FAO-Adapt

Framework Programme on
Climate Change Adaptation

FAO-ADAPT
FRAMEWORK PROGRAMME ON CLIMATE CHANGE ADAPTATION

FOOD AND AGRICULTURE ORGANIZATION OF THE UNITED NATIONS (FAO)
2011

Cover photo: ©FAO/Giuseppe Bizzarri

ACKNOWLEDGMENTS

This document is the outcome of a collaborative effort across FAO involving headquarters, technical departments and regional, subregional and liaison offices. It was coordinated by the adaptation subgroup of FAO's Inter-Departmental Working Group on Climate Change (IDWG-CC). We sincerely wish to thank all FAO colleagues involved for their commitment, technical contributions and stimulating debates.

In particular, we would like to thank the departmental and regional focal points for climate change for the coordination within their respective units, Kaisa Karttunen for the technical consolidation of the document, and the co-chairs of the adaptation subgroup, Stephan Baas and Doris Soto, who facilitated the participatory dialogue for the development of FAO-Adapt throughout FAO.

ABBREVIATIONS AND ACRONYMS

CAADP	Comprehensive African Agriculture Development Programme
CCA	Climate change adaptation
CFS	Committee on World Food Security
CPF	Country programming framework
DRM	Disaster risk management
DRR	Disaster risk reduction
GEF	Global Environment Facility
HLCP	High-level Committee on Programmes
HLPE	High Level Panel of Experts on food security and nutrition
IDWG-CC	Inter-Departmental Working Group on Climate Change
IPCC	Intergovernmental Panel on Climate Change
LDCF	Least Developed Countries Fund
MDG	Millennium Development Goal
NAPA	National Adaptation Programme of Action
PWB	Programme of Work and Budget
REDD	Reducing Emissions from Deforestation and Forest Degradation
RBM	Results-based management
SCCF	Special Climate Change Fund
SIDS	Small island developing states
UNDAF	United Nations Development Assistance Framework
UNFCCC	United Nations Framework Convention on Climate Change
UNFF	United Nations Forum on Forests

CONTENTS

©FAO/Giuseppe Bizzarri

1. INTRODUCTION

1.1 CONTEXT

The increasing spectre of soaring food prices and global warming has brought food security and climate change concerns to the top of the international agenda. Agriculture – namely its agriculture, forestry and fisheries sectors – now faces the double challenge of dealing with the impact of climate change at the same time that it must increase production to meet the food demands of a global population projected to reach 9.1 billion by 2050. Looking ahead, FAO recognizes that these two challenges must be addressed together. Climate change adaptation, a must for the agricultural sectors, will require substantial technical and financial investments in order to achieve food and nutrition security, particularly in food-insecure developing countries.

FAO has more than six decades of experience dealing with climate-related issues. Today, as the world seeks ways to cope with human-induced climate change, FAO has established its position as a global organization with broad understanding of the issues as well as the necessary organizational infrastructure and expertise to support members in adapting their agricultural production to new climate realities.

With respect to climate change adaptation in agriculture, forestry and fisheries, FAO has taken significant and concrete initiatives that provide multiple benefits. FAO provides implementation support to more than 50 global, regional, national and local projects designed specifically to address climate change adaptation, climate-related disaster risk management or a combination of adaptation and mitigation. This means that while these activities reduce existing adaptation deficits and lay a foundation for long-term resilience, they will simultaneously enhance sustainable production increases and food security.

FAO does substantial normative work, developing methods, tools and approaches for climate impact assessment and adaptation. It has a long track record of collecting, processing and applying geospatial information on natural resources and climate as well as data and information on the potential and actual production of food, the state of the world's fisheries and forests, and of its water, land and genetic resources. In many cases, FAO is the main source of this information which is essential for formulating adaptation baselines and strategies.

FAO contributes to global and regional climate change negotiations and discussions advocating for better reflection of agriculture and food security. It works with and provides information to a host of global organizations and instruments involved in adaptation. Ensuring that the nations of the world are prepared to adapt to changing climates is a critical step in FAO's ongoing efforts to achieve global food security.

1.2 INTRODUCING FAO-ADAPT

In 2009, the World Summit on Food Security recognized the challenges climate change presents to food security. In doing so, it offered a proactive commitment to support adaptation and mitigation efforts in agriculture, as well as efforts to increase the resilience to climate change, with particular attention to small agricultural producers and vulnerable populations.

Building on this, FAO has called for an integrated climate change programme with expanded work on adaptation that builds on current activities and is consistent with the legal and political framework of the United Nations Framework Convention on Climate Change (UNFCCC) and the scientific work of the Intergovernmental Panel on Climate Change (IPCC). In February 2011, FAO's Programme Committee recommended that FAO coordinate cross-cutting issues, such as climate change, across FAO's strategic objectives. The FAO Framework Programme on Climate Change Adaptation, called FAO-Adapt is a concrete tool towards achieving these goals.

FAO-Adapt serves a double purpose. First, it systemizes the adaptation activities currently underway across the organization which serves to ensure that all efforts can move ahead toward a clear and unified goal. This, in turn, enables FAO to present a comprehensive body of work to the outside world – as it seeks support to expand its adaptation activities in response to the increasing needs of member countries.

FAO-Adapt will help enhance this support by mainstreaming climate change adaptation into all FAO development activities at national, regional and global levels.

The ability of FAO-Adapt to consolidate FAO's stand-alone work on climate change adaptation and to mainstream climate change adaptation into all of FAO's work on poverty reduction, food security and sustainable development will make a big contribution toward the achievement of FAO's strategic objectives. In addition, FAO-Adapt responds to the global call for enhanced action on adaptation that emerged from the December 2010 decision to establish the Cancún Adaptation Framework and Green Climate Fund as a part of the Cancún Agreement.

The document consists of five main sections. Chapter 1 introduces the background and context of FAO-Adapt. Chapter 2 discusses climate change impacts on the agriculture sectors and food security while Chapter 3 defines adaptation in the context of the agriculture sectors and describes means and measures for adaptation. Chapter 4 introduces FAO's work on climate change adaptation with its core principles and priority adaptation themes and actions and, in conclusion, Chapter 5 presents FAO-Adapts implementation proposals.

At a Glance: FAO-Adapt

FAO-Adapt is an organization-wide framework programme that provides general guidance and introduces principles as well as priority themes, actions and implementation support to FAO's activities for climate change adaptation.

FAO-Adapt offers an initial consensus and comprehensive view of the way forward for mainstreaming climate change adaptation into all FAO development activities and contribute to heading off negative climate impacts.

FAO-Adapt catalyses FAO's adaptation activities to increase its ability to respond to member country requests for support in implementing climate change adaptation measures in agriculture, forestry and fisheries.

FAO-Adapt brings together the body of climate change adaptation work accomplished by FAO, its technical units, decentralized offices and regional bodies.

FAO-Adapt aims to enhance coordination, capacity development and sharing of experiences on adaptation within FAO and among its member countries to widen the coverage, encourage synergies, enhance cross-sectoral approaches and optimize the use of resources for adaptation.

FAO-Adapt facilitates external and internal communication as well as mobilization of additional resources for FAO's work on adaptation.

FAO-Adapt fosters partnerships related to adaptation, including UN agencies, international financing and research institutions, and regional organizations.

©FAO/Giuseppe Bizzarri

2. IMPACT OF CLIMATE CHANGE ON AGRICULTURE, FORESTRY, FISHERIES AND FOOD SECURITY

Climate change affects all agricultural sectors in a multitude of ways that vary region by region. For example, it reduces the predictability of seasonal weather patterns and increases the frequency and intensity of severe weather events such as floods, cyclones and hurricanes. Some regions face prolonged drought and water shortages. Changing temperatures are leading to changes in the location and incidence of pest and disease outbreaks (FAO, 2009a). Approximately 20–30 percent of plant and animal species will be at increased risk of extinction if the global average temperature increases more than 1.5–2.5°C (IPCC, 2007a). The widespread melting of glaciers and snow cover will reduce melt water from major mountain ranges, resulting in reduced availability of water for irrigation downstream. Annex 1 provides a regional overview of possible climate change impacts on agriculture, forestry and fisheries sectors.

Vulnerable communities and people living in fragile environments, such as drylands, mountain areas and coastal zones, will be particularly affected. Climate change will significantly increase production risks of farmers, livestock keepers, fishers and forest-dependent people, particularly in regions that already suffer from chronic soil and water scarcity, high exposure to climatic extremes including floods and droughts, and poverty and hunger (FAO, 2008b).

While farmers in some regions may benefit temporarily from the effects of CO2 fertilization, longer growing seasons and higher yields, the general consequences of climate change are expected to be adverse, particularly for the poor and marginalized. Climate change impact has been found to differ between men and women. It affects food insecure people who are vulnerable to climate change in differing ways according to, for example, their gender, age, health or education.

Crop and livestock production will be affected by increasing temperatures, changing precipitation patterns, and more frequent and intense extreme weather events. These will have direct effects on crop growth and their need for water, as well as soil fertility, water supply for irrigation, and prevalence of pests and diseases. In terms of livestock, climate change also will affect the quality and amount of feed supply and the carrying capacity of pastureland. At the same time, they will have indirect effects on market prices, due to the different regional effects of climate change (UNFCCC, 2010).

Fisheries and aquaculture production systems are likely to suffer from increased water temperatures, sea-level rise and decreased pH, changes in current sea productivity patterns, flooding, droughts and increases in frequency and intensity of storms and other extreme weather events.

Forests and rangelands will be sensitive to climate variations, weather extremes and long-term changes, such as changes in daytime, nighttime and seasonal temperatures, storm patterns, duration and intensity of heat waves, droughts and floods, incidence of pests and diseases, and frost, snow and ice cover.

Coastal areas will suffer, as the rising temperature will affect coral reefs. Damaged reefs will no longer provide coastal protection which, in combination with rising sea levels and increased extreme weather events, becomes a direct threat to agriculture, forestry, fisheries and other livelihoods in coastal areas.

In addition to climate change, other interlinked environmental challenges, such as loss of biodiversity, land degradation and water scarcity, will affect the capacity of agriculture, forestry and fisheries to produce sufficient food, feed, fibre and other products, and provide services to meet the increasing demand stemming from population growth, urbanization, changing consumption patterns and economic growth.

At its 2010 session, the Committee on World Food Security (CFS) requested the High Level Panel of Experts on food security and nutrition (HLPE) to:

"review existing assessments and initiatives on the effects of climate change on food security and nutrition, with a focus on the most affected and vulnerable regions and populations and the interface between climate change and agricultural productivity, including the challenges and opportunities of adaptation and mitigation policies and actions for food security and nutrition."

BOX 1

Impact of climate change on the four dimensions of food security

By altering the conditions of agriculture, forestry and fisheries production and rural livelihoods, climate variability and long-term changes will likely have serious impacts on the four dimensions of food security (FAO, 2008b). Enabling countries to cope with these impacts will require additional efforts from FAO.

Food availability – will decrease in some regions due to a decline in food production from agriculture, forestry and fisheries caused by extreme events, changes in the suitability or availability of arable land and water, and the unavailability or lack of access to technologies and crops, crop varieties and animal breeds that can be productive in changing conditions.

Food access – will face further constraints in some regions because of climate change events that can damage infrastructure and lead to loss of livelihood assets as well as loss of income and employment opportunities.

Food supply stability – will be influenced by food price fluctuations and a higher dependency on imports and food aid in some regions.

Food utilization – will be affected indirectly by food safety hazards associated with pests and animal as well as human diseases.

3. ADAPTATION IN THE CONTEXT OF AGRICULTURE, FORESTRY AND FISHERIES

3.1 DEFINING ADAPTATION

Adaptation to climate change requires making anticipatory adjustments to prepare for expected climate variability and changing average climate conditions, in order to moderate harm and exploit beneficial opportunities (IPCC, 2007a). Climate vulnerability is commonly interlinked with poverty and food insecurity, yet not all poverty alleviation efforts constitute effective reduction in climate vulnerability and not all adaptation will automatically lead to immediate improvements in food security.

Adaptive capacity. Most ecological and social systems have built-in adaptive capacity. However, the current climate variability and rapid rate of climate change are imposing new pressures that have the potential to overwhelm existing coping capacity. The indigenous knowledge of farmers, forest-dependent people and fishers can be a valuable entry point for localized adaptation. This means recognizing the advantage and capitalizing on locally adapted crops, fish and livestock, farming systems, soil, water and nutrient management, agroforestry systems and vegetation fire management. Nevertheless, in efforts to address complex and long-term problems caused by changing climate, indigenous knowledge often needs to be complemented by scientific know-how.

Adaptation efforts must create the capacity to cope with more frequent, increasingly difficult conditions and gradual changes in climate, even though it often is not possible to anticipate their precise nature. This requires focus on capacity development that strengthens institutions dealing with monitoring, research and extension, as well as social learning, innovation and development processes. When localized projections of climate change impacts are not available, this will require a "no regrets" approach, which means taking adaptive actions that will be beneficial even if climate change threats do not occur exactly as anticipated (FAO, 2009b).

Adaptation deficits. Production systems with low productivity and high production volatility that make them chronically vulnerable are said to have "adaptation deficits". Even under existing conditions, these systems produce less, meaning there is a yield gap between their average yields and those of demonstration farms using best practices. They also are less efficient and less resilient to shocks than they could be. Adaptation deficits have arisen, for example, where investments in agriculture have been repeatedly neglected (World Bank, 2010). In such systems, impacts of climate variability and extreme events already reinforce poverty and slow development. That is why it is critical to develop policies and programmes for agriculture, forestry, fisheries and food security that reduce annual climate risk by increasing productivity in a sustainable manner, diversifying rural livelihoods, and increasing local control over resources and decision-making. In this way, they serve current development needs while also preparing ground for the future adaptive capacity (Padgham, 2009).

Risk management and change management. Both risk management and change management play roles in adaptation to climate change. Disaster risk management focuses on preventing, mitigating, preparing for and responding to shocks in short- and medium-term scales, while change management adds a strategic, long-term objective to policy, legal and research frameworks. Both perspectives are interrelated and mutually complementary, providing incentives to modify behaviours and practices over the medium to long term.

- Disaster risk management serves to handle threats such as increased frequency and intensity of extreme weather events and changing patterns of pests and diseases. Strengthening disaster risk management calls for improving local processes and practices for risk reduction and enhancing emergency response and rehabilitation operations.

- Change management in the agricultural sectors consists of several elements, such as legislation,

social and institutional development; policies and planning covering cropping, livestock, forestry, fisheries and aquaculture; land, water and genetic resources; livelihoods; integrated farming systems and ecosystems; and linking climate change adaptation and mitigation processes (FAO 2008b).

When optimizing current conditions and minimizing vulnerability to future changes, trade-offs may occur. For example, converting mangroves into shrimp farms may increase incomes and food supply, but it also may increase vulnerability to climate extremes and climate change. Diversifying agriculture or rural livelihoods builds long-term resilience, but it may decrease income in the short-term. For developing countries, short-term challenges, including immediate climate risks, are often so great that long-term climate risks cannot be given sufficient attention. Designing responses that acknowledge both short- and long-term food security usually requires parallel processes – phased and iterative planning alongside introduction of short- and long-term measures.

3.2 MEANS AND MEASURES FOR ADAPTATION

Adaptation is not accomplished in a single intervention. Rather, it is a continuum, requiring an overarching approach that incorporates interventions that range from those that address underlying drivers of vulnerability to those designed exclusively to respond to climate change impacts (ODI, 2010). The vulnerability of a system depends on its exposure and sensitivity to changes, and on its ability to manage these changes (IPCC, 2001). Climate change adaptation can thus be enhanced by i) altering exposure ii) reducing sensitivity of the system to climate change impacts and iii) increasing the adaptive capacity of the system (OECD, 2010).

Adaptation processes need to be location- and context-specific, integrated and flexible. This is accomplished by basing them on climate monitoring and location and context-specific impact and vulnerability assessments and, at the same time, engaging and working with stakeholders to develop institutional capacity and identify, evaluate, prioritize and select available adaptation options and tools.

In a larger view, adaptation needs to be made an integral part of sustainable development, with climate change implications factored into all development planning, decision-making and implementation. To achieve this goal, the following means and channels can be used to support adaptation in institutions, ecosystems, livelihoods and production systems.

- Mainstream and integrate adaptation fully into agriculture, forestry, fisheries, food security, biodiversity and natural and genetic resource policies, and strategies and programmes at the subnational, national, subregional and regional levels. The goal is to ensure synergy among food security, sustainable development, adaptation and mitigation by raising awareness of links, screening existing development and sectoral policies, strategies and plans through a climate lens, and determining whether they might lead to maladaptation or miss important opportunities arising from climate change (UNDP, 2010).

- Reduce adaptation deficits through development activities in order to reduce vulnerability and lay the foundation for long-term food security through, for example, sustainable increases in agricultural productivity.

- Climate proof all future development plans and interventions by determining whether they are climate sensitive. If so, a more detailed climate risk assessment may be necessary to pinpoint whether they should be amended or if new actions, such as infrastructure development, should be taken to make them more sustainable.

- Enhance adaptation by investing in advocacy and normative work. This can include developing and piloting tools and methods; collecting, analysing and utilizing data and statistics; facilitating information exchanges and communication; advocating and contributing to global, regional and national processes; mainstreaming gender and social considerations in adaptation; preparing manuals and guidelines; and establishing networks and partnerships.

- Promote adaptation through prevention or removal of maladaptive practices, such as those that promote monoculture at the cost of biodiversity. These practices address specific development or short-term adaptation needs and end up being counterproductive with respect to adapting to long-term climate change.

- Work through stand-alone adaptation projects and programmes designed to address specific climate change-induced problems in the agriculture, forestry and fisheries sectors, such as building climate monitoring and impact assessment capacities, diversifying livelihoods, developing entirely new production systems, and promoting urban agriculture.

- Include adaptation as a distinct component of larger programmes, such as multidisciplinary research programmes or institutional capacity development programmes that contain a climate change focus.

- Build the type of capacities institutions need to implement adaptation practices.

Adaptation and development are needed in both smallholder and commercial agricultural systems, but they will have significant differences in their priorities and capacities. Commercial systems are chiefly concerned with increasing resource efficiency and reducing emissions. In agriculture-based countries, where agriculture is critical for economic development, adaptation in smallholder systems is important for food security and poverty reduction, as well as for growth and structural change (FAO, 2010). FAO's work on adaptation to climate change for food security particularly emphasizes the needs of vulnerable groups.

BOX 2

Strong institutions are crucial for adaptation

The governance and coordination of climate change issues at global, regional, national and local levels pose additional challenges to existing governance systems which may need strengthening.

This could require developing new decision support tools and the strengthening of formal and informal structures and institutions in areas such as research, communication and finance. Institutions shape and modify the capacity of farmers, fishers and forest-dependent people to adapt their livelihoods to climate change.

Adaptation requires information generation through research systems. Enhancing communication between producers and users of climate science is clearly a requirement. Institutions to facilitate this exchange can be existing communications and information dissemination networks including, e.g. extension or farmer field schools. Communication for development methods and tools are instrumental for this purpose.

Producer organizations may play a more important role in the future by, for example, offering new avenues to input supplies. Effective plant breeding and seed systems are essential to provide adapted varieties to farmers. Property rights and systems to regulate use and access to natural resources are essential to manage these resources.

Climate change creates new financing requirements in terms of both amounts and financial flows associated with needed investments, which will require innovative institutional solutions.

Various forms of informal insurance mechanisms exist in many rural communities in developing countries, and new mechanisms, such as index insurance, are being developed. Safety nets are a form of social insurance comprising programmes supported by the public sector or NGOs that provide transfers to prevent the poor from falling below a certain poverty level. Safety nets are likely to become increasingly important in the context of climate change (FAO 2010).

©FAO/P. Lowrey

4. FAO'S WORK ON CLIMATE CHANGE ADAPTATION

FAO's vision for the future is a world free of hunger and malnutrition where food and agriculture contribute to improving the living standards of all, especially the poorest, in an economically, socially and environmentally sustainable manner. FAO considers climate change an additional challenge to hunger eradication – one that needs to be addressed as a crosscutting theme rather than a separate activity. FAO has received many requests from its member countries for assistance in assessing climate change impacts on agriculture, forestry and fisheries sectors, vulnerability assessments, disaster risk management, sustainable land and water management, and mainstreaming climate change into national policies and programmes.

Member countries often request FAO's support for capacity development efforts in assessing climate change impacts on agriculture, forestry and fisheries sectors, vulnerability assessments, disaster risk management, sustainable land and water management, and in mainstreaming climate change into national policies and programmes. Capacity development approaches for adaptation, in line with FAO's corporate strategy, focus on policy assistance, institution building, knowledge management and technology development and dissemination.

Comparative advantage. FAO's organizational experience and its country- and region-specific experiences in particular are valuable in seeking location-specific solutions for adaptation. Appropriate adaptation responses often involve combinations of strategy, policy, institutional and technical options requiring a wide range of skills and multidisciplinary actions, including ecosystem-based and livelihood approaches. FAO's breadth of technical competence, its representation at global, regional, subregional and national levels, and its country- and region-specific experiences enable it to offer comprehensive support that can enhance adaptation at all levels while catalyzing links between the levels.

Technical departments of FAO, for example forestry, fisheries and aquaculture, have developed sector-specific climate change strategies and guidelines. These, in turn, have contributed to FAO's corporate adaptation approach, guided the design of sector-specific activities in its field projects and normative work, and have been taken into consideration in the design of FAO-Adapt. In addition, FAO's regional offices – Asia and the Pacific, Near East, Africa, and Latin America and the Caribbean – have initiated processes of preparing region-specific climate change frameworks and strategies to prioritize and inform their future work on climate change adaptation and mitigation. (See Annex 3 for examples of FAO's on-going adaptation activities.)

FAO responds to broad appeal. FAO supports adaptation at the request of its member countries, regional bodies and development partners. FAO's contribution to adaptation stretches from global negotiations and regional and national processes to localized, community-based adaptation field projects. Multi-stakeholder platforms and partnerships widen FAO's reach beyond its own activities.

The scope of meeting the new challenges requires additional efforts and resources. In addition to short- and medium-term disaster risk reduction and sustainable development support, climate change adaptation requires enhancing long-term resilience through research, technology dissemination and transfer, institutional capacity development and policy advice. In response to these calls, FAO-Adapt will enable FAO to expand its work on climate change adaptation by facilitating mobilization of additional resources. This will allow for enhanced programmatic delivery of field projects and programmes on climate change adaptation in the countries and improved internal adaptation competencies.

4.1 CORE PRINCIPLES OF CLIMATE CHANGE ADAPTATION

The following core principles guide FAO's work on climate change adaptation.

Focus on food security

Climate change is likely to severely threaten the achievement of food security and thus impact the ability of the international community to achieve its foremost Millennium Development Goal (MDG1), to reduce extreme poverty and hunger. Therefore, FAO's work on climate change adaptation has a strong focus on actions with potential to reduce vulnerability and ensure food and nutrition security.

Mainstream climate change into development

With mainstreaming, adaptation is increasingly becoming an integral part of FAO's support and services to member countries. With appropriate planning, climate change adaptation can be integrated into sustainable development initiatives and into food security, agriculture, forestry and fisheries planning and programming, resulting in climate-smart agriculture and other developmental benefits.

Support country-driven processes

FAO's activities on adaptation are delivered on a demand-driven basis, based on the specific needs of countries. FAO supports the preparation and implementation of national adaptation programmes and priorities, such as National Adaptation Programmes of Action (NAPAs), UNFCCC National Communication Reports, and other adaptation planning instruments or programmes that build adaptive capacity and resilience into human and natural systems.

Build synergies between adaptation and mitigation

FAO promotes an integrated approach to build synergies among climate change adaptation and mitigation, food security and sustainable development. Promoting climate-smart agriculture that can increase productivity and resilience (adaptation), reduce or remove GHGs (mitigation), and enhance achievement of national food security and development goals is at the centre of FAO's support to its member countries. The goal is to find comprehensive solutions that combine strategy, policy, institutional and technical options.

Promote ecosystem approach

FAO supports an ecosystem approach to policy development and natural resource management. This approach includes incentives that consider food production along with ecosystem capacity and resilience, equity in access to resources, and integration of sectors that use common resources. FAO has relevant technical expertise that it calls upon to support adaptation activities, e.g. in agro-ecosystems, forests and rangelands, inland waters, and coastal and marine ecosystems. The ecosystem approach also calls for multidisciplinary cooperation.

Design participatory, gender-sensitive and location-specific adaptation activities

Through its long experience in people-centered work on agriculture, rural development and climate change, FAO recognizes that adaptation work also calls for demand-driven, location-specific approaches and requires participatory modalities that consider gender-specific vulnerabilities, needs and capabilities as well as the priorities of Indigenous Peoples and vulnerable communities.

Deliver through partnerships and as ONE UN

FAO supports climate change adaptation through partnerships with its member countries, the UN system and agencies, international and national research institutions, international financing institutions, bilateral donors, civil society organizations and the private sector. FAO works with the other Rome-based UN food agencies – World Food Programme (WFP) and International Fund for Agricultural Development (IFAD) – to promote synergies in adaptation activities. FAO also works in partnership with the Global Environment Facility (GEF), providing expertise and experience and actively participating in project planning and implementation under GEF-managed funds.

FAO is also an active partner in UN system-wide efforts seeking synergies, collaboration and coordination with other agencies and bodies, including the High-level Committee on Programmes (HLCP) of the UN System Chief Executives Board (CEB). At the country level, FAO contributes to development and implementation of the UN "Delivering as One" initiative, e.g. through the United Nations Development Assistance Framework (UNDAF), and participates in the joint UN implementation mechanisms for climate change adaptation activities in several countries.

Support transboundary collaboration

Transboundary collaboration is already required for ecosystem approaches, shared resources such as fish stocks, and climate change impacts such as pests and diseases, water shortages, rising seawater levels and melting glaciers. Climate change will further increase interdependence and need for collaboration due, for example, to countries' needs to access genetic resources necessary to adapt to new climatic conditions. FAO's intergovernmental role and its decentralized structure provide excellent mechanisms to support these efforts.

Develop a long-term programmatic approach

Instead of delivering support to adaptation through scattered, relatively short-term projects, FAO will streamline its work through FAO-Adapt, which defines the principles of FAO's work on climate change adaptation directing it towards jointly defined priority themes and actions.

4.2 PRIORITY ADAPTATION THEMES AND ACTIONS PROMOTED BY FAO-ADAPT

FAO-Adapt consolidates five global priority themes and related actions that support adaptation (see Figure 1). These themes and actions have been identified through analysing local, national, subregional, regional and global adaptation needs in the agriculture, forestry and fisheries sectors.[1]

As many of the themes and actions are essentially linked, addressing them efficiently and capturing synergies requires a comprehensive and holistic approach. Adaptation needs vary because of regional differences in the exposure and sensitivity to climate variability and climate change and the adaptive capacities of the systems. Each of the themes is described below in general terms along with associated activities. The activities will be implemented within FAO's Strategic Framework and meet FAO Strategic Objectives. (See Annex 3 for more detailed regional adaptation priorities identified by the FAO regional governing bodies.)

Data and knowledge for impact and vulnerability assessment and adaptation

Countries need a sound understanding of how climate change and variability may impact their food systems, ecosystems, societies and national economies. In this regard, FAO seeks to support countries and decision-makers by building capacities and developing innovative, user-friendly tools and methods for assessing vulnerability, present and future impacts and, in turn, planning adaptation strategies. FAO also promotes sharing of existing climate change-related data and information among institutions as the first step towards bridging knowledge gaps. Communication for development and information-sharing activities help promote people's participation and ownership of adaptation planning and activities.

[1] In this context, these sectors are understood to include crops, livestock, fisheries, aquaculture, trees, forest products, rangelands, soils, land, water, biodiversity, genetic resources, and the specific agro-, aquatic and forest ecosystems and human systems involved in the production systems.

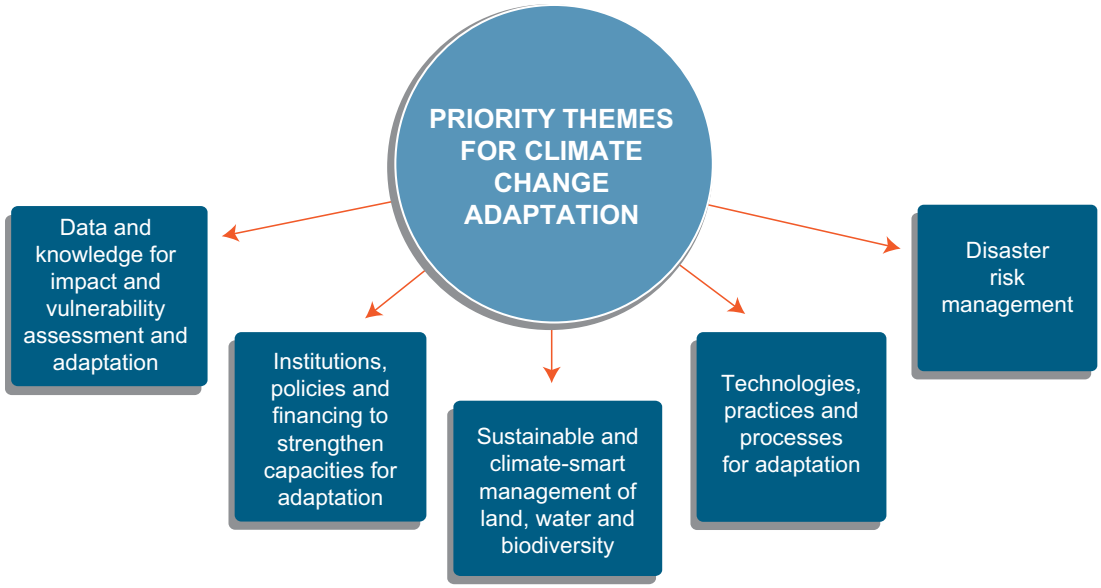

Figure 1. Priority themes for climate change adaptation implemented by FAO headquarters and decentralized offices under FAO Strategic Objectives.

- Assess and monitor impacts of climate variability and climate change on agriculture, forestry and fisheries and the livelihoods that rely on these sectors, taking into account socio-economic scenarios and drivers of change in agricultural sectors per major eco-region.
- Conduct integrated climate change vulnerability assessments for agriculture, forestry, and fisheries systems and associated livelihoods.
- Develop and disseminate guidelines, methodologies and tools for collection, processing and analysis of climate change-related data and information, and strengthen databases for use in impact and vulnerability assessments and adaptation.
- Strengthen capacities at national and regional level on impact and vulnerability assessment and participatory adaptation planning through training, policy, economic and planning advice and decision support tools, and recognize the need for adaptive management and improved decision-making under uncertainty.
- Communicate information and promote equitable access of rural people and institutions to information related to impacts of climate variability and change and adaptation in the agriculture, forestry and fisheries sectors from global to local levels, and vice versa through appropriate channels.
- Document, evaluate and disseminate successful experiences in sustainable natural resources management, agriculture and food production and gender and rights-based adaptation strategies and practices.

Institutions, policies and financing to strengthen capacities for adaptation

Adaptation to climate change requires adjusting institutional structures and arrangements. This includes defining adequate national policy and legislative frameworks, and assigning and coordinating responsibilities within the governance structures of countries and regions. Iterative planning, participatory and systems-based approaches, and strong stakeholder engagement should be key principles in adaptation. Access to adaptation financing is usually a prerequisite for countries to implement adaptation activities effectively. In addition, FAO emphasises that institutions and decision-making must remain flexible for dealing with uncertainties of potential climate change impacts.

- Advocate at the regional and international level for a stronger recognition of the challenges to and potential of agriculture, forestry and fisheries sectors in climate change adaptation frameworks and financing mechanisms, and ensure that main stakeholders, including indigenous people and vulnerable groups, have a voice in advocacy.

- Integrate climate change adaptation into national and sub-national agriculture, forestry and fisheries sector policies and plans, land use and water policies, food security programmes, legal frameworks and investment priorities, and ensure appropriate representation of the sectors in climate change and disaster risk management policies and strategies.

- Strengthen institutional capacities and coordination needed for climate change adaptation, in particular in and among sectoral line agencies, education, research, extension and communication for development services.

- Enhance national capacities of countries to access the financial resources available for technology development and transfer, investments and capacity development for climate change adaptation in the agriculture, forestry and fisheries sectors.

- Strengthen dialogue and networks and develop multi-stakeholder partnerships for adaptation across public and private sectors, non-governmental organizations and communities at all levels.

- Strengthen community- and locally-based mechanisms (e.g. forest-user groups, agricultural and fisheries cooperatives, community networks and media) for management and delivery of services for agriculture, forestry and fisheries and to facilitate locally appropriate adaptation measures, including community-based adaptation.

- Reinforce national and regional capacities for plant, forest and animal health and food safety and improve monitoring and control of variations in pests, diseases and food safety, related to climate change.

- Strengthen food value chains and, in particular, improve small-scale producers' access to markets to increase resilience of food systems.

Sustainable and climate-smart management of land, water and biodiversity

The healthy functioning and resilience of ecosystems depends to a great extent on biological and genetic diversity. For FAO, the key priorities are to increase understanding of the ecosystem services secured by agricultural, aquatic and forest biodiversity and to identify potential impacts of climate change. FAO also strongly argues for priority actions in sustainable and adaptive natural resources management, such as land-use planning and soil and water management, in order to increase resilience of production systems to climate change. Since the specific threat of climate change is new, the response strategy may require major qualitative changes in natural resource management, not just fine-tuning certain on-going practices. This could mean, for example, shifting from tillage-based production to a non-tillage-based system, such as conservation agriculture.

- Monitor global and regional trends and assessing impact of climate change on land, water and biodiversity resources in major food production systems.

- Promote adaptive management and sustainable use of land and water resources in support of increased resilience of the production systems through stronger institutions, infrastructure and practices, including well-functioning ecosystems.

- Enhance in-situ and ex-situ conservation and sustainable use of genetic resources to increase resilience in the production systems and incorporating responses to climate change impacts on biodiversity into national agricultural, forestry and fisheries policies and strategies.

- Promote incentives and tools for more productive, equitable and sustainable management of land, water, aquatic and forest resources, including secured access to land and water, and strengthening capacities for watershed management and schemes of payment of environmental services to finance adaptation.

Technologies, practices and processes for adaptation

The built-in adaptation capacity of ecological and human systems may not be enough to deal with expected medium- to long-term impacts of climate change. Therefore, FAO supports the development and dissemination of technologies, practices and processes related to agriculture, forestry, fisheries and rural energy demands, as well as rural income diversification with the aim to increase resilience of the production systems and livelihoods. Considering the limited access of women to appropriate technologies, which curbs their productivity potential, special attention will be paid to ensuring adequate access of technologies to women.

- Promote the breeding and conservation of crops, trees, livestock and fish adapted to changed climate conditions.

- Support the development and dissemination of technologies and practices and enhance local knowledge to improve the adaptive capacity of production and management systems and value chains in agriculture, forestry and fisheries.

- Identify and promote technologies for efficient and safe use of inputs in agriculture, forestry and fisheries (energy, fertilizer, water, seeds, feeds, pesticides) and for waste management.

- Identify and promote ecosystem-based technologies and practices, including in soil, land, water, forests, rangeland and fisheries management.

- Develop and implement communication for development strategies and systems applied to CCA to enhance participation, and information and knowledge sharing of technologies, innovations and community-based adaptation through appropriate methods, processes and media, such as NGO networks, community radio, information and communication technologies, farmer field schools and extension services.

- Promote work on integrated food-energy systems to enhance smallholders' self-sufficiency in energy, reduce expenditure on agricultural inputs and contribute to their capacity to adapt to climate change.

- Support and promote diversification of livelihoods and income generation strategies to increase food security through integrated farming, forestry and fisheries systems, small-scale enterprise development and off-farm activities.

FAO offers an array of technologies, practices and processes for adaptation that include alternative cropping, livestock production, fish harvesting patterns, conservation agriculture, organic agriculture, crop diversification, systems for seed production, sustainable biotechnologies, irrigations systems, water harvesting, agroforestry, integrated production systems, sustainable forest, rangeland and wetland management, restoration and rehabilitation of degraded lands, post-harvest methods, energy-saving technologies and innovative product development.

Disaster risk management

Increasing frequency and intensity of extreme weather events calls for strengthened disaster risk management, improved local practices for risk reduction and enhanced emergency response and rehabilitation interventions. Building on its long-standing experience in sustainable development and disaster risk management, FAO prioritizes actions for disaster risk reduction as an entry point to climate change adaptation in areas under frequent threat of climate-related emergencies.

- Support community-based, national and transboundary action for disaster risk reduction including

measures such as risk assessment, early warning and sustainable, gender-sensitive practices to enhance preparedness for climate-related hazards, such as floods and droughts, in agriculture, forestry and fisheries.[2]

- Expand and improve transition and linkages between emergency response, rehabilitation planning and development, and integrating "building back better" principles to foster risk mitigation, prevention, preparedness and adaptation.

- Facilitate the development of disaster risk reduction strategies in agriculture, forestry and fisheries to prevent food insecurity and reduce impacts of climate-related hazards and shocks; promote the integration of disaster risk management into sectoral development plans and programmes, including into water and land management.

4.3 LINKING FAO'S ADAPTATION WORK TO GLOBAL AND REGIONAL PROCESSES

Global processes

FAO's work on climate change adaptation is closely linked to global processes, such as the climate change negotiations conducted through UNFCCC and related adaptation-financing mechanisms. FAO promotes synergies between international conventions and agreements, such as UNFCCC, UN Convention to Combat Desertification (UNCCD), Convention on Biological Diversity (CBD), and UN Forum on Forests (UNFF). It also is incorporating climate change, agriculture, forestry, fisheries and food security concerns in the preparation of the Rio+20 Conference. FAO promotes climate-smart agriculture through, e.g. facilitating dialogue among experts dealing with adaptation and mitigation processes and programmes, including the UN-REDD Programme and the FAO Mitigation of Climate Change in Agriculture (MICCA) project.

UNFCCC provides a legal framework for negotiations and collective action to combat climate change and its effects while, at the same time, FAO advocates for better reflection of agriculture and food security in climate change discussions and negotiations. FAO takes an active role in highlighting the ways agriculture affects and is affected by climate change, and identifying its multiple benefits – especially related to achieving MDGs 1 and 7 for eradicating hunger and poverty and ensuring environmental sustainability – while taking measures to avoid the impacts of climate change and recognizing its challenges in terms of trade-offs.

As a result of the UNFCCC negotiation process, countries have received financial and technical support in their efforts to address the impacts of climate change. In 2002, UNFCCC established the Least Developed Countries Fund (LDCF) in order to, e.g. assist the least developed countries (LDCs) in the preparation and implementation of their NAPAs. In November 2010, 45 LDCs had formally communicated their NAPAs to UNFCCC, and more were in the process of finalizing theirs. Moreover, by June 2010, the LDCF had approved 36 NAPA priority projects for funding (GEF, 2010).

The UNFCCC Special Climate Change Fund (SCCF), established in 2001, also finances projects relating to climate change adaptation, technology transfer and capacity building, etc. The SCCF serves as a catalyst to leverage additional resources from bilateral and other multilateral sources. SCCF projects focus on long-term planned response strategies, policies and measures, rather than short-term (reactive) activities. FAO already assists countries in preparing adaptation projects financed by the LDCF and SCCF.

In 2010, the 16th UNFCCC Conference of Parties agreed on the establishment of the Cancún Adaptation Framework with the objective of promoting actions on adaptation, such as:

- assessing impacts, vulnerability and adaptation activities;

[2] Sustainable practices include, *inter alia*, systems for seed production, storage and supply, food preservation, improved control of pests and diseases, animal and plant health, monitoring and control of vegetation fires, safety-at-sea, insurance and other safety-net strategies, microfinance, biosecurity frameworks in aquaculture, and infrastructure improvements.

- strengthening institutional capacities and enabling environments;
- building resilience in socio-economic and ecological systems;
- enhancing climate change-related disaster risk reduction strategies;
- supporting research, development, demonstrations and transfer of technologies, practices and processes, and capacity building for adaptation;
- strengthening data, information and knowledge systems; and
- improving climate-related research and systematic observation for climate data collection and use.

The priority adaptation themes and activities defined in FAO-Adapt align with the Cancún Adaptation Framework actions.

Regional processes

Climate change constitutes an element in several regional processes, including preparation of regional climate change frameworks and strategies, and incorporation of climate change concerns into regional programmes, such as the Comprehensive African Agriculture Development Programme (CAADP). FAO supports these processes, emphasizing the increased need to work toward achievement of food security in light of the climate change concerns of the agriculture, forestry and fisheries sectors. FAO's regional and subregional offices actively participate in the work of regional bodies dealing with disaster risk management and climate change adaptation issues, such as the Agriculture Disaster Risk Management Committee of the Caribbean Region.

5. IMPLEMENTATION ARRANGEMENTS FOR FAO-ADAPT

FAO-Adapt has a five-year life span. Its main purpose is to catalyse FAO's adaptation activities in order to better answer to the needs of the member countries and support the implementation of climate change adaptation measures in agriculture, forestry and fisheries.

FAO departments, divisions and decentralized offices implement climate change adaptation activities within the context of FAO's Strategic Framework and Programme of Work and Budget. The outputs of the adaptation priority themes and actions consolidated under FAO-Adapt will continue to be delivered through the Strategic Framework and associated Unit Results, managed by FAO units in the headquarters and decentralized offices.

5.1 COORDINATION AND KNOWLEDGE MANAGEMENT

Internal coordination and IDWG-CC

The Inter-Departmental Working Group on Climate Change (IDWG-CC) is an active forum for sharing information and knowledge concerning FAO's activities on climate change adaptation and promoting climate change integration in all FAO work. Established in 1988, it also promotes cross-departmental planning and FAO's internal climate change capacity development. FAO's work on climate change adaptation will benefit from improved coordination and knowledge management through FAO-Adapt.

FAO departments and regional, subregional and liaison offices will provide information on their adaptation activities to the IDWG-CC (see Figure 2) through designated focal points. In the context of FAO-Adapt, the IDWG-CC will monitor FAO's work on adaptation, review its alignment with the identified priority themes and actions, and provide advice on how to promote complementarities and avoid gaps or overlaps. It also will provide demand-driven services and technical support to FAO departments and decentralized offices to implement climate change adaptation activities at the country level.

The involvement of the decentralized offices in the IDWG-CC will be institutionalized and facilitated through videoconferences, e-mail exchanges, a community of practice and, as deemed necessary, through participation of the representatives from regional, subregional and liaison offices in the events organized by the IDWG-CC. The climate change thematic and multidisciplinary teams or working groups that exist in several regional and subregional offices are also important information-sharing and liaison forums with outreach to the country level. FAO's five liaison offices will play an important role in implementing FAO-Adapt through their proximity with other UN agencies and international partners, their important functions related to advocacy for climate change adaptation and food security, and their strategic positions which enable them to enhance partnerships with other international organizations on climate change and to facilitate dialogue with donors to mobilize resources for FAO-Adapt.

Support to the IDWG-CC

The IDWG-CC will be assisted by dedicated technical staff members at headquarters and decentralized offices who will support its activities. The technical support staff will work in close collaboration with the departmental, regional and subregional climate focal points in advancing the operationalization of the IDWG-CC decisions.

The IDWG-CC, with the help of the technical support staff, will also facilitate the preparation and implementation of a plan for capacity development on climate change issues for FAO staff and serve as a help desk on climate change issues for the decentralized offices. The decentralized offices have

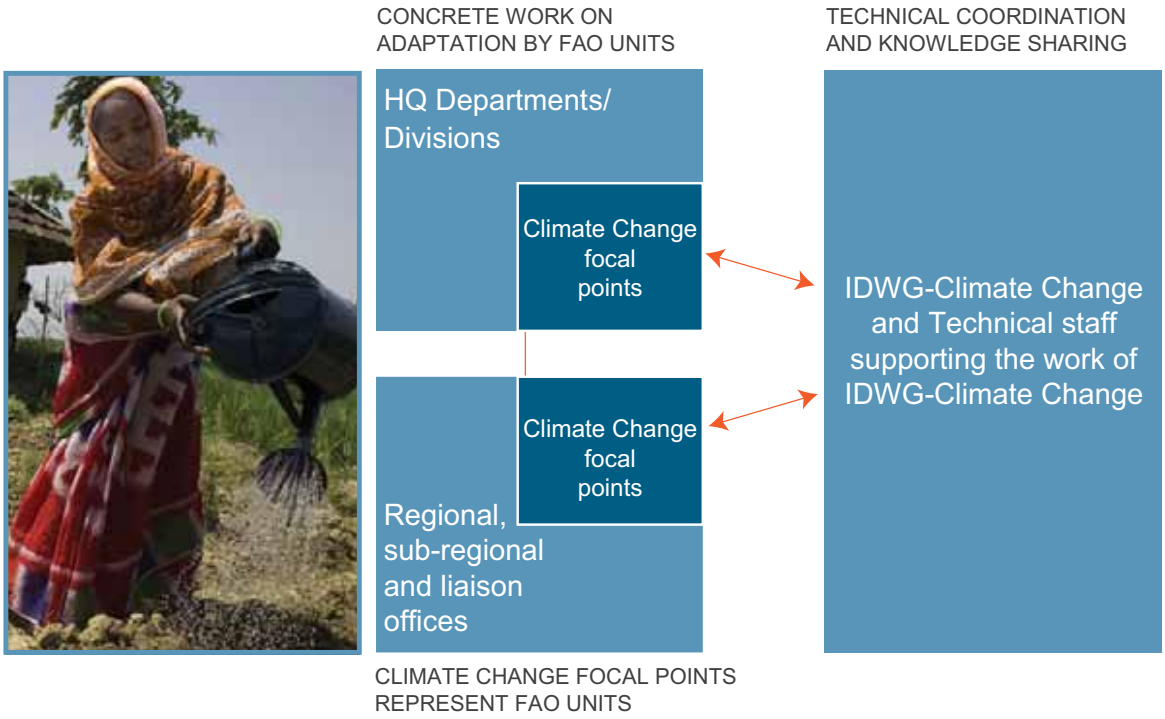

Figure 2. Envisioned structure for coordinating FAO's work on adaptation

specifically requested support in resource mobilization (human and financial) and technical backstopping for the formulation and implementation of climate change adaptation activities at their levels. In general, the information on sources of adaptation financing and support in accessing those sources are in particularly high demand both for the FAO units in technical departments and decentralized offices and the member countries.

Other tasks for the technical support staff will include mapping adaptation-related tool development needs; facilitating preparations for and analysing outcomes of major climate change meetings and their implications for FAO's work, and communicating the analyses to respective units. This includes follow-up of the Nairobi Work Programme and support to regional centres based on the Cancún Adaptation Framework; supporting adaptation project formulation; and identifying available climate change experts to work as short-term consultants.

Because of the surge of climate change-related information both within FAO and externally, there is a need for more efficient knowledge management and communication targeted to the decentralized offices. The technical support staff will design improved systems for adaptation-related knowledge management and internal communication. Additional investment is also needed for external communication to ensure that the messages on FAO's adaptation work are clear and consistent with the actual work.

5.2 CAPACITY DEVELOPMENT AND HUMAN RESOURCES

The demand for adaptation-related services for field projects and programmes as well as for normative work is increasing. FAO member countries, donors and other institutions expect FAO to provide a major contribution to adaptation in agriculture, forestry and fisheries sectors.

In order for FAO to respond to the demand and integrate adaptation in all its activities, capacity development is needed at all levels of the organization. Technical capacities that require further strengthening within FAO include, for example, technical knowledge on cross-sectoral approaches for adaptation, integration of climate change aspects in sectoral policies and food security programmes, social and institutional dimensions of adaptation, and understanding the UNFCCC process and FAO's role in it.

Functional capacities that need strengthening relate, for example, to mobilizing and combining resources from multiple funds; adaptation project and programme development; and enhanced partnering and collaboration with global, regional and national institutions.

Capacity development also can take place in partnership with other institutions and by linking FAO's activities with counterpart capacity development at the country and regional levels. This is also a way to accelerate FAO's capacity development assistance to member countries.

In order to advance FAO's capacities to respond, adequate tools, such as guidance materials for mainstreaming climate change adaptation into FAO's work and examples of successful cases and good practices, are being developed and implemented.

The need for additional human resources for climate change work has been expressed in particular by the decentralized offices. The IDWG-CC will support the initiatives of the regional, subregional and liaison offices in search of additional human resources. The minimum requirement is that adequate time for climate change activities is allocated in the work plans of the existing staff. The IDWG-CC and its technical support staff will not replace the existing information and communication channels between and within the technical departments and decentralized offices. Its role is to add value by focusing on cross-cutting climate change themes and issues.

5.3 FAO PROGRAMME OF WORK AND BUDGET AND FAO-ADAPT

The five priority adaptation themes and related actions introduced in Section 4.2 are based on the input received from regional, subregional and liaison offices as well as headquarter departments. The outputs of the adaptation priority themes and actions consolidated in the Framework Programme will continue to be delivered through technical FAO units in headquarters and decentralized offices.

According to FAO's planning process, work plans are reviewed annually. FAO-Adapt will catalyse the consolidation of climate change adaptation-related activities at corporate level. It will also provide an opportunity to further strengthen linkages between adaptation and mitigation.

FAO develops adaptation projects and programmes when requested by its member countries, regional bodies and development partners. At the national level, FAO programmes are defined and requested by member countries through FAO country offices that work toward ensuring that all programmes are aligned to national needs, strategies and policies. The Country Programming Framework (CPF) is a medium-term planning and management tool which outlines how FAO can best assist the countries in meeting their development priorities, including in the agriculture, forestry and fisheries sectors. Integrating climate change considerations into the CPF lays the foundation for FAO's support to adaptation at the country level.

FAO's intervention could be based on the partial implementation of an existing NAPA or other national adaptation plan and, thus, at the same time, could contribute to capacity development of national and local stakeholders. FAO-Adapt can be used to trigger proposal preparation, resource mobilization and partnerships for testing a programmatic approach at the country level.

5.4 RESOURCE MOBILIZATION AND ALLOCATION FOR ADAPTATION

FAO is preparing a corporate resource mobilization and management strategy that sets out how FAO aims to mobilize resources from its partners, how it will allocate these resources to agreed priorities, and how it will manage and report on their use. Resource mobilization and allocation for climate change adaptation will follow the corporate-level strategy of emphasizing FAO's comparative advantages and position as a key partner in addressing the climate change issues in the agriculture, forestry and fisheries sectors.

Figure 3 illustrates the FAO resource flow for climate change adaptation. It shows that resources from FAO's regular programme budget will continue to be channelled to adaptation activities (e.g. salaries of staff dealing with climate change adaptation) through FAO's existing financing mechanisms (1). Extrabudgetary adaptation resources (2) and food security and other financing that includes adaptation elements (3) will continue to be mobilized and allocated through existing resource mobilization and allocation systems coordinated by the FAO Technical Cooperation Department (TC). FAO-Adapt (4) will provide an additional channel for mobilizing corporate resources for adaptation. As it is supplementing, not replacing, the existing mechanisms and channels, FAO units will continue pursuing extrabudgetary funds for their own adaptation activities.

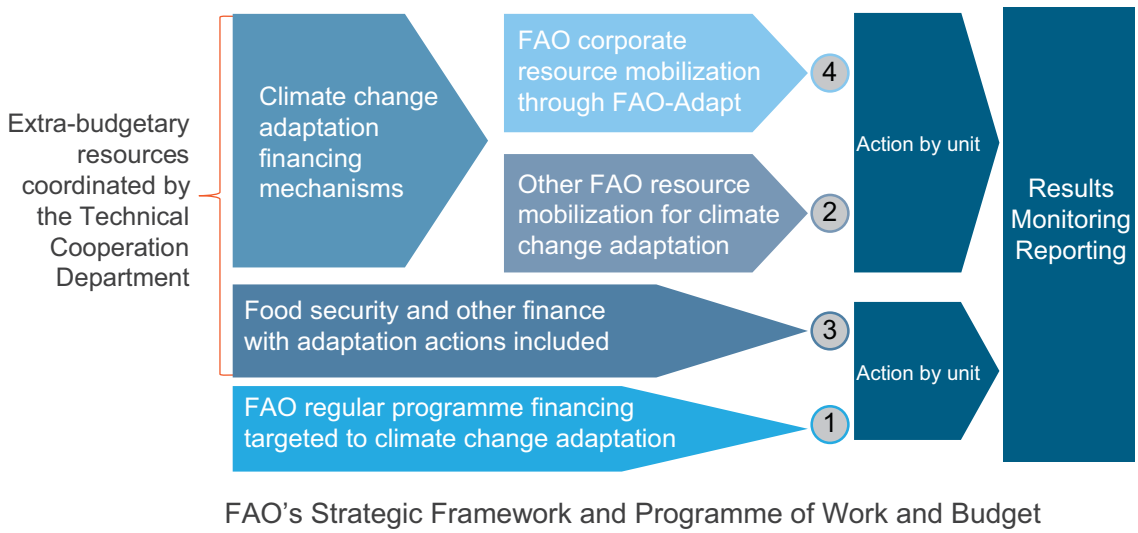

Figure 3. Possible resource flows for climate change adaptation

A transparent mechanism for oversight, priority setting and resource allocation will be set in place once additional resources for adaptation become available through FAO-Adapt. This will be achieved by establishing a multi-donor trust fund and possibly a related decision-making body such as a steering committee, consisting of representatives of FAO departments (management level) and decentralized offices (either management level or climate change thematic and working group representatives). Criteria for priority setting and resource allocation will be defined to guide the prioritization. Special emphasis will be put on the participation of decentralized offices in the priority setting and decision-making on the use of resources. A modular approach in resource mobilization, allocation and utilization implies that resources from multiple sources can be shared at all FAO units at headquarters and regional, subregional, liaison and country offices.

5.5 MONITORING PERFORMANCE AND IMPACTS OF FAO-ADAPT

FAO seeks to embed adaptation-related issues across its results-based management system. As a support function to a theme that runs throughout FAO's work, the ultimate success and impact of FAO-Adapt will be assessed against the extent of FAO's work on adaptation and the aggregated outputs and outcomes of FAO's adaptation activities.

In the immediate term, FAO-Adapt will be monitored through the quantity and quality of support it provides to FAO's work on adaptation, e.g. in country programmes and projects, internal capacity and tool development, internal and external communication, knowledge sharing and management, partnerships, linking and liaising among the FAO units in headquarters and decentralized offices, and other support functions identified by the IDWG-CC. The quantitative performance assessment can be made in terms of, e.g.:

- human resources and working time allocated to adaptation liaison and coordination,
- number of project proposals formulated in the context of FAO-Adapt at both FAO headquarters and its decentralized offices,
- amount of additional resources mobilized through FAO-Adapt,
- number of FAO staff participating in learning events and seminars, including face-to-face and e-learning,
- number of climate change case studies and best practices compiled through FAO-Adapt,
- number of entries and visits to FAO's climate change adaptation Web sites.

5.6 WORK PLAN

FAO-Adapt, the result of a dynamic process, is an important first step for mainstreaming climate change adaptation at FAO which will encompass raising the capacity of the regional and country offices to support implementation. Once initiated, it will be possible to set up qualitative assessment and monitor whether FAO staff perceives that FAO-Adapt services add value to FAO's work on adaptation. More specific indicators can be developed once the work is underway.

FAO-Adapt's initial focus will be on the strengthening of the IDWG-CC and the establishment of dedicated technical support staff, enhancing communication channels and knowledge management systems, mobilizing resources and up-grading FAO's internal adaptation-related capacities and tools. It will also establish a reporting system for Unit Results and activities contributing to adaptation under the various Strategic Objectives supporting the FAO units in programming adaptation and prepare a programmatic approach to adaptation in selected pilot countries.

©FAO/Giuseppe Bizzarri

REFERENCES

ADB. 2005. *Climate Proofing. A Risk-Based Approach to Adaptation*. Asian Development Bank, Manila.

FAO. 2008b. *Climate Change and Food Security: A Framework Document. IDWG on Climate Change*, Food and Agriculture Organization, Rome.

FAO. 2009a. *Coping with Changing Climate: Considerations for Adaptation and Mitigation in Agriculture*, Food and Agriculture Organization, Rome.

FAO. 2009b. *Profile for Climate Change*, Food and Agriculture Organization, Rome.

FAO. 2010. *"Climate-Smart Agriculture". Policies, Practices and Financing for Food Security, Adaptation and Mitigation*, Food and Agriculture Organization, Rome.

GEF. 2010. Report of the GEF to the Sixteenth Session of the Conference of Parties to the UNFCCC, Washington, D.C.

IPCC. 2001. *Climate Change 2001. Impacts, Adaptation and Vulnerability. IPCC Third Assessment Report,* Intergovernmental Panel on Climate Change.

IPCC. 2007a. *Climate Change 2007. Synthesis Report. As Assessment of the Intergovernmental Panel on Climate Change*, Intergovernmental Panel on Climate Change.

IPCC. 2007b. *IPCC Fourth Assessment Report*. Working Group II Report: "Impacts, Adaptation and Vulnerability", Intergovernmental Panel on Climate Change.

ODI. 2010. Responding to a Changing Climate: Exploring how Disaster Risk Reduction, Social Protection and Livelihoods Approaches Promote Features of Adaptive Capacity. Working Paper No. 319.

OECD. 2006. *Adaptation to Climate Change: Key Terms*, Paris.

OECD. 2009. *Policy Guidance on Integrating Climate Change Adaptation into Development Cooperation*, Paris.

OECD. 2010. *Climate Change and Agriculture: Impacts, Adaptation and Mitigation*, Paris.

Padgham, J. 2009. Agricultural Development under the Changing Climate. Opportunities and Challenges for Adaptation. *The World Bank Joint Discussion Paper,* Washington, D.C.

Stern, N. 2006. *The Economics of Climate Change. The Stern Review*. Cambridge University Press.

UNDP. 2010. *Screening Tool and Guidelines to Support the Mainstreaming of Climate Change Adaptation into Development Assistance. A Stocktaking Report*, New York.

UNFCCC. 2007. *Climate Change. Impacts, Vulnerabilities and Adaptation in Developing Countries*.

UNFCCC. 2010. SBSTA. Report of the Technical Workshop on Costs and Benefits of Adaptation Options.

UNIDSR. 2009. UNISDR Terminology on Disaster Risk Reduction. Available at: http://www.unisdr.org/eng/terminology/terminology-2009-eng.html

World Bank. 2010a. *Economic Evaluation of Climate Change Adaptation Projects. Approaches to the Agricultural Sector and Beyond*, Washington, D.C.

World Bank. 2010b. *World Development Report. Development and Climate Change*, Washington, D.C.

©FAO/Giulio Napolitano

DEFINITIONS

The concepts and definitions are based on FAO climate change glossary, IPCC Assessment Reports (IPCC, 2001, 2007a) and the ADB (2005), OECD (2006), UNISDR (2009) and WB (2010b) publications.

Adaptation to climate change

Adjustments to current or expected climate variability and changing average climate conditions. This can serve to moderate harm and exploit beneficial opportunities. Various types of adaptation can be distinguished, including anticipatory and reactive adaptation, private and public adaptation, and autonomous and planned adaptation.

Adaptive capacity

The ability of a system to adjust to climate change (including climate variability and extremes) to moderate potential damages, to take advantage of opportunities, or to cope with the consequences.

Climate proofing

Ensuring that climate risks are reduced to acceptable levels through long-lasting and environmentally sound, economically viable and socially acceptable changes implemented at one or more of the stages in the project cycle.

Climate-smart agriculture

Agriculture that sustainably increases productivity, resilience (adaptation), reduces/removes GHGs (mitigation), and enhances achievement of national food security and development.

Disaster risk reduction (DRR)

Conceptual framework of elements considered with the possibilities to minimize vulnerabilities and disaster risks throughout the society, to avoid (prevention) or to limit (mitigation and preparedness) the adverse impacts of hazards, within the broad context of sustainable development.

Disaster Risk Management (DRM)

Includes but goes beyond DRR by adding a management perspective that combines prevention, mitigation and preparedness with response.

Mainstreaming

Integrating adaptation objectives, strategies, policies, measures or operations such that they become part of the national and regional development policies, processes and budget at all levels and stages. The term is also used to describe the process of integrating adaptation to climate change into development assistance. The term is often associated with the process of taking into consideration potential climate change impacts when making investment or development assistance decisions.

Maladaptation

Any changes in natural or human systems that inadvertently increase vulnerability to climatic stimuli; an adaptation that does not succeed in reducing vulnerability but increases it instead.

Mitigation

Interventions reducing the sources of or enhancing the sinks of greenhouse gases. In the disaster risk reduction context (UNIDSR. 2009), mitigation means lessening or limiting the adverse impacts of hazards and related disasters.

Resilience

The ability of a social or ecological system to absorb disturbances while retaining the same basic structure and ways of functioning, the capacity for self-organization, and the capacity to adapt to stress and change.

Vulnerability

The degree to which a system or society is susceptible to, and unable to cope with, adverse effects of climate change, including climate variability and extremes. Vulnerability is a function of the character, magnitude and rate of climate change and variation to which a system is exposed, its sensitivity and its adaptive capacity.

ANNEX 1. OVERVIEW OF SELECTED POSSIBLE REGIONALIZED IMPACTS OF CLIMATE CHANGE ON AGRICULTURE, FORESTRY AND FISHERIES

	Agriculture	Forestry	Fisheries and aquaculture
Asia and Pacific	• Freshwater availability in Central, South, East and Southeast Asia is likely to decrease. • Temperature increases will lead to a substantial increase in demand for irrigation water for sustained productivity in arid, semi-arid Asia and South and East Asia. • Land suitable for crop cultivation is expected to increase in East and Central Asia, but decrease in other areas, especially in South Asia. • Crop yields could increase in East and Southeast Asia, while they could decrease in Central and South Asia even considering the fertilization effects of CO2. • There will likely be a northward shift of agricultural zones. • Heat stress and limited pasture availability would limit the expansion of livestock numbers.	• Forest expansion and migration are affected, and biodiversity is threatened by land use, land cover change and population pressure in most of Asia. • In North Asia, forest growth and northward shift in the extent of boreal forests is likely. • The frequency and extent of forest fires and the risk of invasive species, pests and diseases in Asian forests are likely to increase. • The Pacific faces: increased incidence, intensity and impact of extreme weather events such as inundation, storm surge, erosion and other coastal hazards; loss of mangrove forests, severe flooding and cyclones; and increased invasion by non-native species.	• Sea-water intrusion is likely to increase the habitat of brackish water fisheries, but coastal inundation is likely to have serious effects on the aquaculture industry and infrastructure, particularly in heavily populated mega deltas. • Increased frequency of El Niño would cause a general decline in fishery production in the coastal waters of East, South and Southeast Asia. • Warming may make the Arabian Sea more productive. • Small island developing states (SIDS), highly reliant on fisheries and highly exposed to the changes, will probably suffer most.
Europe and Central Asia	• Countries in the more temperate and polar regions are likely to benefit. • Countries in mid-latitudes will benefit at first but will begin to be affected negatively if temperatures rise by more than 2.5°C. • The combination of temperature increase and increasing CO2 concentration will result in slightly positive agricultural development in southeastern Europe, while the Mediterranean area and southwest Balkans will suffer. • Central Asia, dependent on irrigation and with high inter-annual variations in yields, can be affected by climate extremes and decrease in water availability. • Cattle and small livestock could suffer from increasing heat stress and spread of diseases.	• In northern Europe, the area of tree species native occurrence will shift northwards and increase in growth. • In the Mediterranean area, forest ecosystems or individual species will start to contract. • The tree species structure will change, e.g. shrubs may increasingly dominate trees in the southern Europe.	• Warm water species are likely to spread to the north, with local extinction occurring at the boundaries. • Increased winter temperature can increase growth, but also increase the risk of diseases. • Marine productivity is likely to increase in temperate areas.

Near East	• Maize yields in North Africa would suffer first with rising temperatures, followed by Western Asia and the Middle East. • Water availability would decrease in most of the region, although it may slightly increase in some areas, such as most of Sudan, Somalia and southern Egypt. • Temperature increase may lead to increased pasture production in mid-latitudes, with increases in livestock production. • Warmer winters may benefit livestock, while greater summer heat stress can have negative effects.	• Depletion of soil moisture may cause the productivity of major forest species to decline, increase fire risk and change the patterns of the region's main pests and diseases. • Severe water shortages due to decreasing summer precipitation in Western Asia will affect forest growth. • Some countries already have experience in afforestation using sewage water for irrigation in peri-urban areas, which will counteract negative effects of climate change.	• Many basins in the region already suffer from lack of water (Mediterranean, Near East) and the usable net water resources are still likely to decline. • In the Mediterranean, there will be changes in fish populations, recruitment success, trophic interactions and migratory patterns of fish populations.
Africa	• The number of extremely dry and wet years is expected to increase in sub-Saharan Africa during this century. • Drying is expected in the Mediterranean area and in much of southern Africa. • Rainfall may increase in East and West Africa. • Some areas, such as the Ethiopian highlands, could benefit from a longer growing season. • Rangeland degradation and more frequent droughts may lead to reduced forage productivity and quality, particularly in the Sahel and southern Africa.	• Mangrove forests protect coastal zones from storms and floods and forests in general regulate water flows and reduce flooding. • Through its impact on forests, climate change also will affect wildlife, bush meat and non-timber forest production, which are important for food security in several parts of Africa. • Availability of water rather than increases in temperatures will affect forest growth in Africa. • African forests will generally face deforestation, degradation, increased forest fires and major changes, e.g. in mountain ecosystems.	• Sea level rise poses a threat to coastlands, lagoons and mangrove ecosystems especially on eastern and western shores of Africa. • Changes in coastal ecosystems and delta areas, such as destruction of coral reefs, will have direct effects on the productivity of fish stocks. • Productivity of the East African lakes could decline. • Temperature increases as such may not affect pond aquaculture in the tropical regions, but water availability may become an issue.
Latin America and Caribbean	• In temperate zones, such as southeastern South America, yield of certain crops such as soy and wheat will increase. • As a result of increased thermal stress and drier soils, productivity in tropical and subtropical regions is expected to decline. • In arid zones, such as central and northern Chile and northeastern Brazil, the salinization and desertification of agricultural land will possibly increase. • Rainfed agriculture in semi-arid zones will face increasing risks of losing crops. • In temperate areas, pasture productivity may increase, benefiting livestock production.	• Tropical forests are probably affected more by changes in the availability of water in the soil CO2 fertilization than by temperature changes. • There will be a tendency towards "savannization" of eastern Amazonia. • A high risk of forest loss is suggested for Central America and Amazonia, more frequent wildfire in Amazonia, more runoff in northwestern South America, and less runoff in Central America. • Mangrove areas will likely be under threat in several parts of the Caribbean and Central and South America.	• More frequent storms, hurricanes and cyclones will affect aquaculture and fishing in coastal communities, especially in the Caribbean area. • Availability of water for some aquaculture production technologies may be affected by retreating glaciers in some areas of the Andes. • Distribution of some fish species in the tropical and subtropical seas may change southwards. • Primary production in the tropical Pacific may decline because of increased stratification and decreased nutrient supply.

Compiled from IPCC, 2007b.

ANNEX 2. EXAMPLES OF FAO'S ON-GOING WORK IN SUPPORT OF CLIMATE CHANGE ADAPTATION

This table provides examples of the various types of activities in which FAO is involved in support of climate change adaptation. Some are stand-alone adaptation projects, while others contain elements of adaptation or focus on sustainable productivity increases and climate-smart agriculture. The examples cover normative work and including pilots and concrete field-level projects.

Priority themes	Actions	Examples of FAO's on-going work in support of adaptation
Data and knowledge for impact and vulnerability assessment and adaptation	Impact assessment and monitoring	• CLIMAFRICA: climate change predictions in sub-Saharan Africa, impacts and adaptations • FAO MOSAICC: Modelling system for agricultural impacts of climate change • GIEWS: global information and early warning system on food and agriculture • Nile Delta: monitoring of climate change impacts of sea level rise in groundwater and agriculture
	Vulnerability assessment	• FIVIMS: food insecurity and vulnerability information and mapping systems • Analysis of vulnerability to food insecurity under climate change, pilot in Nicaragua • Development of vulnerability indicators for fisheries and aquaculture
	Guidance, methods and tools for data and info	• TECA: database for technology for agriculture • WOCAT: database for world overview on conservation approaches and technologies
	Capacities for impact and vulnerability assessment	• Training package on disaster risk management systems analysis
	Communication and access to information	• YUNGA: awareness raising network for participation of children and youth on climate change work • Capacity development for communication for development for natural resources management and climate change adaptation • CA-CoP-L: Conservation Agriculture Community of Practice, communication platform
	Documenting and disseminating experiences	• Development of documentation and technical guidelines on adaptive frameworks, mechanisms and best practices in the fisheries and aquaculture sectors • Gender-sensitive strategies for adaptation to climate change, piloting in India

Institutions, policies and financing to strengthen capacities for adaptation	Advocacy	• FAO submissions to UNFCCC processes and IPCC • Contributions to regional climate change strategies by FAO's regional offices • Support to policy consultations and actions to boost sustainable use of water and energy resources in Africa in the context of climate change • GBEP: global bioenergy platform, advocacy for sustainability standards for bioenergy • Analysis of NAPAs
	Mainstreaming adaptation	• Development of guidelines for incorporating climate change issues into national forest programmes and forest management plans • Development of guidelines on adaptation in fisheries and aquaculture • Development of guidelines on agroforestry policies with climate change considerations • Project on enhanced strategies for climate-proofed and environmentally sound agricultural production in China • Project on integration of climate resilience into agricultural production in rural areas of Mali • Project on integration of climate change adaptation and mitigation measures in the management of natural resources in four priority watersheds in Panama • Project on environmental mainstreaming and climate change adaptation in Mozambique • Regional project in Asia on regional and national strategies on climate change and food security
	Capacity development for adaptation	• E-learning tool for planning community-based adaptation for agricultural extensionists • Study on the role of institutions in facing the challenges of climate change and food security • Project on strengthening environmental governance in the face of climate risks in Guatemala • Regional analyses and capacity building on forests and climate change • Project on adaptation to climate change to sustain Jordan's MDG achievements • Framework for Action in investing in sustainable agricultural intensification – the role of conservation agriculture
	Access to financing	• Country-level training course on accessing climate change financing mechanisms
	Networking and partnerships	• PaCFA: global partnership on climate change, fisheries and aquaculture • Global soil partnership • Participating in UNDG Asia-Pacific Working Group on Climate Change in mainstreaming climate change into UNDAF of pilot countries of Thailand, Myanmar, Bhutan, Fiji, India, PNG, Samoa and Sri Lanka
	Community-based mechanisms	• Community-based adaptation projects, e.g. in Bangladesh and the Philippines • Study on rural institutions and climate change
	Capacities in plant and animal health and food safety	• EMPRES: emergency prevention system for food safety, and food chain crisis management framework for capacity development • Project on improving the level of preparedness in Somalia for Rift Valley Fever and other climate change-related diseases • Evaluation of climate change impact on distribution and behaviour of animal diseases in Latin America
	Value chains and market access	• Workshop and publications on institutional innovations and policy interventions in support of smallholder market participation • Studies on economics of adaptation, including value chains and smallholder access to markets

Sustainable and climate-smart management of land, water and biodiversity	Monitoring trends	• Aquastat: database • Global agro-ecological assessment for agriculture in the 21st century • Production of databases and maps of land and water resources and land-use systems • LADA: land degradation assessment in drylands-programme • Commission on Genetic Resources for Food and Agriculture, scoping study of climate change impacts on genetic resources and role in adaptation • Project on developing indicators and modelling tools, and mapping impact of climate change on livestock agro-biodiversity
	Adaptive natural resources management	• Action plans for watershed management and community-based natural resources management • AquaCrop: software for crop-water productivity modelling • Project on integrated watershed management for attaining climate resilient food security in Cambodia • Fouta Djallon Highlands Integrated Natural Resources Management Project in West Africa • Conservation agriculture programmes, e.g. those promoted and coordinated by the FAO Conservation Agriculture Taskforce for Southern Africa
	Conservation and policy integration of biodiversity	• Report on the World's Plant Genetic Resources for Food and Agriculture 2010 • Global Crop Diversity Trust, endowment of global seed banks • Biodiversity indicator partnership with GEF and UNEP
	Tools and incentives for sustainable natural resources management	• Development of voluntary guidelines on land tenure • Studies on payments for environmental services with country pilots • Guidelines for the implementation of an ecosystem approach in fisheries and aquaculture

Technologies, practices and processes for adaptation	Breeding and conservation	• Project on strengthening utilization of plant genetic resources in Azerbaijan through enhancing conventional plant breeding and associated biotechnology capacity
	Technology development and dissemination	• Piloting crop production intensification and diversification in West Africa • LEAD programme for livestock, environment and development • Project on improving livelihoods and food security in vulnerable SADC countries, and supporting farmers in adapting to climate change through conservation agriculture • TECA: exchange groups around smallholder agricultural technologies
	Input use efficiency	• Preparation of irrigation guidelines • Project on effective irrigation management and climate change adaptation in Vietnam • National bioenergy programmes in Congo-Brazzaville and Angola
	Ecosystem-based practices and technologies	• Programme on Kagera transboundary agro-ecosystem management in Tanzania • Project on integration of ecosystems and adaptation of climate change in the Colombian Massif • On-going activities based on ecosystem approach in fisheries and aquaculture
	Communication for Climate Change Adaptation	• CSDI: Communication for Sustainable Development Initiative for developing stakeholder-based communication strategies that support local adaptation practices and processes, disaster risk reduction and agriculture innovation at global level and, e.g. in Bolivia, Bangladesh, DRC and the Caribbean
	Integrated food-energy systems	• IFES project on integrated food-energy systems • Advocacy for voluntary sustainability criteria and indicators for bioenergy, e.g. the Global Bioenergy Partnership
	Income and livelihood diversification	• RIGA: project and database on rural income generating activities and income diversification • Regional programme for livelihood adaptation to climate change in SIDS countries • Studies on vulnerability, climate change and rural safety-nets
Disaster risk management	Actions on disaster risk reduction	• Guidebook and training package on Disaster Risk Management Systems Analysis • Project on integrating climate change adaptation and DRR planning to increase resilience in fishing communities in the SIDS • Project on strengthening capacities for disaster prevention and preparedness and climate risk management in the agriculture sector of Nepal
	"Building back better"	• Project on strengthening climate resilience and reducing disaster risk in agriculture to improve food security in Haiti • Guidelines for seed rehabilitation: project design • Study on the role of cash transfers in fostering broad-based rural development
	Mainstreaming DRR	• Preparation of national and subnational plans of action in disaster risk management and climate change adaptation in the Caribbean

ANNEX 3. REGIONAL PRIORITIES IN CLIMATE CHANGE ADAPTATION AS IDENTIFIED BY FAO REGIONAL CONFERENCES AND OTHER REGIONAL GOVERNING BODIES

The following lists the priorities for supporting climate change adapation, according to region. The priorities were set by the FAO Regional Conferences and other regional governing bodies.

NEAR EAST

- Plan national policies of adaptation strategies, including the development of early warning systems, the establishment of unified national frameworks and the enhancement of cross-sectoral coordination.
- Enhance institutional and technical capacities in monitoring and assessment of climate change impacts.
- Promote regional cooperation in data collection and exchange of information, and monitor and assess climate change impacts.
- Improve capacity to access easily the financial resources available for climate change.
- Enhance public information and awareness-raising.
- Promote best practices for adaptation to climate change at various levels.

AFRICA

- Collaborate with national governments in developing institutional capacity-building programmes and creating awareness, – including integration of indigenous knowledge to assist rural communities in understanding and coping with climate change and as it relates to food security.
- Review the possibility of providing technical support in capacity building for simplifying issues and technical support to apply effective technologies such as conservation agriculture and use of germplasm that is locally adapted, as well as considerations of gender issues.
- Support adaptation technologies and practices, such as crop-livestock integration, agroforestry, soil and water management, sustainable land management, watershed management and disaster risk reduction.
- Include impact assessments in priorities, facilitate better access to credit and agricultural inputs, strengthen institutional cooperation, establish climate change and food security networks, and develop comprehensive communication plans to share information with regard to climate change impacts, adaptation and mitigation.
- Strengthen adaptation of forest and wildlife resources, recognizing the key roles played by impact assessments, assessments of existing adaptation techniques in the forest and wildlife sectors, and support networks and forums.

ASIA AND THE PACIFIC

- Assist member countries in formulating and implementing sound strategies and action plans that can capture the synergies and manage the trade-offs among climate change adaptation, mitigation, food security and sustainable development, with particular attention on adaptation.
- Facilitate integration of climate change adaptation considerations into agriculture and development planning and implementation.
- Provide advice to member countries, and subregional and regional organizations in adjusting and harmonizing policies, programmes and institutions dealing with climate change adaptation.
- Provide targeted technical support to member countries and build capacities for implementing practical climate change adaptation activities in the areas of crops, livestock, forestry, fisheries, aquaculture, land and water management.
- Develop and disseminate practical, user-friendly tools and methodologies for collecting and analyzing reliable data and information on climate change impacts, especially at local levels, to support planning and informed decision making.
- Explore opportunities for enhancing resilience through innovative risk financing and insurance schemes to spread risk brought about by climate change and other natural disasters.
- Facilitate the formulation of a regional strategy for mainstreaming climate change adaptation and mitigation activities in the agricultural sectors, and the establishment of regional cooperation mechanisms and networks, taking due consideration of differing subregional needs and conditions.
- Assist member countries in effectively engaging in international climate change negotiations and dialogues.

EUROPE AND CENTRAL ASIA

- Assess and monitor impacts of climate change on agricultural sectors and conduct climate change vulnerability assessments.
- Communicate information and promote equitable access to information related to impacts of climate variability and climate change.
- Establish a climate change data management system.
- Strengthen institutional capacities and coordination for adaptation and access of financial resources.
- Breed and conserve crops, trees, livestock and fish adapted to changing climate conditions.
- Establish an interface between climate change, agriculture and rural development.
- Fully involve ministries of agriculture in work on adaptation and mitigation and on National Communications Reports to UNFCCC, incorporating climate change-related policies into rural development and agriculture.
- Disseminate policies on good agriculture practices for adaptation to climate change impacts and their mitigation, based on solid scientific foundations, for sustainable management of land and water and protection of biodiversity.

LATIN AMERICA AND THE CARIBBEAN

- Direct national and international public investment towards improving the adaptation capacity of agriculture.
- Improve the genetics of traditional varieties and develop and disseminate new varieties better adapted to expected climate changes.
- Install infrastructure to manage water shortages and excesses (e.g. irrigation and drainage).
- Develop insurance schemes to protect small producers against climate risks, and early warning systems considered as potential areas for investment.
- Boost agricultural competitiveness through helping agriculture adapt to climate change.
- Support the design and application of a system and tools to manage risk related to climate variability and its impact on agriculture and rural communities at local and national level in Chile, with the prospect of extending experiences and methodologies to other countries of the region.
- Formulate, publish and disseminate related technical and communication materials in the region, accompanied by in situ training programmes.
- Collaborate on design of climate change mitigation and adaptation strategies in livestock production systems, with pilot activities in Latin America and the Caribbean.

Food and Agriculture Organization of the United Nations (FAO)
Viale delle Terme di Caracalla
00153 Rome, Italy
www.fao.org/climatechange/fao-adapt
climate-change@fao.org

FAO-Adapt