Strategic work of FAO for sustainable food and agriculture
CONTENTS

PAGES 4-5
A VORTEX OF PRESSURES CALLS FOR A NEW PARADIGM

PAGES 6-15
PATHWAYS TO SUSTAINABLE FOOD AND AGRICULTURE

PAGES 16-27
ACHIEVING RESULTS AND SHOWING IMPACT

FOR MORE INFORMATION ON THE STRATEGIC WORK OF FAO FOR SUSTAINABLE FOOD AND AGRICULTURE
www.fao.org/sustainability

CONTACT
SPL2@fao.org

SIERRA LEONE
Women farmers carrying bundles of harvested rice. ©FAO/Caroline Thomas
KEY MESSAGES

- FAO promotes the transition to sustainable and climate-resilient agricultural policies and governance mechanisms, working with countries on reviewing their policies and investment strategies and helping them align their policies and programmes in support of implementing the 2030 Agenda for Sustainable Development as well as the Paris Agreement on climate change.

- FAO supports countries to strengthen cross-sectoral dialogue, promoting the transition to sustainable and climate-resilient agriculture and a stronger role of agriculture, forestry and fisheries in national sustainable development.

- FAO helps countries in building capacities to implement policies, instruments and partnerships that promote productive, sustainable and climate-resilient agriculture.

- FAO facilitates evidence-based decision-making by gathering and sharing information and knowledge needed to support the transition to productive, sustainable and climate-resilient agriculture at all levels.

- FAO works with public and private institutions to strengthen capacities to collect data, analyze and produce evidence for informed decision making on the management of natural resources in agricultural systems across production sectors.

- FAO assists producers in testing and adopting production systems that increase productivity and resilience while preserving natural resources through participatory approaches.

- FAO works with public and private institutions to enhance their capacities to promote the adoption of more integrated, sustainable and resilient production systems.

"IN MANY COUNTRIES, ADAPTING TO CLIMATE CHANGE AND FINDING WAYS TO ENSURE FOOD SECURITY AND NUTRITION ARE PART OF THE SAME CHALLENGE AND ADOPTING CLIMATE-SMART PRACTICES WOULD BOOST PRODUCTIVITY AND FARMERS’ INCOMES AND LOWER FOOD PRICES."

José Graziano da Silva, FAO Director-General
The world has seen huge progress in agricultural development in the past decades.

In the last 50 years, intensification of agriculture has been the driving force behind the rapid growth of food supplies by more than threefold, in keeping up with a rapidly expanding population. The success of food production in reducing hunger and improving nutrition globally is also the result of a variety of factors. These include the increased use of fertilizer, water, pesticides, drugs, new crop varieties and animal breeds and innovative agriculture practices that contributed to the Livestock and Green Revolutions, the latter boosting cereal yields in Asia by over 50 percent which saved millions of people from starvation in the 1960s and 1970s. Since then, global food production from crops, livestock, fisheries and aquaculture has grown to an estimated 8.4 billion tonnes per year, while forestry produces 3.5 billion cubic metres of timber and fuelwood per year.

This progress has also come at a high cost to society and to the environment. Oceans are now overexploited and many rivers, lakes and seas are polluted with chemicals. Soils are degraded and have lost much of their fertility. Pesticides are devastating people’s health and the environment, while high levels of greenhouse gas (GHG) emissions from input-intensive agriculture aggravate the menace of climate change and contribute to global warming and volatile weather patterns. Our agricultural systems are the result of unsustainable farming practices that have squandered our natural resources, leaving our current and future generations with the additional task of addressing land degradation, water scarcity and pollution, eroded agro-biodiversity and climate change. Today, there are still too many regions in the world where agricultural productivity is extremely low, and where farmers, pastoralists, and other rural dwellers struggle to survive and make a decent living.

The global development situation is changing rapidly, and no question is
more contested among the international community than what will lay the foundations for future agricultural growth that is sustainable. How can we produce more on land already cultivated without encroaching on our forests? How can we avoid further depleting our already fragile ecosystems on land and water? How can we enable our food systems and natural resources to cope with feeding a growing global population if dietary patterns change and if we lose or waste a third of our food today? How can we mitigate and adapt to changing climatic patterns that wreak havoc on our fragile food systems and the livelihoods of our poorest citizens? Fueling these questions and more is a growing awareness that a paradigm shift is sorely needed if, collectively, we are to transform our food systems for the better.

**Achieving the transition to sustainable agricultural development requires a vision that radically rethinks the status quo.** This is especially the case as our population continues to expand, requiring production systems to increase by more than 60 percent by 2050. This vision, encapsulated in the 2030 Agenda for Sustainable Development, comprises a set of 17 goals with timeframes, committing the international community to end poverty and hunger, and achieve sustainable development in the next 15 years.

Sustainable agriculture lies at the core of the 2030 Agenda. Six out of the 17 Sustainable Development Goals concentrate on sustainable agriculture, namely SDG 2 on hunger, nutrition and sustainable agriculture, SDG 6 on water use efficiency, SDG 12 on sustainable production and consumption, SDG 13 on combating climate change, SDG 14 on conserving marine resources, and SDG 15 on terrestrial ecosystems, land restoration and biodiversity.

Sustainable agriculture contributes to other goals as well, for instance, agriculture plays a critical role in reducing poverty through pro-poor approaches that encompass family farming, women and youth empowerment, value chain, market access and social protection schemes.
The vision of FAO for sustainable food and agriculture is one where food is nutritious and accessible for everyone and one where natural resources are managed in a way that maintain ecosystem functions to support current as well as future human needs.

Farmers, pastoralists, fisher folks, foresters and other rural dwellers have their voices heard, benefit from economic development and have decent employment. Food security has been attained, climate change is a thing of the past and women have the same rights to access and buy land as men.

The Organization’s second strategic objective calls on everyone’s efforts to move towards sustainable agriculture. But this endeavour entails more than just protecting our natural resources. Sustainable agricultural development requires integration and synergies between sectors as well as combination of social, economic and environmental issues. It is a process with overarching frameworks that range from technical to governance and to financing aspects. Sustainable production practices and technologies also imply a synergistic approach of the production value chain in connection with natural resources.

SUSTAINABLE AGRICULTURAL DEVELOPMENT REQUIRES INTEGRATION AND SYNERGIES BETWEEN SECTORS AS WELL AS A COMBINATION OF SOCIAL, ECONOMIC AND ENVIRONMENTAL ISSUES.

Such practices include, for example, agroforestry systems, crop–livestock integration and crop–aquaculture production, to promote the conservation and use of ecosystem services and biodiversity, for the benefit of producers and rural communities. In this way, crop and livestock production, forestry, capture fisheries and aquaculture no longer need to compete for political support, space and natural resources.

With a holistic approach to agriculture, wise choices can be made for inclusive and sustainable practices. Since 2014, FAO has supported 245 initiatives in 89 countries in sustainable agricultural production practices using participatory approaches, including over 80 initiatives in Africa alone. Out of 89 countries, 41 percent were able to reduce the gap in crop yields and over half of the countries had reduced the area of natural vegetation and protected ecosystems lost to agriculture.

FAO is continuously exploring ways to assess the impact of integrated approaches to production and adapting future plans. By addressing
VIET NAM

Girl from the northern highlands working in a rice paddy.
©FAO/NG Quang Toan
FAO has developed a common vision and an integrated approach to sustainability across agriculture, forestry and fisheries.

This unified perspective – valid across all agricultural sectors and taking into account social, economic and environmental considerations – ensures the effectiveness of action on the ground and is underpinned by knowledge based on the best available science, and adaptation at community and country levels to ensure local relevance and applicability.

**THE 5 KEY PRINCIPLES FOR SUSTAINABILITY IN FOOD AND AGRICULTURE**

1. **PRINCIPLE**
   Improving efficiency in the use of resources is crucial to sustainable agriculture

2. **PRINCIPLE**
   Sustainability requires direct action to conserve, protect and enhance natural resources

3. **PRINCIPLE**
   Agriculture that fails to protect and improve rural livelihoods, equity and social well-being is unsustainable

4. **PRINCIPLE**
   Enhanced resilience of people, communities and ecosystems is key to sustainable agriculture

5. **PRINCIPLE**
   Sustainable food and agriculture requires responsible and effective governance mechanisms
A VORTEX OF PRESSURES CALLS FOR A NEW PARADIGM

economic, institutional and financing barriers, FAO works to create enabling conditions for sustainable production systems. In this way, resources are used more efficiently and we create an environment that supports diversification and natural resources conservation. Farmers can also better adapt to and mitigate climate change.

In strengthening many international and national agricultural governance mechanisms and instruments, FAO continues to push for the sustainable use of resources, which includes building capacity of key stakeholders in the negotiation and implementation of these instruments, and of those accessing and using data to support policy and planning decisions. In 2014 and 2015, FAO supported 74 countries with 215 initiatives that adopted integrated approaches across different sectors with notable results from the way natural resources are managed, to exploring ecosystem-based approaches in fisheries and aquaculture, to sustainable land and water management, biodiversity conservation, and to better planning and managing of agricultural landscapes and territories.

FAO has developed a coordinated approach aiming at making agriculture more productive and sustainable through three intertwined pillars:

1. **EFFICIENT RESOURCE USE:** changing towards sustainable intensification of agriculture to produce more with less impact on our resources.

2. **PROTECTING AND CONSERVING THE ENVIRONMENT:** providing better care for our resources so that we protect the biodiversity of our ecosystem, water, soil fertility and reduce pollution.

3. **MAKING AGRICULTURE RESILIENT:** adopting new approach, namely sustainable agriculture, to adapt and mitigate climate change.
The world’s landscape is changing and we cannot rely on our past successes for future gains.

If we are to feed a population of about 10 billion in 50 years, a substantial part of the increase in food production must come from current agriculture production areas with enhanced food systems, ones that are more productive and efficient. This means we must learn to produce more food with less resources and do so under much harsher conditions. As volatile climatic patterns increase, competition will inevitably intensify over natural resources. Our crops and livestock will need to become more resistant to new weeds, pests, fungus, and other diseases. Considering the growing scarcity of land and water resources today in many parts of the world, the logical first step for FAO and its partners is to work together on using all resources more efficiently. Only through these efforts can we increase agricultural productivity with minimum environmental impacts on land, water, energy and biodiversity.

Against this backdrop, the Organization’s programmes reflect an integrated approach that takes into account the complex linkages and competition that exist among the users of resources and the natural environment. More integrated approaches ensure that trade-offs and synergies of the impacts of decisions in one sector are looked at in conjunction with other sectors, while taking food and nutritional security aspects into account.

FAO also believes in an approach that combines organizational strengthening at local level with policy and regulatory support at national or provincial level and in involving multiple stakeholders. In other words, FAO develops the capacities of rural communities, farmer organizations, and government institutions to work together in formulating better policies, strategies and governance that are integrated into sustainable agricultural and the natural resource sector.

Farmers are the primary agents of change. For innovative and sustainable practices to become customary, they need to acquire new knowledge and skills, and they need to be able to see the immediate returns of agricultural productivity while ensuring that their soil, water and other natural resources are sustainably managed in the long run. FAO has developed two flagship products in this regard. The first is a global Farmer Field School network that encapsulates over 500 farmer field modules and a roster of profiles of trainers, enabling new projects to leverage on the skills and experience of similar projects elsewhere in the world. The network also contains group discussions that are moderated by FAO on high-level policies and strategies. Non-formal education and learning processes need to go hand-in-hand with cross-sectoral approaches at a landscape scale. When they are considered together, results have been promising, as the success of the pilot programmes Farmer Field Schools in Burundi and Niger are now being scaled up nationally.

The second FAO product, Technologies and practices for small agricultural producers (TECA) is a repository of sustainable practices in agricultural technologies in crop production, forestry, livestock and fisheries, including adaptation to climate change. Designed for small producers, the platform allows them to interact with people with similar interests and discuss sustainable solutions for their work in online forums or exchange groups that are facilitated by agricultural experts of FAO.
Farmers harvesting fish from a rice field near Qingtian. ©FAO
A sustainable approach to agriculture requires an accurate stock-taking and a much better stewardship of the world’s natural resources.

The picture is grim. Today, 33 percent of land is moderately to highly degraded due to soil erosion, salinization, compaction, acidification and chemical pollution. Agriculture is by far the sector that consumes the most water, with on average 70 percent of all water uses. This figure applies to more than 90 percent in many countries, and is a driver of intense competition and conflicts in many places. Nearly 100 livestock breeds became extinct between 2000 and 2014, and today, 17 percent (1,458) of the world’s farm animal breeds risk extinction, largely due to indiscriminate cross-breeding. Agriculture also accounts for the lion’s share of deforestation. In the tropics and subtropics, large-scale commercial agriculture and local subsistence agriculture are responsible for about 40 percent and 33 percent of forest conversion, respectively. The remaining 27 percent of deforestation happens due to urban growth, infrastructure expansion and mining. Almost a third of commercial fish stocks are now fished at biologically unsustainable levels, triple the level of 1974.

The world’s natural resources, including genetic resources, as
well as ecosystem services such as pollination, provisioning of clean drinking water, natural biological control of insect-pests and diseases and the nutrient cycling in soils, underpin all food and agricultural systems. Ecosystem services in agriculture are the benefits society gets from the environment thanks to farmers' interventions. Nutritious food, clean water, healthy soils, pest and disease control and biodiversity are just a few examples of these benefits. But these essential ecosystem services cannot exist if the ecosystem functions are not supported, sustained, and biodiversity is not protected. Unsustainable land-use practices, land expansion and deforestation, illegal, unregulated and unreported (IUU) fishing, inadequate management of coastal areas, and over-exploitation of natural resources including overfishing and over-exploitation of freshwater, present major challenges to environmental sustainability of agriculture, forestry and fisheries and require strong governance mechanisms and instruments. These issues, among others, pose serious threats to food security and nutrition that may result in ecosystems degradation, including desertification, degradation of grasslands and forests, loss of arable land, habitats, species and genetic diversity, all of which can have negative ripple effects through the global food production system and human health and well-being.

Sustainable agricultural practices improve the availability, access and use of genetic material (crop varieties, fish and animal breeds) that are most suited to the local agro-ecology and cater to the needs of producers and consumers. However, the needs of producers are driven by financial benefits accruing from improved productivity, savings from reduced use of external inputs and opportunities arising from gains in time. While it is understandable, this line of thinking too often traps producers in the vicious cycle of sub-optimal yields and precarious livelihoods particularly as the natural resources base, including agrobiodiversity, is depleted. A new approach, one that protects and conserves the biodiversity of the environment is required to develop technical, policy, governance and financing approaches that are both producer and gender sensitive, tailored to local needs and which target the various components of the value chain. Empirical evidence from development programmes show how to attain increased total agricultural productivity, including policy and institutional reforms, in tandem with the maintenance of the ecosystem and the accruing services that include water retention, replenishment of soil nutrients, the control of pests, reduction of erosion, the provision of pollinators, and maintenance of water quality.

For instance, farmers engaging in Conservation Agriculture (CA) use a combination of technologies that imply low or no tillage, cover crops and crop rotation. In so doing, they minimize soil disturbance and promote healthy soils that result in higher and more sustainable yields. This increase of organic matter content or carbon sequestration in the soils gives farmers immediate as well as long term benefits in terms of enhancing productivity while conserving the soil and mitigating climate change.

A multi-disciplinary approach is key to successfully managing ecosystem services and protecting and conserving biodiversity. The critical fisheries resources of the Amazon Basin, for instance, also depend on the health of the adjacent forests. The forests provide habitats for fish within the ecosystem, they also provide food as many fish eat the fruits that fall on the water, they regulate the water delivery and the water quality, and they are the areas that take on seasonal floods.
Climate change is a defining challenge of our age.

Climate change is a defining challenge of our age. Heavy rainfall, flooding, storms, heat waves and droughts are increasing in frequency and intensity, and the effects are felt far and wide. These extreme weather events, combined with slow-onset changes such as temperature and sea-level rise, are increasingly affecting ecosystems and natural resources on which millions of people depend for their livelihoods and well-being.

The majority of the world’s poor live in rural areas, and agriculture is at times their only income source. Developing the potential to increase the productivity and incomes from smallholder crop, livestock, fish and forest production systems will be the key to achieving global food security and ending poverty over the next twenty years. Agriculture (including forestry and fisheries) is particularly vulnerable to climate change, but it is also a significant contributor to climate change. Without containing GHG emissions growth from agriculture, the Paris Agreement goals cannot be reached.

With the adoption of the Paris Agreement, the international community has shifted its attention to implementation of climate commitments. By submitting their Nationally Determined Contributions (NDCs), countries committed to climate action. The vast majority of countries refer to climate action in the agricultural sector, and about a third specifically refer to the beneficial linkage between mitigation and adaptation in agriculture. More than thirty countries specifically refer to Climate-Smart Agriculture.

FAO promotes Climate-Smart Agriculture (CSA) as an approach that can transform and reorient agricultural systems to effectively support development and ensure food security in a changing climate.

The approach, in practice, pursues the triple objectives of:

- Sustainably increasing productivity and incomes,
- Adapting to climate change; and
- Reducing GHG emissions, where possible.

QUICK FACTS

- Agriculture accounts for 70 percent of water use.
- Agriculture also accounts for 24 percent of anthropogenic GHG emissions while food loss and waste is responsible for about 8 percent of global GHG emissions.
- Agriculture is highly sensitive to climate change. Even a 2° C rise in global mean temperatures will destabilize current production systems.
- Agriculture (comprising crops, livestock, fisheries and forestry) absorbs a fifth of the economic impact caused by natural hazards and disasters in developing countries, including landslides, avalanches or the increase of varieties of weeds, pests and microorganisms.
- Emissions will have to be drastically reduced in order to keep climate change in check and keep the global temperature increase no higher than 1.5° C or 2° C, compared with pre-industrial levels.
Depending upon agro-climatic and socio-economic country and local circumstances, the importance of these objectives will differ. CSA pursues synergies but also recognises that there may be trade-offs between these objectives and promotes decisions based on evidence to select options that are best suited to meet national and local development goals.

CSA is not a set of practices that can be universally applied or applied in isolation, but it is rather an approach that involves different elements embedded in local contexts. The work of FAO to make agriculture, forestry and fisheries more productive and sustainable recognizes that the challenge of climate requires a climate-smart approach to achieve sustainability.

FAO supports countries to enhance the evidence base and strengthen policies and planning for the adoption of Climate-Smart Agriculture at the farm, landscape and national level. At field level, FAO works on capacity development with producers adopting CSA practices through Farmer Field Schools and other advisory services. As an active member of the Global Alliance of Climate-Smart Agriculture and regional CSA alliances, FAO fosters knowledge and supports collaboration to enhance the scale of CSA implementation.
ACHIEVING RESULTS AND SHOWING IMPACT

Regional Initiative “Near East and North Africa’s Water Scarcity Initiative”

Regional Initiative “Sustainable production intensification and value chain development in Africa”
In close collaboration with its partners, FAO works to make agriculture, forestry and fisheries more productive and sustainable in countries and regions around the world as illustrated in the following examples.
REGIONAL INITIATIVES

The Regional Initiatives of FAO are tailored to regional and country needs.

They promote sustainable agricultural development as a way to increase the production and productivity of agriculture, provide for better conservation and enhancement of natural resources and ecosystem services, as well as reduce climate change in different regions.

NEAR EAST AND NORTH AFRICA’S WATER SCARCITY INITIATIVE

In the Near East and North Africa, fresh water resources are among the lowest in the world. Through this Regional Initiative, FAO and its partners advise governments and the private sector on the adoption of modern technologies and institutional solutions that best increase the efficiency and productivity of water use in agriculture for the benefit of millions of farmers and rural communities in the region.

Options to save water and increase water productivity all along the food value chain will be shared with the private sector, while governments will be encouraged to promote incentive frameworks that reposition farmers at the center of the sustainable management of land and water resources.

SUSTAINABLE PRODUCTION INTENSIFICATION AND VALUE CHAIN DEVELOPMENT IN AFRICA

FAO takes a holistic approach to enhanced agricultural diversification, productivity and competitiveness in Africa, within a value chain context. It supports the development of value chains of agri-livestock, including reduced post-harvest loss and waste and land tenure arrangements.

In Africa, FAO facilitates knowledge exchanges on small-scale irrigation, climate smart agriculture/conservation agriculture, crop and livestock value chain development, diversification, access to markets and competitiveness. Furthermore, special consideration is given to gender mainstreaming, youth, governance and the design of the activities. In going forward, this Regional Initiative will focus on sustainable intensification of production and the associated measures needed to address post-production issues.
ASIA AND THE PACIFIC’S REGIONAL RICE INITIATIVE

The havoc that the 2008 rice price crisis and changing climatic patterns caused on traditional rice-based farming systems gave rise to new rice policies and strategies for more sustainable ways of rice farming. The Organization’s Regional Rice Initiative Phase II aims to apply innovative and sustainable rice farming practices to bring about food-secure, better nourished and prosperous rice farmers and consumers in the region.

ASIA AND THE PACIFIC’S BLUE GROWTH INITIATIVE

The Blue Growth Initiative harnesses the potential of the agricultural and maritime sectors for sustainable growth. An array of rice-fish, and rice-vegetables systems have been put in place and integrated through Farmer Field Schools for sustainable intensification of rice production (SIRP). FAO has also been working on sustainable intensification of aquaculture for blue growth – improving production efficiency, sustainability and resilience for food and nutrition. This has led to increases in livelihood opportunities and contributes to a sustainable blue growth of the economy.
FROM THE FIELD

CLIMATE-SMART AGRICULTURE IN SMALLHOLDER FARMING SYSTEMS (Kenya & Tanzania)

Climate change is a fundamental threat to food security in East Africa, with its impacts exacerbating the vulnerability of small-scale farmers, already on the brink of poverty and hunger. The FAO Mitigation of Climate Change in Agriculture (MICCA) programme has been assisting countries in the region to reduce the climate footprint of agricultural sectors with high GHG emissions. Two MICCA pilot projects were first implemented in Kenya and Tanzania from 2010-2014. Almost 10 000 smallholders improved their skills to integrate Climate-Smart Agriculture (CSA) into their farming systems and local landscapes.

In Kenya, FAO supported over 4 500 smallholder dairy farmers to raise climate-smart cattle and improve the overall GHG balance of farming systems. In Tanzania’s Uluguru mountains, 4 948 households were trained to integrate soil and water conservation practices into farm management. Farmers reported higher yields and income as well as increased food availability, proving that smallholder farmers can play a part in the fight against climate change while increasing their productivity and maintaining their livelihoods. These successes and lessons are now up-scaled to the national level to shape policies, plans and programmes that support CSA in Kenya and Tanzania.

EMPOWERING FEMALE SMALLHOLDERS THROUGH THE PROMOTION OF CONSERVATIVE AGRICULTURE (Zambia)

Agriculture has been an important engine of growth and poverty reduction in Zambia. But the sector is underperforming largely due to the effects El Niño and also because women, often a crucial resource in agriculture and the rural economy, face discrimination that reduces their productivity.

In partnership with the EU, FAO is supporting the Zambian Ministry of Agriculture and Livestock to increase agricultural productivity and empower female smallholders. These interventions are helping farmers in 31 districts to use agricultural inputs more efficiently and produce higher yields, with a particular emphasis on addressing the socio-economic barriers that rural women confront.

The project’s Gender Equality and Women’s Empowerment Strategy is helping to mainstream gender in all of its activities. Potential female agro-entrepreneurs are given access to productive resources, such as credit and financing; while female farmers are provided with agricultural inputs and herbicides, a key labour-saving technology in conservative agriculture. To date, 49 percent of project beneficiaries are women. These efforts are effectively promoting the sustainable intensification of agricultural production to the benefit of all farmers, particularly female smallholders, strengthening their resilience and capacities to adapt to climate change.
A VORTEX OF PRESSURES CALLS FOR A NEW PARADIGM

USING NON-CONVENTIONAL WATERS TO SUSTAIN LIVELIHOODS
(Algeria, Egypt, Morocco and Tunisia)

In the dry areas of North Africa and the Near East, population growth and rapid urbanization are intensifying pressures on already scarce, fresh water resources. In addressing these challenges, FAO has joined forces with Italian partner universities and corporations to launch a project on urban wastewater use for irrigation. Safe, environmentally sound and cost-efficient techniques on treating wastewater are now employed in municipalities throughout Algeria, Egypt, Morocco and Tunisia. The project has also supported the construction of water treatment facilities and ferti-irrigation schemes in these countries but is also ensuring long-term sustainability through capacity building. Stakeholders are equipped with skills which enable them to properly manage and replicate these systems, in order to fully reap the benefits of the innovative techniques applied. Building upon the experiences of the Regional Water Scarcity Initiative, this endeavor demonstrates the sustainability and economic viability of low-cost wastewater treatments to improve the livelihoods of populations in the region.
The Ecuadorian province of Chimborazo has the largest and best-conserved expanse of páramos – neotropical high mountain biome with a vegetation composed mainly of giant rosette plants, shrubs and grasses – in the country. This mountainous ecosystem is characterized by rich, sponge-like soils that capture and retain water that is critical to the region for irrigation, human consumption and hydropower purposes. Over time, farmers have been obliged to expand their crop and pasture areas to higher altitudes, at the expense of the páramos. These practices have resulted in the loss of habitats, biodiversity and inappropriate management of these natural resources.

In response, FAO is cooperating with the Ministry of Environment and the provincial government of Chimborazo, to support the sustainable management of the biodiversity and water sources in the region. A community-based watershed management planning scheme has been established to prioritize conservation and sustainable production projects involving more than 100 communities. Three years since its inception, the project resulted in more sustainable farming practices, which are enhancing the conservation of páramo biodiversity and scarce water resources.
ACHIEVING RESULTS AND SHOWING IMPACT

**FARMER FIELD SCHOOL IMPROVES FOOD SECURITY AND NUTRITION**

*Burundi*

With an expanding population living off limited land, often divided into small plots, increasing food production in Burundi will mean focusing on integration and efficiency in farming systems rather than simply bringing more land under cultivation. Through projects implemented by FAO and its partners, 300 hectares of a watershed have been stabilized through sustainable and integrated land management (SLM). The Farmer Field Schools use SLM practices to reduce deforestation and control soil erosion through farming, adopting agroforestry and contour planting - planting bamboo along the river banks to hold soil. The cultivation of over 49,000 fruit trees across field crops also contributed to improve soil fertility and human nutrition.

Reduced erosion in the fields has resulted in higher production, as crops have not been destroyed by floods. This has encouraged farmers to first invest in better seed varieties for horticulture production, then diversifying to include apiculture and mushroom cultivation, which helped to increase their access to foods rich in vitamins and micronutrients, which also contributed to generating more income. The soils were fortified through mineral fertilizers and then planted with better quality seeds of crops, including maize, whose yields tripled in one of the fields. Varieties of crops, including bananas and fruit trees, were chosen based upon resistance, yield and nutrition value.

**PROMOTING SUSTAINABLE RICE INTENSIFICATION AND LIVESTOCK OR FISH-CROP SYSTEMS**

*Lao PDR, Cambodia, China, Indonesia, Pakistan, Thailand, Viet Nam*

To formulate policies that support rice production, policy makers need to be informed of innovative methods and technologies. Since the 2011 launch of FAO’s ‘Save and Grow’ campaign, South and South East Asian countries – where much of the world’s rice is produced – have endorsed System of Rice Intensification (SRI) methods in their national food security programmes. Today, millions of rice farmers have adopted these practices, which have addressed many of their challenges.

SRI also allows farmers to cultivate rice in rainfed areas, such as northeast Thailand, which are increasingly affected by drought, and in major irrigated rice areas of China, Pakistan and India, where, by 2025, water supply is forecasted to be insufficient to meet demand. In Lao PDR, FAO projects supported farmers in transforming the rice sector into a dynamic and competitive one using sustainable practices. Farmers found they could produce rice with better and fewer inputs such as certified seeds which resulted in higher yields and profits. In promoting rice-fish systems, farmers learned of the importance of goods and services produced by rice ecosystems while engaging in sustainable rice-fish farming practices. Rice paddies are rich ecosystems with abundant fish, crabs and other species that are essential for food security and nutrition of rice farmers.
MORE MAIZE, LESS EROSION ON TROPICAL HILLSIDES (Honduras)

On the steep hillsides of southwestern Honduras, the traditional ‘slash-and-burn’ cultivation of maize, beans and other food crops has led to widespread deforestation and environmental degradation. Recognizing that slash-and-burn cultivation was unsustainable, farmers in the Honduran department of Lempira developed a low-cost, resource-conserving system for growing their crops. FAO has been working with local farmers and farmers’ groups to develop and disseminate those practices, which have become known as the Quezungual Agroforestry System, or Qsmas.

Using Qsmas, farmers in the region have been able to double the productivity of their lands. Increased productivity has improved food security and allowed farmers to set aside space in their fields to explore different options for producing food. Almost half of all farmers who have adopted Qsmas use some part of their land, and their additional income, to diversify production. Farmers have embraced the system because it is founded on familiar, indigenous farming practices, but is more productive and profitable than slash-and-burn agriculture, and delivers many other benefits.

PILOTING SUSTAINABLE AGRICULTURE (Rwanda)

Agriculture is the economic backbone of Rwanda, providing 90 percent of the country’s food needs and employing almost 80 percent of the active population. However, the ‘land of a thousand hills,’ with over 11.7 million citizens, is the second most densely populated in Africa and under severe pressure to increase productivity of agriculture and incomes of smallholder farmers, while conserving the country’s natural resources. In 2014, Rwanda partnered with FAO to pilot sustainable food and agriculture. This involved integrating the three dimensions of sustainability (economic, social and environmental) and giving people a central role in addressing sustainability issues through multi-stakeholder, cross-sectoral dialogues so that, together, they could find solutions across sectors that traditionally have been in competition with each other. FAO has been working at both national and local levels.

In close collaboration with the FIRST Programme (Food and Nutrition Security Impact, Resilience, Sustainability and Transformation), FAO facilitates cross-sectoral policy dialogue at a national level. A cross-sectoral working group for agriculture and natural resources guided the development of a strategy on agro-forestry. At the local level, FAO works in Rwanda’s northern province at the Yanze river catchment. There, FAO facilitates dialogue to further an integrated approach to agriculture that integrates the five principles of Sustainable Food and Agriculture. While it is still early days, Rwanda is taking key steps with its many projects. Examples include participatory landscape assessment and planning, participatory learning through farmer field schools for vegetables agroforestry, soil and water conservation, integrated soil fertility management, crop-livestock integration, and helping farmers increase their incomes with diversification and reach the market by building vegetable collecting points.
ACHIEVING RESULTS AND SHOWING IMPACT

CONSERVATION AGRICULTURE
THE KEY TO FOOD SECURITY
(Bangladesh, India, Nepal, Pakistan)

Stretches across South Asia, from Bangladesh, through India and Nepal to Pakistan, the Indo-Gangetic Plains are both the rice bowl and breadbasket of 1.8 billion people. However, in recent years, rice and wheat productivity had begun to stagnate, with yields well below the expected levels. The decline is a result of ‘soil fatigue’ caused by decades of intensive cultivation, the depletion of groundwater, and rising temperatures. In response, the Rice-Wheat Consortium, together with FAO and the Consultative Group on International Agricultural Research (CGIAR), launched a concerted effort to promote resource-conserving technologies for cereal production.

The most widely adopted among these technologies being zero-tillage, which has led to urgently needed, reductions in the use of irrigation water and is helping farmers to reduce production costs and GHG emissions. In India and Pakistan, the rate of adoption of zero and reduced tillage for wheat and rice production has been exponential. These systems are proving to be fundamental to the food security, incomes and employment of hundreds of millions of rural and urban poor in South Asia.

FARMERS STOP PLOUGHING
ON KAZAKHSTANI STEPPE
(Kazakhstan, Uzbekistan, Tajikistan)

The widespread adoption of Conservation Agriculture (CA) in northern Kazakhstan’s wheat belt has been driven by necessity. While the country has vast land resources for wheat production, and is one of the world’s leading producers and exporters of high-quality wheat and flour, the crop relies entirely on precipitation and is, therefore, very vulnerable to the loss of soil moisture the region has recently experienced. The International Maize and Wheat Improvement Center (CIMMYT) and FAO, together with Kazakhstani scientists and farmers, launched a programme to introduce CA in rainfed areas. The programme trials demonstrated that CA practices including zero-tillage and crop rotation had the potential to produce higher wheat yields and to reduce labour and fuel costs.

Applying these principles, some farmers in Kostanay province achieved yields of two tonnes per hectare, almost double the national average previously. CA is considered highly suitable for all of Central Asia’s major cropping systems, from north Kazakhstan’s wheat belt down to the irrigated wheat, rice and cotton fields of Uzbekistan and Tajikistan. Other countries in the region could learn from the Kazakhstani example, where state policy promotes CA, and the top priority in agricultural research is the development and dissemination of water-saving technologies.
INTEGRATING AGRICULTURE IN NATIONAL ADAPTATION PLANS (Uganda)

Changing temperature patterns in Uganda have been linked to more frequent and longer lasting droughts and, consequently, the increased death of cattle. These impacts are economically significant for a country that is reliant on its natural resources. In response, FAO and the UNDP have collaborated with the Ugandan Government to integrate its agricultural sectors – including livestock, forestry, fisheries and aquaculture – in the National Adaptation Plan (NAP) process. The aim is to strengthen the resilience of rural populations and agricultural production systems in the central Cattle Corridor and build both the capacities of communities and commercial farmers to cope with the effects of climate change.

By 2018, Uganda is expected to benefit from technical assistance to aid its work plan activities, in addition to global expertise on mainstreaming climate change into planning and budgeting. A significant milestone thus far was the construction of the National Resource Centre for Climate Change in June 2015, affording the department a dedicated space and the material resources to work on climate change issues. Implementation of the project, supported by FAO and UNDP teams, has also resulted in the integration of adaptation needs into field programmes, including using various crop varieties, and adopting sustainable land management.

INTEGRATED RICE-FISH-AQUATIC BIODIVERSITY INCREASES GROSS INCOME (Viet Nam)

Rice production in Viet Nam is important to the food supply in the country and national economy. In an effort to reduce the use of pesticides and improve both the rice ecosystem health and farmers’ incomes, FAO worked with farmers to integrate rice-fish-aquatic biodiversity into the production system. A total of 105 Farmer Field School farmers (55 women) with adjacent fields on an area of 34 hectares were selected. Rice farmers applied the efficient management principles they learned to grow healthy, well-yielding crops with fewer and more sustainable production inputs. They explored ways to make optimal use of the multiple goods and services that paddy-based farming systems offered. Farmers learned conservation and management of aquatic biodiversity techniques (including both captured and cultured fish species) in combination with improved agronomic practices such as wider plant spacing/reduced seeding rates, improved water management, and reduced chemical pesticides. The average gross income from integrated rice-fish-aquatic production was US$7,751, four times the income (US$1,892) from producing only rice. In general, it was found that these practices increased incomes by 210 percent to 550 percent. Farmers’ experience and the aquatic biodiversity species and numbers – especially fish – accounted for the large difference in benefits. Informed decision-making, based on agro-ecosystem analysis, led to more effective, natural and sustainable pest management. For example, the fish ate insect pests found at the stem and base of rice plants as well as those that fell into the water, which avoided unnecessary use of chemical pesticides and the use of biological control agents.
The 17 Sustainable Development Goals (SDGs) of the 2030 Agenda for Sustainable Development are a set of global priorities adopted by countries in September 2015 to end poverty and hunger, sustain the planet’s natural resources and ensure prosperity for all.

Food and agriculture cut across all the SDGs and lie at the very heart of the 2030 Agenda.

With an integrated approach aimed at tackling the root causes of poverty and hunger, sustainable management of natural resources and leaving no one behind, the strategic work of FAO is broadly aligned with the SDGs.

Our wide-range of technical expertise, length of experience working with development partners and unique skills in the three dimensions of sustainable development (social, economic and environmental) qualify FAO as a valuable ally for countries in implementing and monitoring the SDGs.

To learn more, consult our webpage on the work of FAO in the SDGs. This page is continuously updated with all the latest developments in relation to food and agriculture in the 2030 Agenda.