

FOOD SECURITY

Although the definition of food security has varied considerably over the years and stakeholders still debate specific terminology, the following definition of food security has been used for the purposes of this study:

Food security [is] a situation that exists when all people, at all times, have physical, social and economic access to sufficient, safe and nutritious food that meets their dietary needs and food preferences for an active and healthy life. Household food security is the application of this concept to the family level, with individuals within households as the focus of concern. Food insecurity exists when people do not have adequate physical, social or economic access to food as defined above.

Food security can be broken down into the following components, as explained largely in the Food and Agriculture Organization's (FAO) own words:

Food availability is the availability of sufficient quantities of food of appropriate quality, supplied through domestic production or imports (including food aid). Food availability addresses the "supply side" of food security and is determined by the level of food production, stock levels and net trade.

Food access means access by individuals to adequate resources (entitlements) for acquiring appropriate foods for a nutritious diet. Entitlements are defined as the set of all commodity bundles over which a person can establish command given the legal,

political, economic and social arrangements of the community in which they live (including traditional rights such as access to common resources).

Stability means that a population, household or individual has access to adequate food at all times. They should reduce their risk of losing access to food as a consequence of sudden shocks (e.g. an economic or climatic crisis) or cyclical events (e.g. seasonal food insecurity).

Utilization of food is optimized through a combination of adequate diet, clean water, sanitation and health care in order to reach a state of nutritional well-being where all physiological needs are met. Sufficient energy and nutrient intake by individuals is the result of good care and feeding practices, and it is especially important for infants and young children. For the broader household, food preparation, diversity of the diet and intra-household distribution of food are also important.



The strategy for 2017–2020 is guided by the three principles of

- **continuity,**
- **emerging issues and**
- **cooperation**

Continuity is being ensured, in particular:

- in supporting the development and implementation of international soft law and other international regulatory and guiding frameworks advocating for food security and nutrition, including the right to food, using international multi-stakeholder platforms and creating alliances with likeminded donors.
- in promoting innovations, scalable solutions testing new instruments, including partnerships with private sector actors.

Emerging issues

- **Climate change:** research and development of adapted cultivation methods including crop practices and new plant varieties (as the pace of climate change now exceeds the pace of the breeding progress).
- **Political economy of land and seeds:** for a large number of smallholders, securing access to land and seeds is becoming an issue of survival and of maintaining rural production systems.
- **Urbanization:** urban food insecurity due to rapid urbanization and rural-urban migration, exacerbated by competing interests for land, needs attention. (Peri-)urban food production is gaining in importance.

- **Exotic and invasive species:** as a side effect of globalization and industrialized agriculture, invasive species and spreading of exotic plant diseases threaten agricultural production and human health. Related interventions will be identified within the thematic priorities outlined in the next chapter.

The promotion of **Cooperation** between and coordination at global and regional levels, with SDC partners in priority countries, and harnessing synergies between global programmes with bilateral and humanitarian cooperation will be crucial.

State of Food Security and Nutrition in the World: Persistent hunger and obesity increase the global burden of malnutrition

After decades of steady decline, the trend in world hunger—as measured by the prevalence of undernourishment—reverted in 2015, remaining virtually unchanged in the past three years at a level slightly below 11%. As a result, more than 820 million people globally were still hungry in 2018, the latest UN State of Food Security and Nutrition in the World (SOFI) report finds, underscoring the immense challenge of achieving the Zero Hunger target by 2030.

This 2019 report introduces a second indicator for monitoring Sustainable Development Goal (SDG) Target 2.1: The Prevalence of Moderate or Severe Food Insecurity, based on the Food Insecurity Experience Scale (FIES). While severe food insecurity is associated with the concept of hunger, people experiencing moderate food insecurity face uncertainties about their

ability to obtain food and are forced to compromise on the quality and/or quantity of the food they consume. Considering all people affected by moderate levels of food insecurity together with those who suffer from hunger, the report estimates that over 2 billion people worldwide do not have regular access to safe, nutritious and enough food.

- More than a quarter of the world's population struggles to eat safe, nutritious, and enough food, and that includes 8% of the population in Northern America and Europe, stressed
- With the increasing number of individuals facing hunger, and an estimated 2 billion food insecure people,
- Hunger is on the rise in almost all sub-regions of Africa, with a prevalence of undernourishment at almost 20%. The prevalence of food insecurity (moderate or severe) is much higher in this region than in any other part of the world, affecting more than half of the population.
- Hunger is also rising in Latin America and the Caribbean, as well as Asia. The report also includes information on the significant increase in the prevalence of undernourishment in Venezuela, where hunger increased from 6.2% to 21.2% between 2012 and 2018.
- The slow progress on reducing low-birthweight and child stunting, along with an increase in anemia and obesity, indicates the severe

challenges of ending all forms of malnutrition by 2030.

- Hunger is also becoming prevalent in middle-income countries that experience poor economic growth. Out of 77 countries that experienced a rise in hunger, 65 countries saw their economy slowing down or contracting, 44 out of the 65 countries are middle-income countries, only 19 are low-income countries.
- In addition, periods of extreme price volatility further affect food security and nutrition, especially in food import dependent countries, where a 1% increase in the countries' commodity dependence leads to an 8% increase in undernourishment.



On the production side of food security, pointing out that there are growing concerns over natural resources, including access to water, with half of the world's population currently living in areas experiencing water scarcity at least one month per year. Food insecurity remains a particular problem in

Africa South of the Sahara, where significant population growth is expected to continue through 2050, Johansson explained, adding that agricultural production needs to keep pace with relative population growth.

Science and technology, including biotechnology, can contribute to increased productivity and economic returns, Johansson, said. USDA projections anticipate a reduction in global food insecurity over the next 10 years, with the food gap expected to shrink despite rising demand. These factors, along with countercyclical measures to stabilize economic growth, continued investments in agricultural productivity, and reduced barriers to trade, can help to meet some of the challenges outlined in the 2019 SOFI report.

The Agriculture and Food Security Network The network has identified six thematic priorities:

- **Land governance** is at the centre of agriculture development and food security. Rural advisory services and agricultural education for many years has received little attention despite the high importance of reaching farmers, especially smallholders, with innovative practices and approaches.
- **Postharvest management:** Around 30% of food produced is lost or wasted. In the countries of the Global South, there is immense scope to improve the use of

resources by reducing postharvest losses.

- **Nutrition:** Being aware of the almost 800 million people who are undernourished and the increasing number of overweight children and adults among the poor population in developing countries, this topic is linked to several of the other thematic priorities of the network.
- **Rural – peri-urban – urban dynamics:** Today, more than 50% of the world’s population is living in the urban and peri-urban space. By 2050 this figure will reach more than 70%.
- **Ecological agriculture:** A sustainable world needs an agriculture that is based on ecological principles.
- **Result measurement (monitoring)** and evidence based reporting require constant learning and improvement.

Action is at the heart of the Sustainable Development Goals (SDGs). As the principle connection between people and planet, sustainable food and agriculture can fuel positive change. FAO’s new publication, Transforming food and agriculture to achieve the SDGs, presents 20 actions to help countries in incorporating sustainable agriculture and rural development into their broader development goals. These actions offer a practical guide to implementing the 2030 Agenda.

1. Diversifying to increase productivity, create employment and add value in food systems

Food production systems need to respond to a fast growing population, changing diets, greater urbanization, rising obesity and malnutrition and natural resources that are increasingly overburdened and impacted by climate change.

One way to do this is by diversifying production. For example, in Chiapas, Mexico, coffee farmers are utilizing agroforestry on their farms. Because these intercropped trees provide heavy shade, fields are 2°C to 3 °C cooler than those under light shade. As such, they lose significantly less water through soil evaporation and plant transpiration, thereby increasing soils' resilience to drought. Crop yields in agro forestry systems are comparable with, and more stable than, those obtained with synthetic fertilizers and release less greenhouse gas emissions.

2. Protecting pollinators, safeguarding natural resources

Sustainable production in agriculture, forestry and fisheries requires specific attention to the management and use of natural resources, including soil, water, energy and biodiversity. There are many opportunities to conserve resources while also increasing agricultural productivity and improving livelihoods.

Protecting pollinators, for example, is essential to our food production. Pollinators, including bees, birds and bats, are vital to global crop production, boosting outputs of 87 of the world's leading food crops. Yet, pollinators are at risk worldwide. In Ghana, vegetable growers commonly border their fields with rows of cassava plants. Most

cassava varieties will flower three months after planting, profusely producing nectar that attracts bees and other insects. Vegetable crops such as aubergine and tomato – neither of which are highly attractive to pollinators – benefit from the pollinators initially visiting the cassava flowers.

3. Promoting inclusive growth to improve livelihoods and foster participatory economies

Inclusive growth means turning economic expansion into better living standards for all, creating opportunities and improving livelihoods across and within societies.

There are more than seven million indigenous people in Honduras and Guatemala. They are often among the poorest in the region and depend heavily on natural resources for their livelihoods. Yet, they frequently lack legal ownership, control over or access to land, which prevents them from investing in income-generating activities. In 2016, the government of Honduras recognized the Misquito indigenous peoples' ownership of more than one million hectares of communal land. This was thanks in part to an FAO-World Bank partnership that designed an investment plan to delimit and register new land titles in the Mosquitia region of Honduras. A Plan of Action was also launched to promote the conservation of natural resources and sustainable management of indigenous territories. 17 500 indigenous families are now able to access and manage the natural resources in their territories.

4. Enhancing the resilience of people, communities and ecosystems

Resilience is a major factor in ensuring sustainable agriculture, fisheries and forestry. Phenomena, such as extreme natural hazards, market volatility, civil strife, political instability or disease epidemics impair the productivity and stability of agriculture. Nearly 25 percent of the total damage and loss caused by natural hazards and disasters in developing countries are in agriculture.

5. Adopting a holistic approach to adapt governance to the new challenges

The transition to more sustainable agriculture and food systems requires a multidimensional approach. Actions should not only focus on promoting changes in practice but should also build political alliances with actors both within and beyond the food and agriculture sectors.

In the Mekong Delta, Viet Nam, diverse incentives co-financed from public programmes, private sector investment and civil society initiatives are supporting shrimp fishers to comply with mangrove restoration and protection regulation. The private sector provides financial bonuses per hectare of mangroves conserved within aquaculture farms and has developed a certification for shrimp raised in integrated mangrove-aquaculture areas, offering a ten percent premium for certified organic shrimp.

Mainstreaming sustainable food and agriculture into national development strategies and action plans requires

integrated programmes and policies, interlinked goals and targets and regularly monitored progress. This publication offers decision-makers the elements to forge ahead in meeting the world's goals and achieving ZeroHunger by 2030.

Transforming Food System

We can't really talk about the planet's most pressing environmental problems without talking about food systems. And by food systems, we also mean the agriculture that it takes to support them: farming, fisheries, forestry and the value chains that provide food and fiber for our daily lives.

Agriculture uses 70 percent of all fresh water withdrawal and contributes nearly 30 percent (including off-farm) of global greenhouse gas emissions. Food production is also responsible for 75 percent of agrobiodiversity loss. This is already true now and by 2050, the world will need 50 percent more food to feed a population of over 9.7 billion, a population which will be more urbanized, affluent and demanding in its food choices. Our natural resources are already under pressure. Yet, 815 million people are hungry, and 2 billion people suffer from micronutrient deficiencies.

It is clear that food production and agriculture need to be a large part of the discussion in realizing the world's main objectives for the future, i.e. the Sustainable Development Goals. Recognizing this, the Global Environment Facility (GEF) and FAO, as an implementing agency, address the critical nexus of agriculture and the environment. Through 187 projects in over 120 countries, FAO-GEF projects have

tackled issues like climate change, biodiversity, land degradation, safe disposal of hazardous chemicals and management of international waters. Traditionally, FAO and the GEF have worked together to help smallholder producers improve production practices in ways that also generate global environmental results, but the partnership is increasingly focusing on the entire value chain.

Here are just three of the FAO-GEF projects that are helping to tackle environmental challenges through the lens of agriculture:

1. Helping food producers adapt to climate change

Rural people produce three-quarters of the world's food yet these same people constitute 80 percent of the global poor. Most do not have the means to change their farming practices on their own. One of the biggest areas of work for FAO and GEF is helping farmers to cope with the changes in climate and become resilient to them.

Worldwide, rainfall is increasingly less predictable and storms and natural disasters are more frequent. Temperatures aren't stable and seasons don't come when they are supposed to. In Mali, these realities are extreme. As a country whose rainfall has never been reliable, Mali has also been increasingly prone to drought in the last 50 years. Continued trends of increased temperatures and decreased rainfall could be devastating to Mali's major food crops, such as millet, sorghum, rice and maize, not to mention, problematic for livestock, the

country's second most important export commodity.

A GEF-funded project focused on helping over 40 000 smallholder farmers to diversify production, improve soil health and fertility and choose seeds and varieties more tolerant to varied temperature and rainfall. These actions have helped increase yields by 21 to 77 percent for sorghum, millet, rice, corn, sesame and cotton.

2. Better managing marine ecosystems

In the Bay of Bengal, an area that spans eight countries (Bangladesh, India, Indonesia, Malaysia, Maldives, Myanmar, Sri Lanka and Thailand), 400 million people live at or below the poverty line. They are dependent on the Bay for their food and livelihoods. Yet, the continuing degradation of the Bay of Bengal's marine resources is severely impacting the quality of life and the economic potential in these coastal communities.

A FAO-GEF project was implemented to enhance the regional management of the area's environment and fisheries sector by tackling issues such as restoration, marine pollution and habitat conservation. Transboundary marine resources are particularly complex as there are a broad range of stakeholders with whom to consult. FAO and GEF worked with local government agencies, commercial fishers, artisanal fisher-folk and local NGOs to support their capacities to plan and implement a whole ecosystem approach to management of these resources.

3. Preserving the biodiversity of our ecosystems and species

In the Chimborazo area of Ecuador, the páramos, a type of mountain tundra ecosystem, is very important to the local indigenous population, who are dependent on these natural resources for their food sources and livelihoods. FAO, GEF, Ecuador's Ministry of Environment, the Chimborazo Provincial Council and other national partners are working to conserve and manage the biodiversity of the páramos and mountain ecosystems to re-establish and sustainably use the area's agricultural biodiversity. The project has worked with local communities to construct five modern watershed management plans that meet their needs.

It has also helped build local capacities to shear vicuñas for their prized wool. The vicuña is a relative of the llama and native to South America. Their fine wool, which can be knitted into garments, fetches high prices on the market. Vicuñas had all but disappeared in Ecuador. However, in 1988 Peru and Chile helped reintroduce them to this country and now there is a large population roaming Ecuador's Chimborazo Fauna Production Reserve. Shearing the Chimborazo vicuñas is the first time this had been done in the area.

Water Management and Food Security

To contribute decisively to ending hunger, water management, policies and investments must overcome daunting challenges. Rising global population, incomes, and urbanization are driving strong and diversified growth in food and water

demand—and intensified competition for water within agriculture and across agricultural, domestic, and industrial uses.

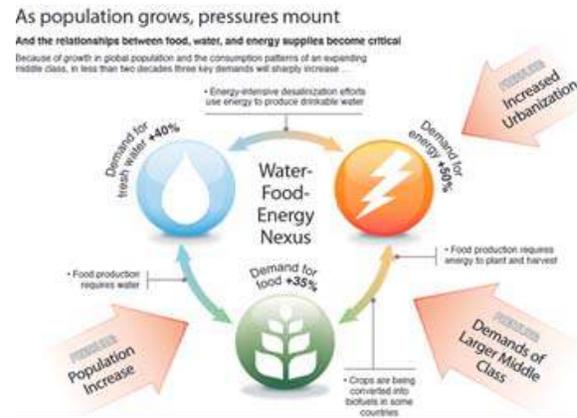
Rapid urbanization also boosts water demand for household and industry, creating competition with irrigation in important water-scarce agricultural regions. That competition can turn into outright conflict, disrupting local livelihoods and triggering migration and trans border disputes.

Developing new sources of water to alleviate competition is difficult: the cost of developing water for irrigation and other uses is increasing, as the more accessible sources have already been utilized.

Even projected increases in global production of cereals of 37% between 2010 and 2050, meat by 66%, and fruits and vegetables by 85%, progress on hunger and nutrition will be too slow. Water scarcity could compound this problem, further jeopardizing production growth and continued progress on hunger and nutrition.

Climate change presents another serious challenge. Climate impacts across the entire water cycle could substantially slow progress on water management, agricultural production, and food and nutrition. Increased variability in rainfall and streamflow, reduced rainfall in many dry regions, and thirstier crops due to higher temperatures will all require new policies and management to create more predictable and precise supplies of water. Sea level rise will lead to inundation and salt water intrusion in existing irrigated and rainfed areas, putting further pressure on the land base.

Intensive groundwater pumping for irrigation has depleted aquifers in many arid and semiarid agricultural regions, leading to saltwater intrusion and declining water tables. India's Green Revolution, for example, relied on irrigation to greatly improve productivity, but it also massively reduced groundwater reserves.



Finally, water pollution in both agricultural and non-agricultural sectors damages health and nutrition and reduces food production, constraining agricultural and economic development, especially in densely populated regions where water is already scarce and wastewater treatment is poor.

These global water security challenges are immense—as are the risks of inaction. But they can be overcome. If this vital resource is properly managed, it will be possible to meet both the food and water needs of current generations and begin building a sustainable, nourishing food system for the future.

The broad strategies outlined below can guide the design of regional and local priorities and begin to move the world toward greater food and nutrition security.

•Water rights. The establishment of secure water rights is fundamental to improving water management. This means ensuring recognition of existing formal and informal rights and gender equity, to empower farmers and provide a framework for water management that is more effective and equitable. When small farmers have secure water rights, they know that they can retain

access while investing in farm improvement, new crop varieties, and improved irrigation technology and crop management – all of which can change water use patterns. Physical controls on water usage, including rationing or quotas through enforcement of water rights, can maintain or reduce basin-wide water use after new technologies are introduced.

•Incentives encouraging efficient water use. These include water brokering to water user associations (WUAs); paying farmers for reduced water use; and payment for environmental services to integrated soil and water management or upper watershed management that improves downstream water quality.

•Reducing high subsidies for water, energy, and fertilizer use. These general support programs have caused overuse of these resources and environmental degradation. Cutting them can encourage the adoption of conservation incentives and practices, as well as the uptake of new technologies. The money governments save should be invested in increased agricultural and water research and development to boost productivity growth; in compensatory

income support to small farmers; and in carefully targeted smart subsidies to achieve specific water management goals such as initial adoption of efficient technologies. Thanks to rapidly increasing access to information and communication technologies, smart cards or phones can be used for the efficient transfer of compensatory funds to small farmers.

•Reform education and extension systems.

These should be overhauled to increase gender-sensitive farmer knowledge, disseminate information, and improve adoption of appropriate existing and new water technologies. Radio, TV, social media, mobile phones, and other advanced information and communication technologies can be used to reach farmers quickly and directly. Decentralized, demand-driven, and participatory extension services with increased participation by the private sector, NGOs, WUAs and producer organizations can engage farmers in programs whose goals coincide with their own.

•Better data collection and mapping.

Public-private partnerships are needed to develop satellite-based remote sensing and ground sensors to map groundwater and measure water availability and use; integrated information processing and dissemination of this information can inform real-time water and crop management decisions. In addition, increased public and private investments in infrastructure – including rural roads, cold chains, and water recycling and re-use – would reduce postharvest losses of food and water and increase farmer incomes.

•Expand small-scale irrigation. Although some potential still exists for large-scale irrigation, the emphasis should be on selective investment in farmer-led small-scale irrigation, particularly in Africa south of the Sahara. This will require targeted access to credit, weather insurance, and smart subsidies during the initial adoption stage.

•Reduce international trade and macroeconomic distortions.

Addressing this problem will become more urgent as climate change increases the reliance of many developing countries on food imports. As water scarcity worsens and climate variability increases, imports of food (and the virtual water embodied in that food) will be crucial in water-scarce areas to ensure food security and to facilitate short-term term imports to address food shortages caused by weather-induced production shortfalls.

•Promote balanced diets for health and sustainability.

This should include encouraging more responsible water use through collective action across government and business. Schools can be a platform for early nutrition education, fostering healthy eating behaviors in school meals; corporations can convey positive health messages and promote healthier sourcing and products; and health and nutrition campaigns can improve diets and nutrition by carefully targeting populations, communication activities and channels, message content and presentation.

These policy reforms and investments will be difficult to implement and take time, political commitment, and money.

Prevailing policies have strong constituencies that can be resistant to change. But overcoming these challenges will only get harder the longer they go unaddressed. The time to act on fundamental reform of water policies for food and nutrition security is now.

HUNGER, WATER MANAGEMENT

To contribute decisively to ending hunger, water management, policies and investments must overcome daunting challenges. Rising global population, incomes, and urbanization are driving strong and diversified growth in food and water demand—and intensified competition for water within agriculture and across agricultural, domestic, and industrial uses.

Rapid urbanization also boosts water demand for household and industry, creating competition with irrigation in important water-scarce agricultural regions. That competition can turn into outright conflict, disrupting local livelihoods and triggering migration and trans border disputes.

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Finally, water pollution in both agricultural and non-agricultural sectors damages health and nutrition and reduces food production, constraining agricultural and economic development, especially in densely populated regions where water is already scarce and wastewater treatment is poor.

These global water security challenges are immense—as are the risks of inaction. But they can be overcome. If this vital resource is properly managed, it will be possible to meet both the food and water needs of current generations and begin building a sustainable, nourishing food system for the future.

The broad strategies outlined below can guide the design of regional and local priorities and begin to move the world toward greater food and nutrition security.

- **Water rights.** The establishment of secure water rights is fundamental to improving water management. This means ensuring recognition of existing formal and informal rights and gender equity, to empower farmers and provide a framework for water management that is more effective and equitable. When small farmers have secure water rights, they know that they can retain access while investing in farm improvement, new crop varieties, and improved irrigation technology and crop management – all of which can change water use patterns. Physical controls on water usage, including rationing or quotas through enforcement of water rights, can maintain or reduce basin-wide water use after new technologies are introduced.
- **Incentives encouraging efficient water use.** These include water brokering to water user associations (WUAs); paying farmers for reduced water use; and payment for environmental services to integrated soil and water management or upper watershed management that improves downstream water quality.
- **Reducing high subsidies for water, energy, and fertilizer use.** These general support programs have caused overuse of these resources and environmental degradation. Cutting them can encourage the adoption of conservation incentives and practices, as well as the uptake of new technologies. The money governments save should be invested in increased agricultural

and water research and development to boost productivity growth; in compensatory income support to small farmers; and in carefully targeted smart subsidies to achieve specific water management goals such as initial adoption of efficient technologies. Thanks to rapidly increasing access to information and communication technologies, smart cards or phones can be used for the efficient transfer of compensatory funds to small farmers.

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- **Better data collection and mapping.** Public-private partnerships are needed to develop satellite-based remote sensing and ground sensors to map groundwater and measure water availability and use; integrated information processing and dissemination of this information can inform real-time water and crop management decisions. In addition, increased public and private investments in infrastructure – including rural roads, cold chains, and water recycling and re-use –

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These policy reforms and investments will be difficult to implement and take time, political commitment, and money. Prevailing policies have strong constituencies that can be resistant to change. But overcoming these challenges will only get harder the longer they go unaddressed. The time to act on fundamental reform of water policies for food and nutrition security is now.