAO resilience programme is the "building back better" principles that incorporate risk reduction and adaptation measures rapidly after emergencies to link from rehabilitation to sustainable development.

FAO works together with other UN Agencies and development partners to strengthen capacity development and linkages between disaster risk reduction and climate change adaptation across sectors through

various partnerships including, for example, the Capacity for Disaster Reduction Initiative, the Global Preparedness Partnership, and the 5-10-50 Partnership Initiative for Risk-Informed Development.

FINANCING AGRICULTURE'S POTENTIAL

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.

Putting this extra investment into sustainable food and agricultural systems will bring 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.

FAO assists nations to mobilize agricultural financing from the GEF. The FAO GEF portfolio has more than 120 projects in over 55 countries for a total investment value approaching USD 466 million. FAO now works with the GCF to support

countries to achieve their climate commitments and enhance ambition.

FAO leads the development and implementation of innovative GCF-funded projects, accredited to manage medium-sized (up to USD 250 million) grant-based projects. FAO also supports GCF projects led by others, including international partners such as the United Nations Development Programme. FAO's expertise can strengthen the technical quality and potential of such projects. FAO assigns particular importance to supporting accredited regional, national and subnational ("direct access") entities. FAO provides its technical expertise to countries under the GCF Readiness and Preparatory Support Programme.

About 90 percent of commitments under the Paris Agreement include agricultural sectors, which shows how crucial funding change in these sectors is to fighting climate change. FAO has the expertise to support countries to access and utilize large-scale climate finance. FAO is here to help ensure that the resources investors entrust to reforming agriculture is well spent.

However, change is coming. The Global Environment Facility (GEF) has funded action on sustainability for more than 20 years, distributing USD 17 billion in grants and mobilizing an additional USD 88 billion in financing. The GEF has been joined by the Green Climate Fund (GCF) – the financing mechanism of the United Nations Framework Convention on Climate Change for developing countries – and the Addis Ababa Action Agenda to help the global financial system invest in the right places.

WHERE TO FOCUS

Sustainable land and water management systems can reduce energy use, water withdrawals and conserve soils. The rehabilitation of degraded lands can serve as carbon sinks. Cutting food waste and loss can reduce associated emissions. These and other efforts can make a huge contribution to meeting climate commitments and working towards zero hunger.

A NEW VISION FOR CLIMATE ACTION

The last few years have been extraordinary in terms of global commitment to a better future. The international community: laid out the vision of a hunger-free, more equitable world in the 2030 Agenda for Sustainable Development; pledged to keep global warming well under two degrees Celsius and create a climate-resilient future through the Paris Agreement on climate change; committed to reduce disaster risks with the Sendai Framework for Disaster Risk Reduction; and adopted the Addis Ababa Action Agenda to finance these demanding processes. FAO's new Climate Change Strategy refocuses its work to serve these landmark decisions.

The food and agriculture sectors are central to human development and need to be at the centre of the push for sustainability and the global response to climate change. These sectors hold enormous opportunities to create synergies between the climate and development agendas.

Support for agriculture, particularly smallholder farmers, is pivotal to achieving SDG 1 (no poverty) and SDG 2 (zero hunger) under a changing climate. It also contributes to SDG 13 (climate change) and

is relevant to other goals, such as SDG 14 (sustainable oceans) and SDG 15 (life on land).

FAO is fully committed to supporting countries to reach their targets. The organization foresees a world in which food and agricultural systems are resilient to the impacts of climate change through adaptation measures and mitigation options. It advocates for large-scale climate finance to back a transformation in agriculture as a key route to a more-sustainable future.

The strategy will be implemented through a plan of action, which sets out the results to be delivered by FAO. Driven by the desire to serve its Members, it translates FAO's core mandate into strategic choices and action priorities at the global, regional and national levels.

The strategy will also serve to strengthen the FAO Regional Initiative focused on sustainable use of natural resources, adaptation to climate change and disaster risk management in the Latin America and Caribbean Region as well as the priorities of the FAO Asia and Pacific area of coping with the impact of climate change on agriculture and

food and nutritional security. It is also an invitation for partners to join FAO in an ambitious way forward that will require a decisive and collaborative effort to safeguard food security in a changing climate and unlock the potential of the agricultural sectors to ensure that climate change is tamed.

The new strategy sets FAO on the path to serve as a key partner in the achievement of global ambitions. The strategy is grounded in seven principles related to social inclusion, environmental sustainability and results-oriented action, and is framed by three outcomes:

- 1 **Enhanced capacities of nations on climate change through FAO leadership as a provider of technical knowledge and expertise.**
- 2 **Improved integration of food security, nutrition, agriculture, forestry and fisheries within the international agenda on climate change through reinforced FAO engagement.**
- 3 **Strengthened coordination and delivery of FAO work on climate change.**

PUBLICATIONS

The State of Food Security and Nutrition in the World 2017

Building resilience for peace and food security

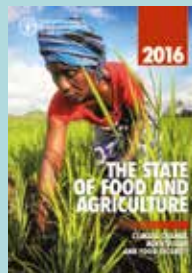


FAO, IFAD, UNICEF, WFP and WHO, Rome, 2017, 117 pp. (also available in Arabic, Chinese, French, Russian and Spanish)

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 report 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, although 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 Food and Agriculture 2016

Climate change, agriculture and food security



FAO, Rome, 2016, 191 pp. (also available in Arabic, Chinese, French, Russian and Spanish)

The Paris Agreement, adopted in December 2015, represents a new beginning in the global effort to stabilize the climate before it is too late. It recognizes the importance of food security in the international response to climate change, as reflected by many countries focusing prominently on the agriculture sector in their planned contributions to adaptation and mitigation. To help put those plans into action, this report identifies strategies, financing opportunities, and data and information needs. It also describes transformative policies and institutions that can overcome barriers to implementation.

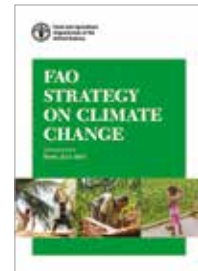
Turning Nationally Determined Contributions into action



FAO, Rome, 2017, 16 pp.

Many countries have recognized that responding to climate change and achieving sustainable development go hand in hand. This connection has been emphasized in the Paris Agreement and in the 2030 Agenda with its 17 SDGs. FAO, which has been proposed as a custodian agency for more than 20 SDG indicators, is in a strong position to support countries in their efforts to achieve the SDGs. This brief summarizes FAO's analysis of Nationally Determined Contributions (NDCs) and provides an overview of how the Organization, through policy processes, capacity development and technical interventions on the ground, supports the implementation of NDCs in the agriculture sectors.

FAO Strategy on Climate Change



FAO, Rome, 2017, 46 pp.

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 process 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 to face climate change.

Climate Smart Agriculture: building resilience to climate change



FAO-Springer, Rome, 2017

Climate-smart agriculture (CSA) is a concept that calls for integrating climate change adaptation and mitigation into agricultural growth strategies. This new open-access book, co-published with Springer, provides tested good practices and innovative approaches for promoting CSA systems in support of food security at country level.

Climate-smart agriculture sourcebook: update – Summary of the second edition 2017



FAO, Rome, 2017

This summary provides an overview of the second, digital edition of the Climate-Smart Agriculture Sourcebook. The new edition includes new findings, case studies and lessons learned. It also takes into account the changes in the landscape of international climate action since the original edition was published in 2013. The 2030 Agenda for Sustainable Development – which encompasses the Paris Agreement on Climate Change, the Sustainable Development Goals and the Addis Ababa Action Agenda – provides an unprecedented international framework for strong national actions and collective international efforts to achieve sustainable development.

Low-emissions development of the beef cattle sector in Argentina



FAO, Rome, 2017, 34 pp.

What is the potential for improving beef productivity while reducing enteric methane emission intensity from production? This study identifies low-cost strategies, such as use of conserved fodder and control of reproductive diseases.

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



FAO, Rome, 2017, 36 pp.

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.

PUBLICATIONS

FAO's work to enhance countries' capacity to report to the UNFCCC – agriculture, forestry and other land use



FAO, Rome, 2017, 20 pp.

This infographic booklet shows what FAO – through both the REDD+/National Forest Monitoring teams and Mitigating Agriculture GHG Emissions Towards Wider Opportunities project – provides to its Members regarding the Measurement, Reporting and Verification framework. It also presents experiences on the ground with examples from activities in Africa, Asia and Latin America and the Caribbean, and highlights useful resources.

Voluntary Guidelines on National Forest Monitoring



FAO, Rome, 2017, 61 pp.

FAO has prepared guidelines to assist forest managers to integrate climate change into forest management plans and practices. Implementation of the guidelines commenced in Latin America and Asia and Southern Africa. Currently, FAO is working with six Eastern African countries on the implementation of the guidelines: Burundi, Ethiopia, Rwanda, South Sudan, Uganda, and the United Republic of Tanzania..

Soils' potential to contribute to offset international aviation emissions



FAO, Rome, 2017, 8 pp.

International aviation is responsible for 1.3 percent of global anthropogenic carbon dioxide emissions. Even considering improvements planned by the International Civil Aviation Organization, a gap of 523 million tonnes of carbon dioxide remains to meet emission reduction targets. This note presents soil carbon sequestration as an option for offsetting these emissions. Success stories of FAO projects, such as the development and implementation of the Quesungual System in Honduras, show it is possible to enhance carbon stocks, thus mitigating increasing contents of GHGs in the atmosphere and at the same time improving food security and climate change resilience.

Greenhouse gas emissions from aquaculture: a life cycle assessment of three Asian systems



FAO, Rome, 2017, 92 pp.

Assessing climate change vulnerability in fisheries and aquaculture



FAO, Rome, 2015, 98 pp

Addressing agriculture, forestry and fisheries in National Adaptation Plans – Supplementary guidelines



FAO, Rome, 2017, 102 pp.

This publication responds to a call by the Least Developed Group of the United Nations Framework Convention on Climate Change (UNFCCC), inviting international actors to draft sectorial guidelines to the UNFCCC National Adaptation Plan (NAP) Technical Guidelines. The NAP-Ag guidelines aim to support developing countries in reducing the vulnerability of the agriculture sectors to the impacts of climate change by: building adaptive capacities and resilience; addressing agriculture in the formulation and implementation of NAPs; and enhancing the integration of adaptation in agricultural development policies, programmes and plans. The guidelines outline four elements and related steps for preparing the agriculture sector's contributions to NAPs.

Save food for a better climate! Translating the food loss and waste challenge into climate action



FAO, Rome, 2017, 63 pp.

This publication aims to inform on the interrelationship between food loss and waste and climate change. In this context, it highlights the related impacts and outlines the recent global frameworks adopted by the international community, and how they have been translated into national priorities and targets. It explores climate technology options along with the challenges and opportunities related to financing needs. Finally, the publication identifies ways and enabling factors to reduce food loss and waste as part of the collective effort to enhance ambition for climate action while simultaneously delivering the other objectives of the 2030 Agenda.

ClimAfrica – Climate change predictions in sub-Saharan Africa: impacts and adaptations



FAO, Rome, 2017

This document was produced in the ambit of the FAO-led Work Package no. 4 of the ClimAfrica project. It provides an improved understanding of the current dynamics of major food production systems in Africa (up to 2020) and develops a set of conditional vulnerability scenarios based on current agricultural and socio-economic trends to be used to assess impacts under the ClimAfrica project. The methodological approach is based on the FAO methodology for framework for land evaluation and agroecological zoning to develop scenarios of major production systems in sub-Saharan Africa.

Climate change and food security: risks and responses



FAO, Rome, 2016, 98 pp.

This report brings together evidence on the impacts of climate change on food security and nutrition. It shows how a cascade of impacts from ecosystems to livelihoods interacts with a series of vulnerabilities, undermining food security and nutrition. The report presents ways to adapt, to reduce vulnerabilities and to build resilience to climate change.

PUBLICATIONS

Voluntary Guidelines to Support the Integration of Genetic Diversity into National Climate Change Adaptation Planning



FAO, Rome, 2015, 32 pp.
(also available in Arabic, Chinese, French, Russian and Spanish)

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 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.

The impact of disasters on agriculture: addressing the information gap



FAO, Rome, 2017, 24 pp.

The number and frequency of recorded natural disasters, along with the associated impact and damage to livelihoods and economies, are increasing significantly. Natural disasters often destroy critical agricultural assets and infrastructure, disrupting production cycles, trade flows and livelihoods means. This affects food security and causes additional disruptions throughout the value chains. There is limited systematic data and information on the impact of disasters and hazardous events in agriculture. Countries should act to minimize the devastating effects on livelihoods and the economy. Agriculture must be at the centre of these efforts, given its wide interactions with the environment and direct reliance on natural resources for production.

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



FAO, Rome, 2017, 32 pp.

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 disaster-risk-reduction (DRR) good practices at farm level, compared with usual practices. The analyses presented are based on data collected from ongoing projects that promote local good practices for DRR and climate change adaptation. The aim is to inform policy-makers and practitioners on the opportunities to reduce risk exposure of farmers by the result of this study.

The impact of disasters on agriculture and food security



FAO, Rome, 2015, 77 pp.

This study assesses the impact of medium- to large-scale natural hazards and disasters on the agricultural sectors in developing countries between 2003 and 2013, focusing on direct physical damage and indirect economic losses. The findings of the study are expected to support national and international efforts to reduce damage and losses caused by disasters and strengthen the resilience of the agricultural sectors, in line with resilience targets set under the Sendai Framework for Disaster Risk Reduction, the Sustainable Development Goals, and the Universal Climate Change Agreement.

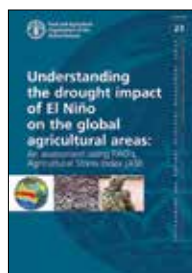
Adoption of climate technologies in the agrifood sector: methodology



FAO, Rome, 2015, 58 pp.

Global agrifood systems play an important role in GHG emissions and are therefore increasingly under pressure to achieve efficiency improvements and reduce their environmental footprint. Fostering the adoption of best available green technologies along agrifood supply chains is an essential step toward this objective. As a contribution to quickly expanding literature on the subject, the report, produced in collaboration with the European Bank for Reconstruction and Development, provides a practical methodology to enable a country or funding agency to assess and monitor the market penetration of sustainable climate technologies and practices in agrifood chains.

Understanding the drought impact of El Niño on the global agricultural areas: available methodologies and their relevance for the sector.



FAO, Rome, 2015, 52 pp.

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.

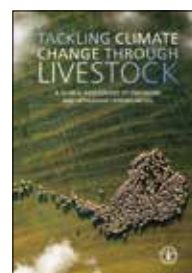
Climate Smart Agriculture Sourcebook



FAO, Rome, 2013, 570 pp.

The aim of the sourcebook is to guide policy-makers, programme managers, sectoral experts, academics, extensionists and practitioners in their efforts to make the agricultural sectors more climate-smart, more sustainable and more productive, while responding to the challenges of climate change. The sourcebook illustrates the concept, details CSA approaches in and across different subsectors, and outlines enabling frameworks.

Tackling climate change through livestock



FAO, Rome, 2013, 139 pp.
(also available in French)

As renewed international efforts are needed to curb GHG emissions, the livestock sector — a significant emitter of greenhouse gas — has the potential to reduce its emissions significantly.

FAO'S WORK ON CLIMATE CHANGE

United Nations
Climate Change
Conference 2017



The Food and Agriculture Organization of the United Nations (FAO) estimates that 815 million people in the world today are chronically hungry. After declining for over a decade, in 2017 global hunger is on the rise again. According to this year's estimates, the world must, by 2050, produce 49 percent more food than in 2012 as populations grow and diets 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, then progress towards eradicating hunger and ensuring the sustainability of our natural-resource base to achieve the 2030 Agenda for Sustainable Development will be at risk.

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.