Food and Agriculture Organization of the United Nations

IsDB البنك الإسلامي للتنمية Islamic Development Bank

Climate-Smart Agriculture in action: from concepts to investments

Dedicated Training for Staff of the Islamic Development Bank

Cairo, Egypt | 18-21 March 2019

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Food and Agriculture Organization of the United Nations

Cairo, 2019

Required citation:
Lewis, P. 2019. *Climate-Smart Agriculture in action: from concepts to investments dedicated training for staff of the Islamic Development Bank.* Cairo, FAO. 52 pp. Licence: CC BY-NC-SA 3.0 IGO.

ISBN 978-92-5-131333-6

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Foreword

The emerging global development agenda represented by the Sustainable Development Goals along with subsequent agreements, notably Paris Agreement during COP 21, represent a trajectory shift in the global development dialogue. These globally agreed agendas put sustainability at the forefront of all the development efforts. Islamic Development Bank transformation, led by the President Dr. Bandar M. Hajjar, also underlies sustainability considerations in its new business model. Specifically, our increased focus on climate change led to the creation of a new dedicated unit to mainstream climate aspects in our operations to enhance the robustness and sustainability of our interventions. The Bank also formulated its maiden Climate Change Policy and forged strategic partnerships to further this agenda.

Nevertheless, climate change remains a relatively new area for the Bank and significant efforts are required to build capacity of our newly established 11 Regional Hubs to effectively deliver on this agenda. It is in this context that we have initiated this series of capacity building programs, accompanied by guiding modules, to expose our operations staff to the nuances of climate change aspects as they relate to their specific sectors. In this regard, this training module and the related workshop on "Climate-Smart Agriculture", prepared in collaboration with our partners from FAO, will be a bellwether for several other programs in the series.

It is no surprise that we have chosen agriculture sector to kick-start this capacity building series. Agriculture sector has always been at the heart of IsDB operations in member countries given its important role and multi-dimensional contribution to job creation, food security, economic growth and improved wellbeing. It is also among the sector most affected by climate change in our Member Countries. The productivity and sustenance of this vital sector is increasingly threatened by climate change, driven largely by sporadic rainfall pattern, increased temperature and unpredictable local weather regimes. This means, for sustained food security to be assured, climate resilient approaches and considerations must be built in agriculture investments to improve productivity and increased yields.

This workshop on Climate-Smart Agriculture (CSA) in Action will help contribute to addressing the technical, social and institutional issues that challenge the wide scale uptake of CSA in member countries. The training sessions would also discuss implications of the new IsDB's Climate Change and Agriculture policies on IsDB operations and projects lifecycle, where the linkages and interconnections between these policies and their operationalization would be detailed.

I have no doubt that this 4-day intense and rigorous workshop will provide IsDB Operations Task Leaders, Agriculture Sector Professionals and Global Practice participants with the knowledge and versatility needed to design and implement climate proof and environmentally robust agriculture projects. I encourage all concerned IsDB staff to engage effectively and make the most out this important training.

Dr. Mansur Muhtar
Vice President Country Programs
The Islamic Development Bank

Foreword

Building on the historic Paris Agreement and the 2030 Agenda for Sustainable Development, global initiatives are now in motion to transform these commitments into action. New evidence has signaled a rise in world hunger over the past three years after a prolonged decline in the previous decade (2005-2014). The number of undernourished people has increased from 784 to 821 million between 2015 and 2017, and the situation is worsening in South America and most regions of Africa. The latest 2018 joint FAO, WFP, IFAD, UNICEF and WHO report on *The State of Food Security and Nutrition in the World – Building Climate Resilience for Food Security and Nutrition* highlighted climate variability and extremes as key drivers behind the recent rise in global hunger. They are also one of the leading causes of severe food crises, and are more broadly undermining all dimensions of food security – food availability, access, utilization and stability. The agriculture sectors need climate action more than ever, in order to face current and future impacts on food security and nutrition.

There is an urgent need to scale up climate-smart agricultural investments worldwide, particularly in the Near East and North Africa, to stop climate change impacts from seriously compromising food security and nutrition, and exacerbating conflicts and distress migration. This is a priority both for FAO, through its Strategy on Climate Change, and for the Islamic Development Bank, through its Climate Change Policy.

The strengthened partnership between the IsDB and FAO focuses on Climate-Smart Agriculture (CSA) and builds off its seminal Regional Workshop on Climate-Smart Agriculture in the Near East and North Africa region. This workshop brought together representatives from the ministries of environment and agriculture for the first time in the region to discuss how climate-smart agricultural solutions might be mainstreamed into national policy and programme planning.

Building on this regional partnership, the FAO Regional Office for the Near East and North Africa and the FAO Climate and Environment Division is proud to bring this 4-day training on Climate-Smart Agriculture (CSA) to the IsDB's Staff from around the world, to support the development of climate-smart agricultural investment projects, especially through the IsDB's Climate Change Policy.

Alexander Jones
Director | Climate and Environment Division
Food and Agriculture Organization of the United Nations

Acknowledgements

The development and the facilitation of the workshop *Climate-Smart Agriculture in action: from concepts to investments* was coordinated by:

- Mohamed Abdel Monem, Sustainable Soil Consultant, FAO Regional Office for the Near East and North Africa;
- Rima Al-Azar, Team Leader for Global Climate Governance and Climate-Smart Agriculture (Climate and Environment Division of FAO);
- Ahmed Al Qabany, Manager – Climate Change, on behalf of the Islamic Development Bank (IsDB)
- Phoebe Lewis, Agricultural Officer, FAO Regional Office for the Near East and North Africa;
- Jozimo Santos Rochas, Agro-Industry Officer, FAO Regional Office for the Near East and North Africa.
- Olatunji Yusuf, Environmental Specialist– Climate Change, on behalf of the Islamic Development Bank (IsDB)

Technical content and presentation of the training were delivered by:

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Workshop communications were delivered by Melanie Pisano, Climate Change Communications Consultant (FAO). Workshop logistics and technical support were supported by Nadida Osman (Technical Programme Assistant, FAO RNE).

Introduction

The Islamic Development Bank (IsDB) is in the process of finalising two policies to support the agriculture sector in adapting to the impacts of climate change, one focused on agriculture (Agriculture and Rural Development Policy 2018-2023) and the other on climate change (Climate Change Policy 2018-2023). The agriculture policy focuses on guiding investment in agriculture and rural development in the IsDB's member countries. It aims to realise higher degrees of food security through real and effective sustainable rural and agricultural development that reduces poverty and improves natural resource utilization based on a regionally differentiated approach. The climate change policy focuses on supporting the IsDB-member countries in developing climate-resilient and sustainable investment, and providing the IsDB with a referential climate policy framework. These aims are reinforced by the Bank's five principles. First, to maintain the IsDB's member countries' climate action plans; second, to promote climate change resilience; third, to support the transition to a green economy; fourth, to leverage resources; and finally, to manage the climate change facility that it has developed.

In October 2018, the IsDB and FAO Regional Office for the Near East and North Africa partnered to deliver the first Regional Workshop on Climate-Smart Agriculture in the NENA region. The IsDB now aims to ensure that all their offices are aware of CSA and are able to make investments that meaningfully take CSA and its principles into account. In so doing, they aim to enhance the capacity of the agricultural systems to support food security, incorporating the need for adaptation and the potential for mitigation into sustainable agriculture development strategies.

FAO is proud to bring the four-day training on CSA to the IsDB's Staff: *Climate-Smart Agriculture in action: from concepts to investments*, to support the development of climate-smart agricultural investment projects in the IsDB's focus countries, especially through its Climate Change and Agricultural policies.

This training booklet contains core information from the training, including but not limited to: learning objectives, learning materials, and key CSA Sourcebook Chapters. The training booklet also provides useful links to additional learning resources, as well as key FAO publications for future reference.

Objectives and expected outcomes

The overall objective of this proposal for technical assistance is to strengthen the capacities of project managers from IsDB's in CSA, through a dedicated training on the concept/approach of CSA, its implementation, key associated practices and technologies, and preliminary guidance on how to integrate climate change concerns into agricultural investment projects/programs.

The specific objectives are, for IsDB's project staff:

- To understand the CSA concept and approach for implementation at the field/institutional/policy/financing levels;
- To have an overall guidance on how to integrate climate change concerns into agricultural investment projects and programs.

The expected outcomes of this training are the following:

- IsDB project staff have a proper understanding of the CSA concept/approach and its 5-step implementation process;
- IsDB project staff have gained the necessary knowledge and know-how to implement the CSA approach at the field, institutional, policy, and financing levels;
- IsDB project staff have benefited from guidance on how to integrate climate change concerns into agricultural investment projects and programs, including under IsDB's project development cycle.

Method and training delivery

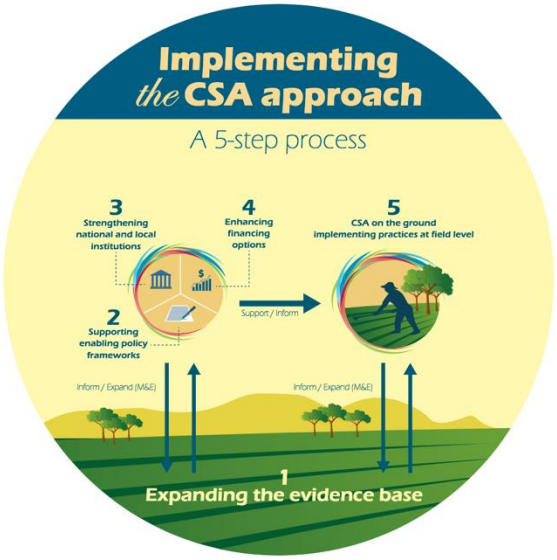
This initial training will focus on the key concepts and approaches associated with climate action in the agricultural sectors, especially CSA, and will be structured around the five-step CSA implementation approach, from building evidence base to the implementation and dissemination of locally suitable practices and context-specific technologies, while addressing barriers at the institutional, policy and financial levels.

This training will also introduce preliminary guidance on how to integrate climate change concerns into agricultural investment projects/programs.

FAO will provide a three-day face-to-face training in each hub, based on a two-tiered approach: the first is to provide participants with a well-rounded understanding of concepts and approaches, the second allowing for participants to apply this knowledge through practical exercises and group work.

The design and delivery of this training will be based on the 5-step implementation process of the CSA approach (see figure 1 below), namely:

- ✓ Step 1: Expanding the evidence base
- ✓ Step 2: Supporting enabling policy frameworks;
- ✓ Step 3: Strengthening national and local institutions;
- ✓ Step 4: Enhancing financing options;
- ✓ Step 5: CSA on the ground: implementing locally-suited and context-specific practices and technologies for CSA.



For instructional purposes, it is suggested to deliver the training as follows:

On day 1, the training will be focus on the preparation phase of investment projects. It will start with a wider overview and concepts of CSA and climate action in the Agriculture sectors. This will then be followed by an immersion into Steps 1, 2 and 3 of the CSA implementation process that looks into building an evidence base for CSA, and on the importance of strengthening national and local institutions and their enabling policy frameworks. A presentation on IsDB's project cycle will be given which will highlight the challenges the Bank faces when mainstreaming CSA into their programmes. This will be followed by group exercises, in which participants will receive practical know-how on how to best integrate CSA into the preparation phases of project design and development of the IsDB's project cycle.

On day 2, the training will be focusing on implementation with a presentation given on different locally suited and context –specific practices and technologies and how these are implemented. This will be followed by presentations on how to enhance financing options and the available financing mechanisms that are available. A presentation on IsDB's climate change strategy will be given to better understand the Bank's vision and objective in relation to Climate Change. This will be followed by group exercises, in which participants will receive practical know-how on how to integrate CSA into the implementation phase of the IsDB project cycle.

O**n day 3, the training will be dedicated to the monitoring and evaluation** aspects of the project cycle, more specifically on IsDB's project climate risk management, followed by an introduction to the *Aware climate risk screening* tool which helps to determine the climate change vulnerability context of a project. Practical examples and exercises will be provided to participants on how to enter data in the "Aware" software and analyses findings. Participants will also have a chance to freshen up their skills on how to formulate SMART indicators and on the important elements of M&E which will be useful for the session on Day 4. Finally, the *Ex Ante Carbon balance* tool which was developed to track and estimate GHG impact

of projects and policies will be presented on Day 3. Participants will get a chance to work through the tool by solving various pertinent exercises.

Finally, on day 4, the training will be dedicated to specific monitoring and evaluation indicators and how these can be used to track climate change adaptation impacts in the agriculture sectors. Participants will also get a chance to work in groups and solve exercises using the skills practiced during the previous day, which will be used to integrate CSA into the monitoring and evaluation phase of the IsDB's project cycle. The fourth day will wrap up just before lunch time with closing remarks followed by a certificate awarding ceremony for all participants.

The detailed agenda is provided in a supplementary document.

Session 1 | Introduction to Climate-Smart Agriculture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Module 1.1 From climate action in agriculture to climate-smart agriculture (CSA): an overview of key concepts and approaches

Learning objectives

1. Understand the international climate processes and policies that led to the conceptualization of CSA through time
2. Understand the fundamental concepts of climate change (e.g. adaptation, mitigation, resilience) and impacts on food security and nutrition
3. Understand the key characteristics of the CSA approach, and have an overview of its implementation process

Learning materials

- Visual Presentation
- CSA Sourcebook (2017) Chapter A1
- CSA Sourcebook (2017) Chapter A2

Extra resources

- FAO's work on Climate Change - Infographic booklets [English]
- FAO's work on Climate Change – Infographic booklets [French]
- E-Learning course: Climate Change and Food Security
- E-Learning course: Community based adaptation to Climate Change
- To be released at COP24 in Dec. 2018: Water Management for CSA; Livestock Management for CSA; Sustainable Soils and Land Management for CSA; Crops Production for CSA

Relevant chapter of the second edition of the FAO CSA Sourcebook (2017):

Introducing Climate-Smart Agriculture

Module A.1 of the CSA Sourcebook Second Edition

To contribute to achieving the SDGs under a changing climate, agricultural production systems need to simultaneously tackle three intertwined challenges: sustainably increasing agricultural productivity and incomes; building resilience to the impacts of climate change; and contributing to climate change mitigation where possible. CSA was developed as a framework to address these three challenges.

CSA can facilitate a transition to agriculture and food systems that are more productive, more sustainable and more climate-friendly. This is achieved by promoting the adoption of climate-smart practices that have been proven to be effective based on solid evidence, and providing an enabling environment that includes conducive policies, institutions and finance. CSA is not a technique, a new production system or a one-size-fits all set of practices, but rather a three-tiered action-based approach to identify existing production systems that can best respond to the impacts of climate change.

CSA approaches help identify which production systems are suitable for adaptation and, where possible, mitigation, and enable institutions to scale up their response to tackle the challenges of climate change in specific locations. They provide the means to help stakeholders at local, national or international levels choose the agricultural strategies that are the most readily adaptable to specific climate conditions. CSA approaches set out to isolate and address trade-offs that may need to be made between the three objectives of CSA. Out of this process emerge pragmatic, context-specific options that can guide evidence-based decision making. The key to success is a long-term, coordinated effort by stakeholders at all levels – from the producer level to the global level.

This chapter introduces key climate change issues that need to be addressed in agricultural sectors to help achieve the SDGs, including the role of the agricultural sectors as a contributor to global greenhouse gas emissions. It revisits the evolution of CSA and looks at its relationship with broader policy goals and frameworks, as well as complementary approaches to sustainable food and agriculture, such as sustainable production intensification and agroecology. It provides guidance on how to operationalize and implement CSA, and clarifies core concepts related to creating enabling environments, mobilizing synergies, managing trade-offs and overcoming barriers to adoption.

Climate change adaptation & mitigation

Module A.2 of the CSA Sourcebook Second Edition

A strong scientific consensus has been reached regarding the projected long-term impacts of climate change. It is expected that there will be an increase in the frequency and intensity of extreme weather events, such as droughts, floods and storms, and that there will be changes in local weather patterns that will affect ecosystems. Communities and ecosystems will need to adapt to new conditions and build resilience to the potential negative impacts that are projected for the future. The concentrations of greenhouse gases in the atmosphere also needs to be reduced to minimize global warming and climate change and avoid reaching environmental tipping points beyond which the damage done becomes irreversible. The Paris Agreement on climate change aims at "holding the increase in the global average temperature to well below 2o C above pre-industrial levels and to pursue efforts to limit the temperature increase to 1.5o C above pre-industrial levels". To achieve this goal, all sectors, including the agricultural sectors, must reduce their greenhouse gas emissions. It is undisputed that the agricultural sectors will also need to increase their output to meet the dietary needs of a growing world population. However, the agricultural sectors currently account for approximately one fifth of global emissions. If future growth in agriculture follows the emissions trajectories of the recent past, agriculture's share of total emissions will increase and compromise global efforts to reach the Paris Agreement's temperature goal. Maintaining this same trajectory will also continue the global trends in deforestation and land degradation, which are being driven by an increasing demand for food, wood and other agriculture-related products. The agricultural sectors offer unique opportunities to contribute to climate change mitigation. Sustainable management practices can avoid further losses in the carbon that is currently stored in soils, trees and coastal ecosystems. Sustainable soil, rangeland and forestry management can create carbon sinks that capture carbon dioxide from the atmosphere and store the carbon in the soil and biomass. CSA seeks to maximize these opportunities. Often, CSA approaches can simultaneously bring about gains in adaptation, mitigation and/or productivity. CSA seeks to take advantage of opportunities to maximize synergies and co-benefits, and minimize or avoid trade-offs.

This module makes the case for adaptation and mitigation actions in the agricultural sectors, particularly in the context of countries' Nationally Determined Contributions under the Paris Agreement. It first considers climate change adaptation and mitigation approaches and methodologies individually and then brings them together to identify potential synergies and trade-offs. It highlights the complexities that must be addressed during the process of designing a CSA intervention.

Session 2 | The 5-step process to implement the CSA approach

Module 2.1 Implementing and disseminating locally-suited and context-specific practices and technologies for climate-smart agricultural production systems and value chains

Learning objectives

1. Introduce and discuss practical examples of practices and technologies for CSA, in the different agricultural sub-sectors and along the value chains
2. Understand the importance of designing locally-suited and context-specific practices and technologies for CSA
3. Gain an overview of major FAO programs related to climate action in the agriculture sectors

Learning materials

- Visual Presentation
- CSA Sourcebook (2017) Chapter B1
- CSA Sourcebook (2017) Chapter B2
- CSA Sourcebook (2017) Chapter B3
- CSA Sourcebook (2017) Chapter B4
- CSA Sourcebook (2017) Chapter B5
- CSA Sourcebook (2017) Chapter B6
- CSA Sourcebook (2017) Chapter B7
- CSA Sourcebook (2017) Chapter B8
- CSA Sourcebook (2017) Chapter B9
- CSA Sourcebook (2017) Chapter B10

Extra resources

- Climate Change for forest managers
- Impact of climate change on fisheries and aquaculture
- Code of conduct for responsible fisheries
- Save & Grow series

Relevant chapters of the second edition of the FAO CSA Sourcebook (2017):

Climate-smart crop production

Module B.1 of the CSA Sourcebook Second Edition

Crop production is highly sensitive to the climate. It is affected by a variety of climate factors: long-term trends in average rainfall and temperatures; inter-annual variability in temperatures and precipitation; the occurrence of shocks during specific stages in plant development; and extreme weather events. As the climate changes, crop production strategies must change too.

There are many options for climate change adaptation and mitigation across different cropping systems. The suitability of these options will vary according to the specific types of stress the system is facing, the farmers' coping and adaptive mechanisms, and the degree to which each climate factor affects yields. The sustainable intensification of crop production is the cornerstone on which all climate-smart crop production options are based. It guides decisions on how to overcome inefficiencies that result in yield and productivity gaps and minimize the negative environmental and social impacts of production.

Sustainable crop production intensification calls for farming practices that make use of good quality seeds and planting materials of well-adapted varieties; the cultivation of a varied range of crop species and varieties in associations, intercrops or rotations; the control of pests through integrated pest management; and the adoption of conservation agriculture and sustainable mechanization to maintain healthy soils and manage water efficiently to achieve the highest possible output by unit of input within the carrying capacity of the ecosystem.

Critically, climatic changes can also cause dysfunctions in plant-pollinator interactions, as many pollinators are sensitive to high temperatures and drought. When pushed beyond their tolerance levels, this has grave consequences for crop pollination. Undertaking climate change mitigation hand-in-hand with adaptation strategies is therefore key. One important synergy can be found in the important role of grasslands in sequestering organic carbon. This can be improved by controlling grazing to sustainable levels which promotes growth of herbaceous species and reduces the degradation of grasslands. Introduction of deep-rooted grasses and legumes can also play an important role in improving the sequestration of soil carbon.

If farmers have access to good knowledge of ecological dynamics and to technological innovations as well as a good understanding of the type and extent of change in the climatic factors that affect crop production, they can work better rather than harder. They can maintain ecosystem functions and leverage the biogeochemical processes of their agricultural ecosystem for best results. They can also manage the trade-offs and synergies that are involved in adapting to new local climate conditions, and respond to fluctuations in international markets.

This chapter presents the principles, practices and technologies for the sustainable and profitable production of annual and perennial crops to meet food, feed, energy and fibre needs, and promote economic growth in a world where populations are expanding, the climate is changing, dietary patterns are evolving and pressure on natural resources are increasing. It looks at specific crop systems and the projected impacts of climate change on crop production, such as increased concentrations of atmospheric carbon dioxide, higher temperatures, alterations in precipitation regimes, and increased pests outbreaks. The chapter also describes the off-farm elements that enable farmers to adopt climate-smart crop production practices.

Climate-smart livestock production

Module B.2 of the CSA Sourcebook Second Edition

Farming is the source of livelihood for one-third of the world's population. About 60 percent of the people who rely on farming for their livelihoods own livestock. Livestock production is a rapidly growing sector. It currently accounts for 40 percent of global agricultural gross domestic product and is crucial for food security in all regions. Livestock make a necessary and important contribution to the world's supply of calories and protein. Livestock are also a major asset for households in rural communities: several hundred million pastoralists depend on this lifestyle and grasslands ecosystems for their living. They provide a range of essential services, including a means for savings, collateral for obtaining credit and a buffer against climatic shocks and other crises. In mixed systems, livestock consume crop residues and by-products and their manure is used to fertilize crops. Cattle, camels, horses and donkeys also provide transport and draught power for field operations. Furthermore, livestock, especially small ruminants and poultry, are key to empowering women and making progress toward gender equity. The contribution that livestock make to rural livelihoods goes far beyond agriculture production and food security; it directly supports social welfare, education and human health.

It is essential that livestock are managed carefully to maximize the range of services they provide and reduce the vulnerability of the sector to the impacts of climate change. Action in this area is especially urgent given that nearly 800 million livestock keepers currently live on less than USD 2 per day. Their livelihoods are particularly at risk from the impacts of climate change. Increased temperatures, shifts in rainfall distribution, greater frequency of extreme weather events, increased heat stress and reduced water availability are expected to adversely affect both directly and indirectly livestock production and productivity around the world. The livestock sector is also a major contributor to climate change. FAO estimates that the sector is responsible for about 14.5 percent of the total anthropogenic greenhouse gas emissions. Identifying suitable options for making livestock production more climate-smart is critical. There are many synergistic options capable of delivering benefits for both adaptation and mitigation that can be implemented in the livestock sector, including shifts in species and breeds, improved feed management, sustainable grazing practices, silvopastoralism and on and off-farm diversification to name but a few.

This chapter assesses the role of livestock in CSA. It considers the impacts of climate change on livestock production and presents an overview of the emissions associated with the sector. It describes the principles of climate-smart livestock production, focusing on increased efficiency in the use of resources and building resilience. The chapter gives insights into the main strategies for achieving climate-smart livestock production and outlines specific practices suitable for the main production systems. It also looks at what is needed to establish an enabling environment for climate-smart livestock production.

Climate-smart forestry

Module B.3 of the CSA Sourcebook Second Edition

Over a quarter of the world's population depends on forests and trees outside forests for their livelihoods. They depend on them directly through the consumption and sale of foods, medicines and wood fuel; and indirectly through forest-related employment, the provision of ecosystem services, and the domestication of forest-derived foods.

Forests and trees are long-term presences in landscapes and are essential for the well-being of urban and rural communities. They act as buffers against shocks and provide ecosystem services that underpin agricultural production. They protect water and soil resources, assist in soil development and enhance soil fertility, regulate climate, and provide habitats for wild pollinators and predators of agricultural pests. Forested wetlands and mangrove forests help protect coastal areas from flooding, which contributes to stabilizing food production on vulnerable coastal lands. Forests also play a central role in river-based and coastal fisheries. Mountain forests protect valuable water catchments, ensuring that downstream communities and agricultural lands receive high-quality, evenly discharged water.

There are strong interactions between climate change and forests. Air temperature, solar radiation, rainfall, and atmospheric carbon dioxide concentrations are major drivers of forest productivity and forest dynamics. In turn, forests help to control climate by removing large amounts of carbon dioxide from the atmosphere and acting as carbon sinks, storing the carbon in the soil and biomass. They are also a source of carbon dioxide emission in that they release carbon dioxide into the atmosphere through respiration. Forest vegetation and soils contain about half the planet's terrestrial carbon. However, terrestrial ecosystems have the potential to sequester much more carbon dioxide than they currently do. Deforestation and forest degradation account for an estimated 17 percent of global greenhouse gas emissions.

Climate change and increased climate variability have both direct and indirect effects on forests and forest-dependent people. In boreal and tropical regions, climate change is making forests more susceptible to stresses. Reducing emissions from deforestation and forest degradation and the role of conservation, sustainable management of forests and enhancement of forest carbon stocks (known as REDD+) will play a central part in global efforts to combat climate change. In the Paris Agreement, countries agreed to conserve and enhance sinks and reservoirs of greenhouse gases, including forests. Many countries made specific commitments to forest-related actions in their Nationally Determined Contributions under the Paris Agreement.

This chapter focuses on sustainable forest management as the foundation for climate-smart forestry. The chapter looks at the risks climate change poses to forests and trees outside forests and how the ecosystem services provided by forests can improve the resilience of agricultural production systems. It also discusses the sector's actual and potential role in climate change mitigation.

Climate-smart fisheries & aquaculture

Module B.4 of the CSA Sourcebook Second Edition

The fisheries and aquaculture sector provides millions of people with food, income and livelihoods. An estimated 660 to 820 million people, about 10 to 12 percent of the world's population, derive their income and livelihoods from capture fisheries and aquaculture, and the postharvest activities associated with processing, marketing and trade. Ninety percent of those working in capture fisheries are engaged in small-scale operations. Oceans and inland waters provide significant benefits to the world's population, especially in the most impoverished communities.

Climate change is affecting the abundance and distribution of fisheries resources and the suitability of some geographical locations for aquaculture systems. Climate-related physical and chemical changes are linked to increasing carbon dioxide emissions. These emissions are being absorbed in large part by aquatic ecosystems, which is triggering substantial changes in these environments and affecting the important ecological services they provide.

Other factors, such as pollution, dam construction and unsustainable fishing, are further exacerbating the harmful impacts of climate change. Population growth is increasing the demand for food, and unsustainable fishing practices have caused production from marine fisheries to level off. Aquaculture will have to bridge this gap between supply and demand. To do this, the aquaculture subsector will need to increase production by 70 to 100 percent above current levels over the next two decades. There are numerous options for supporting such growth in a climate-smart and sustainable manner, including improved siting and design; sustainable water management practices; selective breeding and genetic improvements; improved feed management; strengthened emergency procedures and biosecurity measures. However, it must also be noted that aquaculture development faces growing constraints, as the competition for land, water, energy and feed resources intensifies.

The impacts of climate change and related adaptation options vary by region. The impacts are expected to be largely negative, but in some areas climate change may have a positive effect on the sector. For instance, in some cases, rising sea levels may create new environments and new opportunities, for example in marine aquaculture and the expansion of mangrove forests. Context-specific, climate-smart agriculture solutions based on a solid evidence will be required to guide the sector toward a sustainable future.

This chapter explores how the objectives of CSA can be reached in the fisheries and aquaculture sector. It describes how an ecosystem approach to fisheries and aquaculture can establish a framework to holistically address climate change across marine and coastal systems. It provides a summary of strategic climate-smart approaches for the sector and notes the progress the sector is making in this regard. It also outlines priorities for future action alongside areas where further research is needed.

Integrated production systems

Module B.5 of the CSA Sourcebook Second Edition

Integrated production systems use some of the products, by-products or services of one production component as inputs for another production component within the agricultural unit. In integrated systems, production components are mutually supportive and mutually dependent. Examples of integrated production systems include agroforestry and crop-livestock, rice-fish, fish-livestock and food-energy systems.

By increasing efficiency in the use of resources, integrated production can help reach the mutually supporting objectives of CSA. Higher efficiency in the recycling of resources (e.g. converting waste into biogas) creates systems that have a minimum environmental impact and require fewer expenditures on inputs (e.g. fertilizer, feed and energy). The diversification of resources and incomes associated with integrated production offers producers a greater number of risk management strategies and options to adapt to the impacts of climate change. Also, the greenhouse gas emissions intensities of integrated systems are typically lower than those of specialized systems.

Successful integration depends on flexibility to reduce trade-offs and competition between the various production components of the agricultural system. This requires substantial knowledge, labour and sometimes initial investments that may pay off only over a relatively long period of time.

The sustainable intensification of production on integrated agricultural systems requires a better understanding of the impacts of climate changes and climate variability on these systems. This can be achieved by generating and exchanging knowledge at all level, developing capacities, and supporting greater coordination of policies and enabling institutions.

This chapter describes the principles of integrated production systems and provides concrete examples of how these systems can support the objectives of CSA. The chapter details the contribution each integrated system can make to the sustainable intensification of production, and to climate change adaptation and mitigation. It also provides guidance on adaptive management and looks at barriers to the adoption of climate-smart integrated production systems and the enabling environment needed to overcome them.

Water management and climate change

Module B.6 of the CSA Sourcebook Second Edition

Water is one of the prime channels through which the impacts of climate change on the world's ecosystems and on livelihoods will be felt. Climate change will have an impact on every element in the water cycle. Agriculture will be affected by increased evaporative demand due to warmer temperatures. Changes in the amount of rainfall and variations in rainfall patterns will affect the two sources of water for irrigation: river runoff and groundwater recharge.

The most immediate impacts of climate change will be the increased variability of rainfall, higher temperatures, and extreme weather events, such as droughts and floods. In the medium to long term, climate change will reduce the availability or reliability of water supplies in many places already subject to water scarcity. These impacts must be considered in the bigger picture of water scarcity and agricultural development. Agriculture is responsible for 70 percent of freshwater withdrawal globally. Other factors, such as population growth, urbanization and changing dietary habits, are also driving changes in water use, meaning climate change is placing additional burdens on already stressed systems.

As the climate changes, sustainable water management will play an increasingly important role in maintaining agricultural productivity and supporting food security and nutrition. This has been emphasized in countries' Intended Nationally Determined Contributions towards the Paris Agreement. Of the 189 countries that presented Intended Nationally Determined Contributions, 132 mention water services in relation to adaptation actions in general, and 74 countries explicitly refer to water resources in the context of adaptation actions in the agricultural sectors. Rainwater harvesting, use of marginal water and wastewater resources, water use efficiency measures and watershed management procedures are some examples of options countries identified.

This chapter provides an overview of the current status, trends and challenges of water management for agriculture. It considers the impacts of climate change on water management and the vulnerability of rural populations and farming systems. It presents a range of possible adaptation and mitigation options at different scales of intervention. The chapter also introduces approaches and tools to assess climate change risks and select climate-smart water management options.

Sustainable soil and land management for climate-smart agriculture

Module B.7 of the CSA Sourcebook Second Edition

As a result of climate change, land degradation and losses in biodiversity, soils have become one of the world's most pressing problems. The degradation of the ecosystem services provided by soils undermines food security and nutrition, water quality and availability, human health, and social and economic development. In cropping, grazing and forest systems, climate variability and change is expected to affect soil health and plant growth in a variety of ways. Reduced or erratic rainfall and more frequent and severe periods of drought will lower the capacity of soils to supply water and nutrients to plants.

Higher evaporation and transpiration rates will lead to increased erosion, reduced groundwater recharge and reduced soil moisture for plant growth, and a higher incidence of soil salinization. Warmer soil surface temperatures will increase the rates of mineralization of soil organic matter and, in turn, impair the soil's capacity to sequester carbon and retain water, which will also ultimately reduce the soil's potential to support plant growth.

Sustainable land management can make an important contribution to CSA, as it also guides actions to strike the right balance between using resources sustainably and safeguarding their long-term productive potential. Soils host the largest terrestrial carbon pool and their biogeochemical processes regulate the exchange of greenhouse gases with the atmosphere. These emissions are strongly affected by factors such as land use, land use change, vegetation cover and soil management. The stocks of soil organic carbon in the upper soil layers are responsive to these factors, and provide an opportunity to influence greenhouse gases levels in the atmosphere. Sustainable crop, grazing and forest systems can sequester substantial amounts of carbon from the atmosphere and store it in soils and vegetation. Sustainable soil and land management initiatives that build up soil organic matter are a good example of climate-smart interventions that can deliver co-benefits at all levels, by contributing to climate change mitigation while also maintaining soil-supported ecosystem services, and thereby increasing the resilience of agricultural ecosystems to climate change and other stressors.

This chapter looks at soil and land management in the context of climate change. It provides technical details on the concepts of sustainable soil management, and considers how the large-scale implementation of climate-smart soil and land management practices could enhance climate change adaptation and mitigation. The chapter also highlights the types of institutions and policies that can support the wider adoption of sustainable soil and land management practices, and offers tools and assessment methodologies to assist decision makers in this regard.

Genetic resources for food & agriculture

Module B.8 of the CSA Sourcebook Second Edition

Genetic resources for food and agriculture are the basis for life on Earth: genetic diversity is vital for the survival and adaptability of any species. From the perspective of sustainable agriculture and food security, genetic resources are the raw materials on which humanity relies to sustainably increase agricultural production and improve livelihoods; adapt and build resilience to climate change; and mitigate greenhouse gas emissions. Over centuries, selective breeding and domestication, combined with natural selection, have added to the immense diversity of wild genetic resources that contribute to food and agriculture and led to the development of numerous and diverse varieties, breeds, stocks and strains of plant, animals and micro-organisms. However, genetic diversity is being lost due to changes in the way land and water is being used; agricultural intensification; excessive use of pesticides and fertilizers; changing consumer demands; invasive alien species; inadequate policies; and the impacts of climate change. As different plants, animals and micro-organisms have different capacities to survive or adapt to shocks and changes, safeguarding and sustainably managing the diversity of genetic resources is a vital component of climate change adaptation and mitigation strategies. For example, valuable traits, such as water stress tolerance, drought resistance, or resistance to pest or diseases, may be included in breeding or conservation strategies designed to build resilience to climate change, including by putting more emphasis on wild crop relatives. There is also significant, and as yet underexplored, potential to contribute to climate change mitigation through the improved use and development of genetic resources.

This module describes the nature of genetic resources for food and agriculture and outlines why these are essential for CSA. It outlines the expected impacts of climate change on plant, animal, forest, aquatic, and micro-organism and invertebrate genetic resources. It describes the management of these resources, in particular their characterization, evaluation, inventory and monitoring. It also looks at how the sustainable use and development of genetic resources can contribute to climate change adaptation and mitigation, and at the same time support the conservation of genetic resources for food and agriculture. It also considers enabling institutional and policy process.

Energy-smart food in the Climate-Smart Agriculture context

Module B.9 of the CSA Sourcebook Second Edition

Energy is needed at every stage of agriculture and food production. It is therefore important to consider energy management not only in the production phase, but along the full value chain. The connections between energy and agrifood chains have grown stronger as agriculture has become increasingly reliant on mineral fertilizers, irrigation and machinery. Post-harvest activities, such as food storage, processing and distribution, are also energy-intensive. Over the last decades, the increased use of energy by the agrifood sector has significantly contributed to feeding the world – and to greenhouse gas emissions. Energy from fossil fuels has expanded farm mechanization, boosted fertilizer production and improved food processing and transportation. Between 1900 and 2000, the world's arable area doubled, and the energy content of edible crops expanded six-fold. This greater productivity was made possible by an 85-fold increase in energy input per hectare.

The agrifood sector is estimated to contribute about 30 percent of global greenhouse gas emissions. As a result, agrifood chains that are highly dependent upon fossil fuels pose serious challenges to development. Business-as-usual development would lead to a more than 40 percent increase in the demand for water, energy and food by 2030; a development scenario that is clearly unsustainable.

A sustainable approach must focus on the water-energy-food nexus, and address trade-offs and capitalize on synergies in the use of these resources. Food losses occur at all stages of the supply chain.

The energy embedded in global annual food losses amounts to around 38 percent of the energy consumed by the whole food chain. At the same time, agriculture and forestry have always been a traditional source of energy generated from biomass. The energy produced by agrifood chains can be partially used in food production, or it can be exported outside the agrifood chain and serve as a livelihood diversification strategy. This could be done, for example, through the sale of biogas produced on farms to local households, or through the generation of electricity from agricultural residues that can be fed into the national energy grid.

One of the world's greatest challenges is to develop global food chains that rely less on fossil fuels and emit fewer greenhouse gases; have a secure supply of energy; are resilient to fluctuating energy prices; make efficient use of water, energy and land; and can continue to ensuring food security and foster sustainable development. Energy-smart food chains are a key component of CSA.

This chapter looks at the relationship between food and energy in a world where the climate is changing and competition for natural resources is increasing. It describes how energy is used in agrifood chains and how the sector can produce energy. The chapter links the objectives of the energy-smart food programme, which focuses on the water-energy-food nexus, with those of CSA. It outlines possible energy solutions for CSA and indicates potential synergies and trade-offs.

Developing sustainable food systems & value chains

Module B.10 of the CSA Sourcebook Second Edition

Food systems encompass the diverse range of actors and their interlinked value adding activities involved in the production, aggregation, processing, distribution, consumption and disposal of food products that originate from agriculture, forestry or fisheries as well as the broader economic, social and natural environments in which they are embedded. Sustainable food systems are those that deliver food and nutrition security for all, in ways that are economically sustainable, in that they are profitable; socially sustainable, in that they deliver broad-based benefits for society; and environmental sustainable, in that they have a positive or neutral impact on the environment. To make food systems more environmentally sustainable and climate-smart, it is important to examine the food system's carbon footprint, and where possible, identify more efficient, less carbon-intensive approaches. For instance, measures and strategies aiming to reduce food losses and waste are an excellent opportunity for such improvements: globally, about one-third of all food produced is lost or wasted, meaning that the natural resources used and the greenhouse gases emitted in its production were effectively wasted, too. To identify climate-smart interventions, it is important to take a holistic view of the entire food system and consider how it will be affected by climate change and where it is most vulnerable. Since food systems are extremely complex, analysis must take place at a workable scale. Such an analysis can be realized by adopting a value chain approach. The FAO sustainable food value chain development approach involves an analysis at three interconnected levels: the core value chain, the extended value chain and the enabling environment. The core value chain is comprised of the various stages: production, aggregation, processing, distribution and consumption, including waste disposal. Governance is the vertical and horizontal coordination of these different stages. The extended value chain includes the available input support services. The enabling environment relates to societal and environmental elements and the diverse actors involved in developing climate-smart food system.

Concrete examples of one possible intervention for each stage in the value chain include:

- ✓ **Production**: Improve fertilizer use efficiency;
- ✓ **Aggregation**: Improve coordination;
- ✓ **Processing**: Invest in packaging that maintains food quality and safety;
- ✓ **Distribution**: Encourage supermarkets to take measures to minimize refrigerant leakage and reduce energy use;
- ✓ **Consumption:** Promote local food products, particularly for perishable goods;
- ✓ **Disposal:** Invest in weatherproof landfills alongside improved recycling of food packaging materials.

This module takes a holistic view of the food system. It uses a sustainable food value chains approach to identify areas of intervention to adapt to climate change and, where possible, mitigate climate change in the food system. It identifies key considerations for selecting appropriate value chains, the roles of the various stakeholders, and possible interventions to develop climate-smart value chains and food systems.

Module 2.2 Enhancing financing options

Learning objectives

1. Increase our understanding of the unique role of finance in promoting and sustaining CSA outcomes
2. Understand the range of costs associated with CSA adoption and strategies to address these
3. Understand the variety of climate financing options available and mechanisms to access them

Learning materials

- Visual presentation
- CSA Sourcebook (2017) Chapter C4
- SOFA (2016) Chapter 6

Extra resources

- National Adaptation Plan (NAP). Guidelines for Agriculture, Forestry and Fisheries. Supplement to the LEG NAP Technical Guidelines
- Incorporating Climate Change Considerations into Agricultural Investment Programmes. A Guidance Document

Relevant chapter of the second edition of the FAO CSA Sourcebook (2017):

Financing climate-smart agriculture

Module C.4 of the CSA Sourcebook Second Edition

Substantial, long-term investments are required in order for producers and policy makers to assess, promote and adopt climate-smart approaches and practices.

Countries' Nationally Determined Contributions to the Paris Agreement have laid a foundation for global action on adaptation and mitigation in all sectors, including the agricultural sectors. However, the financing needs for the agricultural sectors far exceed the funds pledged to date. Most agricultural investments are financed from domestic resources, either private or public. Available estimates suggest that the private sector is by far the largest source of finance for climate change adaptation and mitigation, with producers being the biggest investors in agriculture. Only a small share of the funding comes from international sources.

The international public finance landscape has evolved and now includes dedicated multilateral climate funds (e.g. the Green Climate Fund, the Global Environment Facility, the Adaptation Fund and the Pilot Program for Climate Resilience) that explicitly focus on support to climate action. Climate action in the agricultural sectors can be a game-changer in terms of the impact on climate change. There is an urgent need to use the available public resources – both international and domestic – more effectively in support of adaptation and mitigation efforts and in agriculture.

Relative to the rising investments in the agricultural sectors, the scale of public climate finance has been modest. This situation, along with the increasing need to take action to address climate change, indicates that climate funds will be most efficiently used if they strategically leverage agricultural investments in support of CSA. Areas for investment include the creation of an enabling policy environment to overcome barriers to the adoption of CSA; the mainstreaming of climate change adaptation and mitigation efforts in domestic budgets; and unlocking the private sector potential for climate-smart agricultural investment. The incorporation of climate change into national agricultural investment planning and operations, and the design of new types of cross-sectoral investments can be used to scale up CSA practices and approaches and provide for higher investment returns while reducing their climate-related risks. The identification of climate-related risks and opportunities for CSA interventions that can lead to the implementation of context-specific adaptation measures should be part of agricultural investment planning, preparation and appraisal.

This chapter looks at the challenge of meeting the investment needs of CSA and provides an overview of the available financing sources. It places a specific focus on opportunities related to climate finance. The chapter also describes the main the principles for incorporating CSA into the agricultural investment cycle and provides a summary of practical tools and approaches for mainstreaming CSA into investment processes.

Module 2.3 Strengthening national and local institutions

Learning objectives

1. Develop a clear understanding of the relationship between formal and informal institutions and CSA outcomes
2. Examine the evidence on the role of key rural institutions in supporting a transition to CSA

Relevant CSA Sourcebook Chapters

- CSA Sourcebook (2017) Chapter C1
- CSA Sourcebook (2017) Chapter C2
- CSA Sourcebook (2017) Chapter C3

Extra resources

- Institutions, Economic Freedom and Structural Transformation in 11 Sub-Saharan African Countries. FAO Agricultural Development Economics Working Paper 18-01
- Unleashing the Transformational Power of Informal Institutions for Rural Development: An FAO Perspective
- Developing a Climate-Smart Agriculture Strategy at the Country Level: Lessons from Recent Experience

Relevant chapter of the second edition of the FAO CSA Sourcebook (2017):

Enhancing capacities for a country-owned transition toward CSA

Module C.1 of the CSA Sourcebook Second Edition

Making agricultural systems climate-smart is a knowledge intensive process that requires strong country ownership. A sustainable transition toward CSA demands a system-wide and inclusive approach to capacity development. Such an approach empowers people and strengthens organizations, institutions and networks, and also helps establish conducive policy and regulatory frameworks. Capacity development encapsulates both the overall aim of development (what) as well as the process (how) by which more sustainable results can be achieved. Contextualized and targeted interventions should be designed based on a system-wide capacity needs assessment, and progress and results should be monitored and documented.

Transitioning towards CSA will require enhanced technical and functional capacities among agricultural stakeholders. For example, enhancing technical capacities to monitor and interpret weather- and climate-related data, particularly at the local level, will allow communities to reach informed decisions on climate-smart agricultural management practices (e.g. when, and what type of crop variety to sow to best adapt to prevailing conditions). Complementing technical expertise with additional functional capacities is key to putting this expertise into practice and achieving sustainable results.

Functional capacities for CSA include the capacity to: formulate and implement policies and undertake policy reforms; generate, manage and exchange data, information and knowledge; implement programmes and projects; and engage in multi-sectoral networks, alliances and partnerships that include subnational authorities and non-state stakeholders. Dedicated attention must be given to enhancing organizational and institutional capacities, as well as networks. This can be done, for instance, through improved inter-ministerial coordination, the synchronization of mandates and the facilitation of multi-stakeholder processes. Addressing capacity gaps in an iterative manner and tapping into opportunities for capacity building will enable countries to scale up climate-smart interventions in their agricultural sector.

This chapter introduces the core principles of a system-wide, country-owned capacity development approach for CSA. It provides operational guidance to support countries to inclusively assess their capacity needs and design, undertake and monitor contextualized capacity development interventions. The chapter also looks at capacity development methodologies, tools and practices. It also considers other catalytic factors for CSA, including multi-stakeholder processes and networks, agricultural innovation systems, local institutions at the landscape level, farmer field schools, indigenous knowledge and knowledge sharing, information and communication technologies, and communication for development.

Supporting rural producers with knowledge

Module C.2 of the CSA Sourcebook Second Edition

Extension services and other rural advisory services are a key instrument that helps farmers, pastoralists, fishers and foresters to manage change and respond to different challenges and opportunities. Extension services have evolved from a single agency focused on disseminating technology, to a mix of public, private and civil society service providers that offer a broader range of information and services to rural communities. Collectively, extension and advisory services comprise different types of providers, including extension agents, community knowledge workers, agricultural producers, facilitators, advisors, promoters, knowledge intermediaries and programme managers. They assist rural communities in developing their own technical, organizational, entrepreneurial and managerial skills.

Promoting CSA approaches and strengthening capacities for their wider uptake involves changing the behaviour, strategies and agricultural practices of millions of agricultural producers. These producers need to be supported in understanding the impacts of climate change, and the options that are available to them for making a shift towards climate-smart strategies. Extension services have a central role to play in connecting producers with sources of new information and tools, and encouraging and facilitating the behavioural changes that are needed to build the resilience of agricultural livelihoods and contribute to sustainable development. It is worth noting that extension is explicitly mentioned in SDG2 as one of the areas that needs increased investment in order to meet the goal of ending hunger, improving nutrition and promoting sustainable agriculture.

This module outlines the evolution of agricultural extension and advisory services, and describes why they are an important vehicle for fostering the wider uptake of CSA. It also provides examples of how extension and advisory services are already supporting CSA. The module looks at the key challenges and opportunities in this area, and considers the capacity gaps that need to be addressed in order to allow extension services to reach their full potential in promoting CSA.

Enabling policy environment

Module C.3 of the CSA Sourcebook Second Edition

The transition to climate-smart agricultural systems demands not only strong commitments, but also greater coherence, coordination and integration among various sectors dealing with climate change, agricultural development, food security and nutrition. At the international level, commitments to sustainable development are clearer and stronger today than ever before. The 2030 Agenda for Sustainable Development is made up of explicitly interrelated components, including the Paris Agreement on climate change, the SDGs and the Addis Ababa Action Agenda on means of implementation as well as the Sendai Framework for Disaster Risk Reduction. When countries translate these international objectives into national actions, implementing and monitoring these various agendas in an integrated and coherent manner can save resources and deliver greater results. Successful integration will depend on the ability of national governments to develop a set of national targets that serve each of these agendas, optimize benefits and co-benefits, and address trade-offs.

The CSA approach offers an equally excellent mechanism to 'deliver as one' on interconnected goals related to climate change and sustainability, agriculture and food security, while also contributing to inclusiveness, poverty reduction, social equity and economic growth. To deliver on these commitments, the public sector may need to support effective and sustainable investments. This could be done in a number of ways, including through regulations, incentives, capacity development, investments in research and innovation, the dissemination of knowledge, the construction of infrastructure and social protection.

This chapter looks at how key international agreements and policy frameworks can help guide effective national planning and implementation on CSA. It considers the need for integration and coordination among national policy processes related to agriculture, fisheries and forestry climate change. The chapter provides examples of policy measures that can create incentives for adopting CSA approaches and reduce the different types of barriers to their adoption.

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Module 2.4 Supporting enabling policy frameworks

Learning objectives

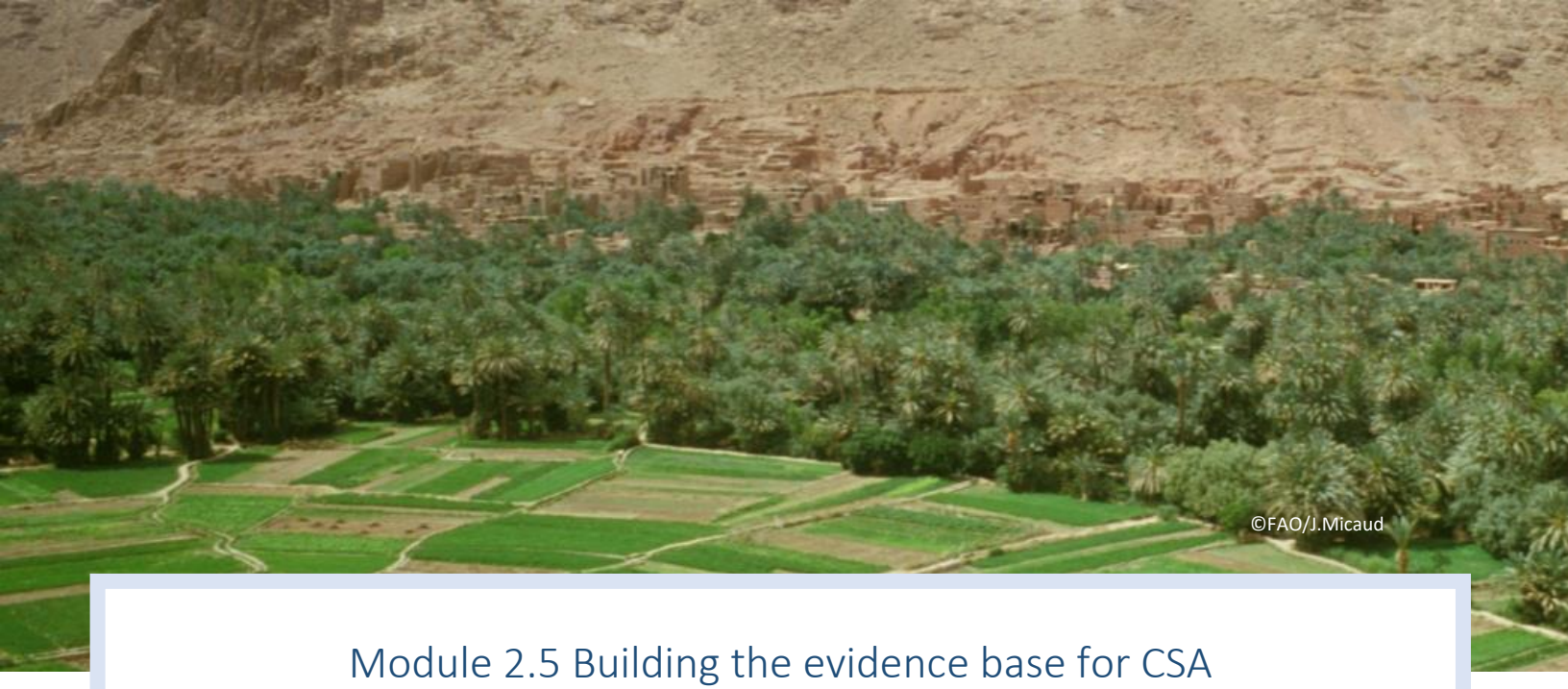
1. Understand the role of enabling policies in promoting a CSA transition
2. Understand 3 key elements of the policy environment to consider in CSA investment planning
3. Develop an understanding of CSA policy assessment tool

Learning materials

- Visual Presentation
- CSA Sourcebook (2017) Chapter C1– Summary on page 34
- CSA Sourcebook (2017) Chapter C3– Summary on page 36

Extra resources

- Integrating Agriculture in National Adaptation Plans (NAP–Ag)
- Food Security and Climate Benefits Through Nationally Appropriate Mitigation Actions in Agriculture
- The State of Food and Agriculture 2016. Climate Change, Agriculture and Food Security
- The Agriculture Sectors in the Intended Nationally Determined Contributions: Analysis. Environment and Natural Resources Management Working Paper 62



Module 2.5 Building the evidence base for CSA

Learning objectives

Building the evidence base for CSA

1. To understand the key evidence requirements for effective CSA investment planning
2. Gain an appreciation of potential data sources and methods for building evidence base

Modelling System for Agricultural Impacts of Climate Change (MOSAICC)

3. Develop an understanding of what MOSAICC is and how it functions
4. Develop an understanding of how MOSAICC can be integrated in projects and programmes
5. Develop an understanding of how MOSAICC can strengthen the evidence of climate impacts on agriculture for the formulation of climate-smart agriculture projects
6. Develop an understanding of how MOSAICC can help facilitate investments in climate-smart agriculture projects

Learning materials

- Visual Presentation
- CSA Sourcebook (2017) Chapter C8

Extra resources

Building the evidence base for CSA

- Food security and nutrition in the age of climate change
- Crop diversification increases productivity and stabilizes income of smallholders
- Incorporating CC considerations into agricultural investment programmes
- CC considerations e-learning platform
- Adoption of climate technologies in the Agrifood sector
- Cost-benefit analysis of CC adaptation policies and investments in the agriculture sectors

MOSAICC

- MOSAICC Official Website
- MOSAICC Morocco Application
- MOSAICC Morocco informational video

Relevant chapter of the second edition of the FAO CSA Sourcebook (2017):

Climate impact assessments and appraisals of options

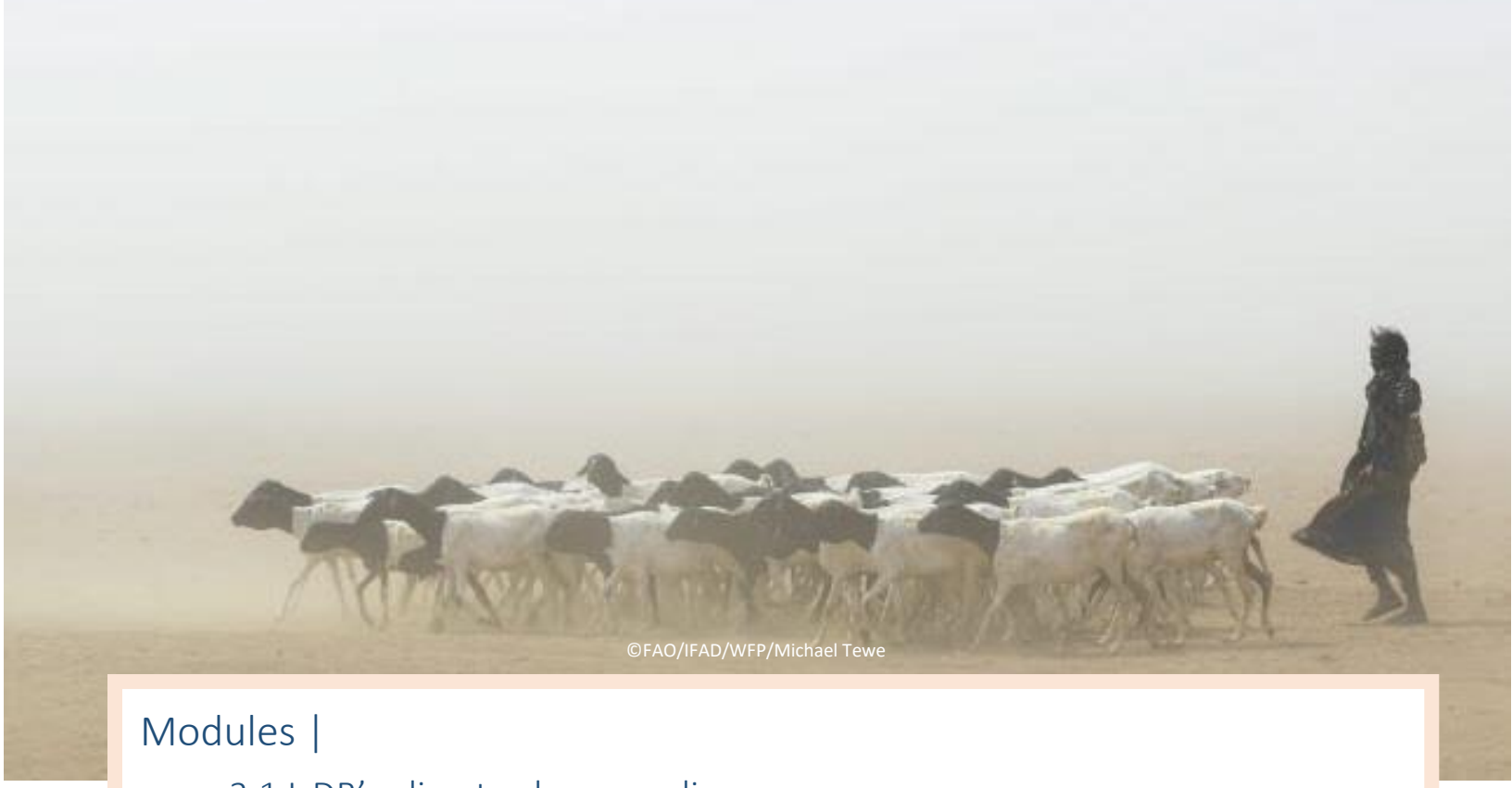
Module C.8 of the CSA Sourcebook Second Edition

There are a number of potential practices that would improve the productivity of local agricultural systems, enhance food security and support livelihoods. Implementing CSA is a context- and location-specific process. No single solution is applicable to all situations. A careful, strategic assessment needs to be made for each policy or programme to evaluate the potential benefits and trade-offs in various social, economic and environmental conditions. Assessments can determine how local climate conditions, and their impact on the agricultural sectors, food security, and livelihoods, have changed, and how they may continue to change in the future. They can also determine whether certain measures are climate-smart or not in a given context. Effective CSA interventions may differ from more traditional agricultural development initiatives and natural resources management approaches.

Climate impact assessments characterize the effects of climate change and identify the most vulnerable locations and contexts that require adaptation actions. Without proper assessments, it is difficult to justify why a transition to CSA is necessary and which CSA activities will achieve the desired results. Knowing which crops or livelihood activities may be more sensitive to a changing climate, for example, will help practitioners choose more resilient crops and adopt more diversified livelihoods. Impact assessments can also provide essential information to stakeholders regarding changing weather patterns and the spatial distribution of precipitation, allowing them to better allocate resources for the management of water resources. A comprehensive understanding of historical and projected changes in climate will allow for informed decision making regarding CSA policies and programmes.

This module gives an overview of methodologies, frameworks, and principles that support the assessment of the impacts of climate change on agriculture, food security, and livelihoods. It also looks at appraisals of the effectiveness of CSA interventions in enhancing adaptation, mitigation and food security. It focuses mainly on the subnational and national levels. Some case studies, however, address activities at the producer or project level. The module provides practical guidance on how to conduct assessments and appraisals relating to policies and project justification and design.

Session 3 | IsDB's Climate Change Policy



Modules |

3.1 IsDB's climate change policy

3.2 IsDB's agriculture and rural development policy

Learning objectives

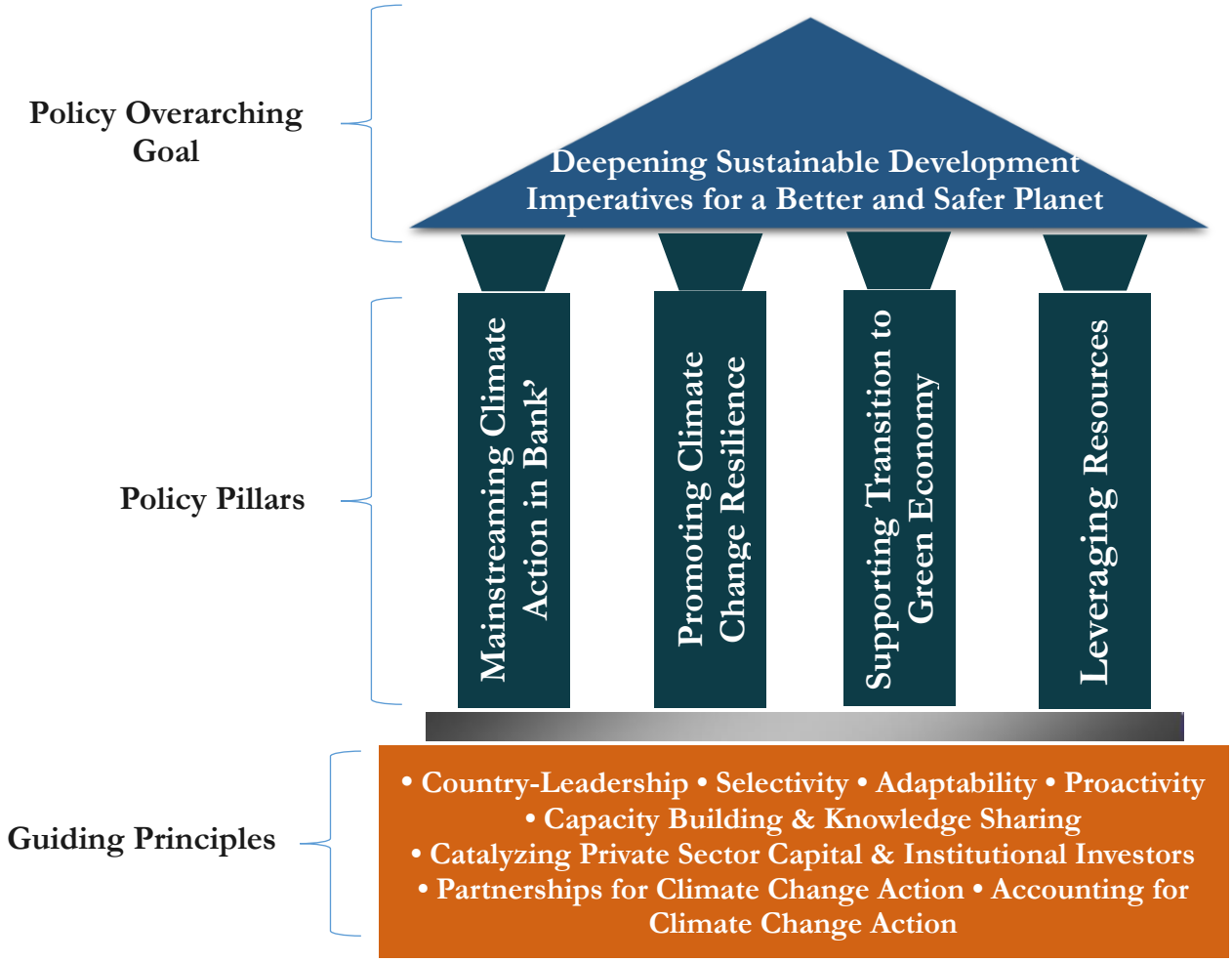
1. To familiarize the IsDB staff (OTLs and Global Practices specialists) of the objectives and the expect results of the Bank's Climate Change Policy and Agriculture and Rural Development Policy;
2. To demonstrate how to use climate safeguards system for screening projects' CC vulnerabilities;
3. To introduce the climate finance sources

Learning materials

- Visual Presentation
- Case Studies
- Climate Change Concept Note and Agriculture and Rural Development Concept Note

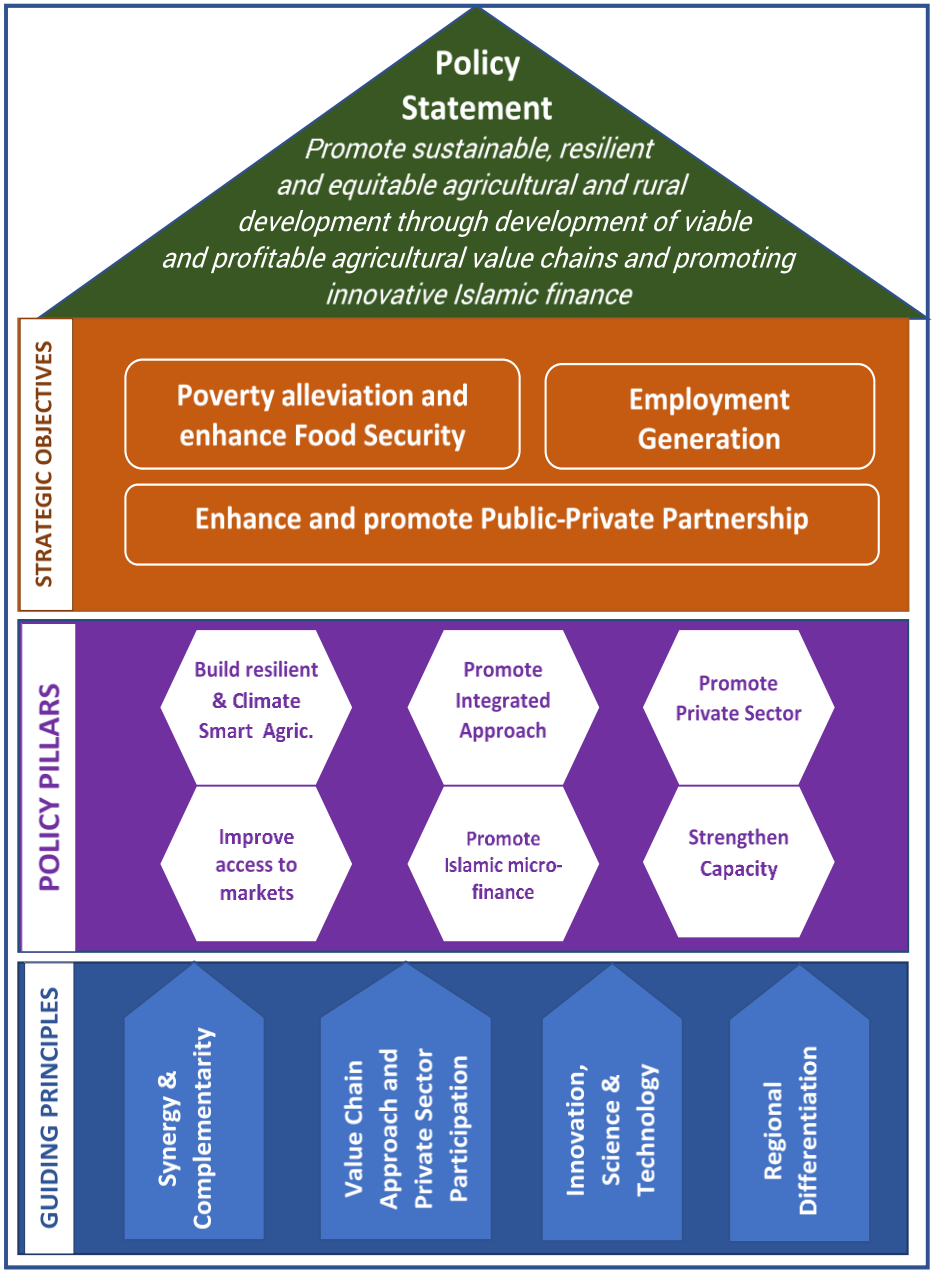
IsDB Climate Change Policy:

1. The IsDB Climate Change Policy recognizes that IsDB member countries are faced with different types of challenges, and that a country-driven approach will be imperative to ensure the objectives outlined in this policy are realized. The Policy is anchored on two objectives: (1) to support IsDB Group MCs in developing climate-resilient and sustainable investment, and (2) to provide IsDB Group a referential climate policy framework.
2. These objectives underpin IsDB's overarching goal, which is reinforced by its 4 Climate Change Policy Pillars and Guiding Principles (as shown below). The four policy pillars are: (a) Mainstreaming Climate Action into IsDB's Operations, (b) Promoting Climate Change Resilience, (c) Supporting Transition to Green Economy, and (d) Leveraging Resources.
3. The policy is guided by eight principles: (i) Country-Leadership/Ownership (ii) Selectivity (iii) Adaptability (iv) Proactivity (v) Capacity Building & Knowledge Sharing (vi) Catalyzing Private Sector Capital & Institutional Investors (vii) Partnership for Climate Change Action and (viii) Accounting for Climate Change Action. The policy places significant emphasis on mainstreaming climate action (SDG 13) in IsDB business activities supported through partnerships, leveraging and adoption of innovative financing mechanisms for scaling up climate investments.



IsDB Agriculture Policy:

1. The IsDB agriculture and rural development policy is meant to guide IsDB investment in its Member Countries. It applies to all IsDB-financed projects, programmes and initiatives in the sector. The policy provides a platform for synergies within the IsDB Group to bring about the desired development impact while maximizing efficiency. It will allow IsDB to forge purposeful partnerships with multilateral development partners, including multilateral development banks (MDBs), civil society organizations and the private sector. The policy Framework, pillars, and guiding principles are shown below.



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Session 4 | Incorporating climate change considerations into agricultural investment projects and programmes - preliminary guidance

Module 4.1 Incorporating climate change considerations into agricultural investment projects – from concept to evaluation

Learning objectives

1. Develop an understanding of how climate change considerations can be integrated into every stage of the project cycle
2. Recognize issues and key challenges in reflecting climate change considerations
3. Identify resources to inform and support climate change mainstreaming in investment

Learning materials

- Visual Presentation
- Investment Learning Platform (ILP)
- CSA Sourcebook (2017) Chapter C4– Summary on page 32
- CSA Sourcebook (2017) Chapter C8– Summary on page 39
- CSA Sourcebook (2017) Chapter C9

Extra resources

- FAO Investment Centre: Incorporating climate change considerations into agricultural investment programmes
- Climate Screening Tool - Agriculture (World Bank)
- Climate Smart Planning Platform

Relevant excerpt from the Investment Learning Platform (ILP)

Climate change considerations

Climate change has gone from being a niche concern to being recognized as a key factor to consider in agricultural development (FAO Climate Change).

Climate change poses many threats to agriculture, including reduction of agricultural productivity, production stability and incomes in areas of the world that already have high levels of food insecurity and limited means of coping with adverse weather. In addition, agriculture, forestry and land-use change cause significant levels of global greenhouse gas (GHG) emissions, contributing to the exacerbation of climate change impacts in the future.

It is therefore imperative to incorporate climate change considerations into overarching agricultural investment planning, as well as into specific projects and programmes. Successful incorporation of climate change can enable stakeholders to confront expected negative impacts and take up emerging opportunities, in order to capture the synergies and manage the trade-offs between adaptation, mitigation, food security and sustainable development.

This Note summarizes key steps and approaches to systematically incorporate climate change considerations into agricultural investment planning and project management.

The focus of integration differs depending upon the project context and objectives. In most cases, the primary focus of climate mainstreaming is on planning for adaptation to climate change and defining specific measures to safeguard development benefits in the medium to long run. In addition, agricultural projects may have a potential for mitigating GHG emissions that can be realized through additional climate change measures.

While climate considerations should permeate the design and implementation of all components, specific climate change-related activities may be subsumed in a specific component of a development project that receives separate funding, especially when funding from separate global climate finance mechanisms is targeted.

Climate-specific funding for agricultural development is still very limited and often cumbersome to obtain, and while these funding opportunities should be utilized when available, the main funding for climate-smart agricultural development will remain the agricultural development budgets.

Relevant chapter of the second edition of the FAO CSA Sourcebook (2017):

Programme and project monitoring and evaluation

Module B.9 of the CSA Sourcebook Second Edition

The overall goal of monitoring and evaluation activities is to effectively guide the transition of well-conceived CSA policies into programmes and projects that are successfully implemented on the ground. Climate change is likely to have the most severe impact on groups that are already the most vulnerable and food insecure. CSA interventions must prioritize their needs and concerns as well as contribute to climate change adaptation and mitigation. Monitoring and evaluation must pay particular attention to vulnerable groups and be accountable to them. Traditionally, programme and project monitoring predominantly deals with tracking progress and intermediate results, and, if needed, making adjustments during project implementation. Monitoring is complemented by evaluation, which primarily deals with the assessment of results and impacts. Expectations for these results and impacts need to be set out clearly at the beginning of a project, and are of particular significance when the project approaches its conclusion. Given the complexity of climate change and CSA interventions, flexible monitoring and evaluation processes are particularly valuable. With climate change, considerable uncertainty will exist regarding what the actual (as opposed to the predicted) impacts of climate change will be on a given agricultural system. During and beyond the life of a project, weather patterns and their impacts will change continuously as a result of global warming. Smallholder producers and supporting institutions will need to adapt not just once, but constantly. Knowledge on successful adaptation and mitigation practices in various agricultural sectors also depends upon learning by doing, and this knowledge may need to be reconsidered under variable conditions. CSA also pursues various objectives and often involves multiple sectors, and there are often several intervention pathways that can be taken. This means that simple linear logic models based on known and predictable results may have their limits for CSA project planning and monitoring and evaluation. The challenge of climate change requires an adaptive management approach that involves constant innovation, real-time monitoring and evaluation, learning among stakeholders and re-strategizing.

This module presents an overview of important climate change-related monitoring and evaluation activities in programme processes and project cycles, and describes their various purposes. The module provides guidance on how to address monitoring and evaluation issues in CSA context. The module also considers the importance of adaptive management and developmental evaluation in light of the challenge of complexity that climate change and CSA interventions present for planning, monitoring and evaluation. The module also reviews some of the challenges specific to monitoring and evaluation in the context of CSA and offers some guiding principles to help address them.

Module 4.2 The Ex Ante Carbon-Balance Tool to estimate GHG impacts of project and policies (EX-ACT)

Learning objectives

1. Develop an understanding of what the Ex Act tool is and how it functions
2. Develop an understanding of how the Ex Act tool can help facilitate investments in climate-smart agriculture projects

Learning materials

- Visual presentation
- CSA Sourcebook (2017) Chapter C8– Summary on page 39

Extra resources

- EX-ACT Quick Guidance [English]
- EX-ACT Guide Technique [French]
- EX-ACT Comprehensive User's Manual
- Ex Ante Carbon Balance tool for value Chains (EX-ACT VC) Guidelines
- Ex-Ante Carbon-balance Tool for Measurements, Reporting and Verification (EX-ACT MRV) Guidelines
- EX-ACT E-learning [English]
- EX-ACT E-Learning [French] Active Soon

Module 4.3 Indicators to track climate change adaptation in the agricultural sectors

Learning objectives

1. Introduce and familiarize the participants with a framework and methodology for tracking adaptation in agricultural sectors
2. Learn the rationale, components and challenges of tracking adaptation in agricultural sectors
3. Practice the methodology through a case study – compiling and analyzing indicators
4. Review the framework and methodology in a broader context of adaptation communications

Learning materials

- Visual presentation
- CSA Sourcebook (2017) Chapter C9– Summary on page 45

Extra resources

- FAO (2017) Tracking adaptation in agricultural sectors
- IIED Climate Change Working Paper: Tracking adaptation and measuring development
- The Vulnerability Sourcebook
- Impact Evaluation Guidebook for Climate Change Adaptation Projects

Session 5 | Integrating CSA into IsDB's project cycle

Group discussions and final recommendations on integrating CSA into IsDB's project cycle

Group discussion objectives:

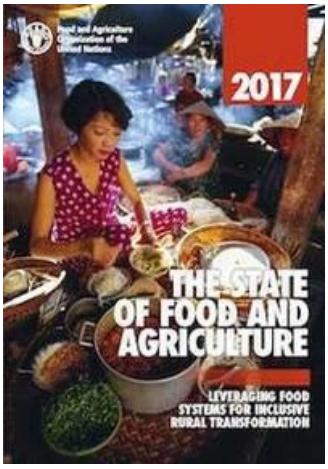
1. Discuss and identify key entry points for integrating CSA into each phase of the project cycle respectively (preparation, implementation and monitoring and evaluation).
2. Make concrete recommendations for FAO's technical assistance to IsDB in integrating CSA into agricultural investment projects

Group division:

- Group 1: Integrating CSA into the preparation phase of IsDB's agriculture investment projects
- Group 2: Integrating CSA into the implementation phase of IsDB's agriculture investment projects
- Group 3: Integrating CSA into the monitoring and evaluation phase of IsDB's agriculture investment projects

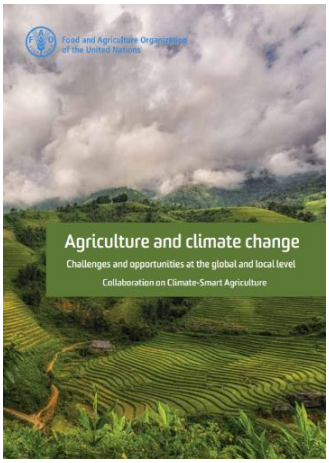
FAO key publications

The State of Food and Agriculture



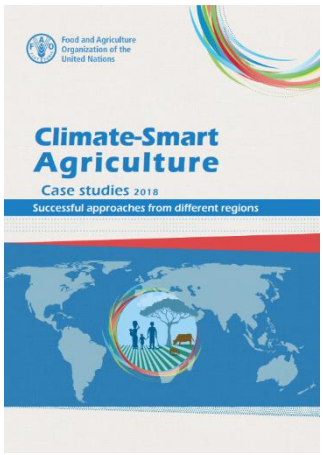
English French Spanish

Agriculture and climate change (2019)



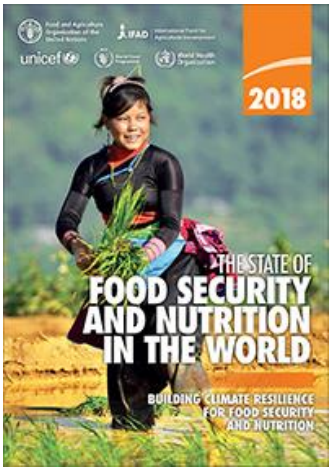
English

The Climate-Smart Agriculture Case Studies (2018)



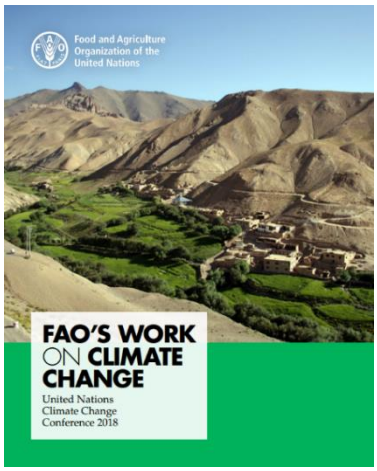
English

The State of Food Security and Nutrition in the World



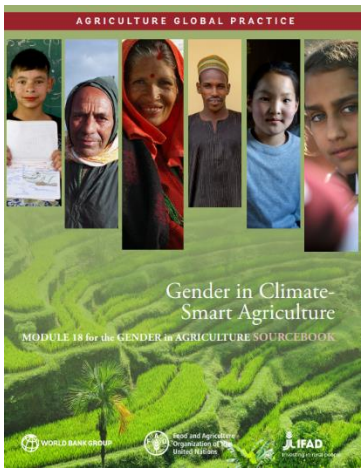
English French Spanish

FAO's Work on Climate Change (2018)



English

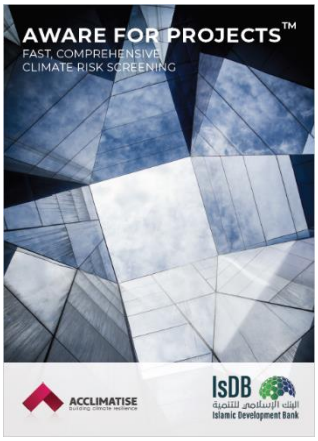
Gender in Climate-Smart Agriculture: Module 18



English

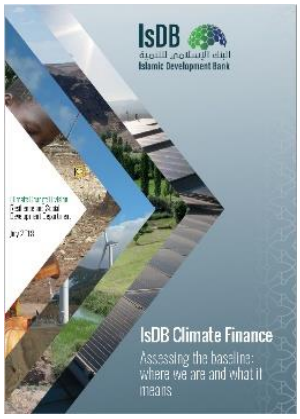
IsDB related publications

Aware for Projects - IsDB User Guide

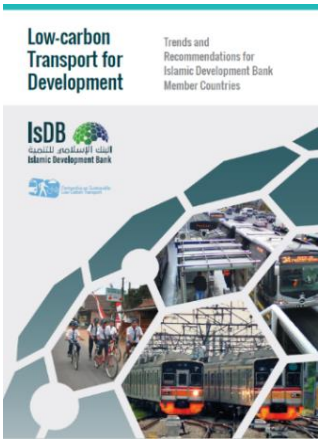


MDB Climate Finance Lessons Learned Paper

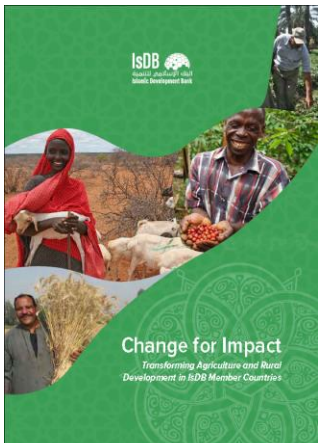
IsDB Climate Finance Report (2013-2017)



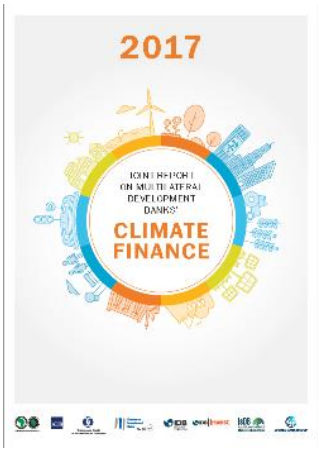
IsDB Low-Carbon Transport for Development Report



IsDB Agriculture Book (2018)

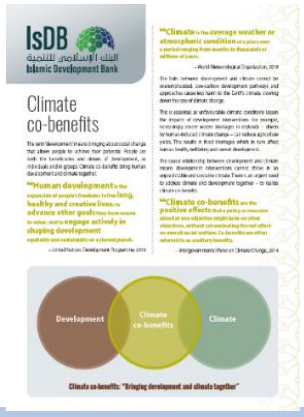


2017 MDB Climate Finance Report



IsDB Climate Change Technical Policy Paper

IsDB Climate Change Agriculture Guidance Note



FAO E-Learning Courses

Multilingual e-learning courses offered free of charge as a global public good through the FAO E-Learning Centre

Existing courses in the climate change category

- The National Greenhouse Gas Inventory for Agriculture
- Incorporating Climate Change Considerations into Agricultural Investment Programmes
- Climate Change and Food Security

E-learning courses on Climate-Smart Agriculture

- Introduction to climate-smart agriculture
- Water management for climate-smart agriculture
- Climate-smart livestock production
- Climate-smart crop production
- Climate-smart soil and land management

ISBN 978-92-5-131333-6

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CA3675EN/1/03.19