Food and Agriculture Organization
of the United Nations

Agriculture and climate change

Challenges and opportunities at the global and local level

Collaboration on Climate-Smart Agriculture

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Food and Agriculture Organization of the United Nations
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FOREWORD

In 2015, the international community set two reframing agendas for the sustainable future of our planet. During the United Nations (UN) Summit on Sustainable Development, countries adopted 17 Sustainable Development Goals (SDGs) to jointly embark on a resilient and sustainable path that leaves no one behind. With the historic adoption of the Paris Agreement under the United Nations Framework Convention on Climate Change (UNFCCC), countries pledged to take important steps in reducing their Greenhouse Gas (GHG) emissions and strengthen countries' resilience and ability to adapt to climate change, joining the cause to take common climate actions.

Both transformational agendas acknowledge the critical importance of agriculture in dealing with the large climatic changes currently faced, the severity of which is likely to increase in the future. Furthermore, both the Paris Agreement and the SDGs stress the importance of safeguarding food security and ending hunger in the face of climate change. The role of agriculture is not only crucial in mitigating, but also in adapting to climate change. According to the Intergovernmental Panel on Climate Change (IPCC), approximately a quarter of all anthropogenic GHG emissions worldwide are caused by agriculture, forestry and land use changes. At the same time, by causing extreme weather, drought, flooding and other disasters, climate change is depriving the livelihoods of millions of people around the world. Particularly affected are the nearly 80 percent of the world's poor that live in rural areas and typically rely on agriculture, forestry and fisheries for their survival.

Countries around the world plan for a significant role of agriculture in mitigating and adapting to climate change. Nearly 80 percent of the Nationally Determined Contributions (NDCs) to meet the Paris Agreement commitments, contain plans of action on agricultural mitigation, while 90 percent of the NDCs that include adaptation selected the agricultural sector as a priority area for action.

Despite major improvements in the last decades to eradicate hunger, the international community is still distant from reaching the "Zero Hunger" Objective, as also recognized at the G7 Meeting in Taormina, Italy (May2017). After a prolonged decline, global hunger increased again in 2016, and now affects 815 million people. To keep meeting the world's growing food demands, FAO projected that current agricultural production levels need to rise up to 60 percent by 2050. Though changes in crop yields are hard to estimate, the IPCC warns that

decreases of 10 to 25 percent may be widespread by 2050 in the face of climate change.

To assist countries in developing and transforming agricultural systems that both limit their impact on and are resilient to climate change, the Food and Agriculture Organization of the United Nations (FAO) mobilizes support in promoting Climate-Smart Agriculture (CSA) around the world. It aims to sustainably increase agricultural productivity, adapt and build resilience to climate change, and reduce and/or remove GHG emissions in the agricultural sector. To encourage integrated approaches to these three pillars of CSA (productivity, adaptation and mitigation), renewed multi-stakeholder partnerships are needed that include both rivate and public actors around the world.

To this end, the Ministry of Environment, Land and Sea of Italy (IMELS) and FAO signed a Memorandum of Understanding (MoU) in 2014 to support the Project "*International Alliance on Climate-Smart Agriculture*". As part of this project, IMELS supported FAO in hosting and implementing the Global Alliance for Climate-Smart Agriculture (GACSA), as a multi-stakeholder platform to foster learning, knowledge sharing, partnership building, dialogue and debate in the context of CSA. The GACSA helps experts, researchers and practitioners to tap into the wealth of CSA-related resources, knowledge, information and expertise, boosting concrete CSA initiatives at all levels that help address the challenges facing food security and agriculture in the context of climate change.

The IMELS and FAO are pleased to present this publication with an overview of how the project created knowledge, helped identify capacity and implementation gaps, and developed assessments and tools for the promotion and implementation of CSA actions. Through this project, IMELS and FAO have been crucial players in creating a strong knowledge community around CSA. Based on results achieved by the project, IMELS and FAO have been collaborating to scale-up CSA at the field level, to backstop its integration in agricultural systems, and at the policy level, representing a concrete support to specific needs of developing countries. Around the world, CSA has proven to be an invaluable method to build productive, resilient and climate-smart agricultural systems to bolster sustainable development and ensure food security in a changing climate. Collaborative efforts to build knowledge around and implement CSA therefore provide important pathways toward achieving the Paris Agreement and reaching the SDGs, both now and in the future.

Alexander Jones

Director

Climate and Environment Division

FAO

Francesco La Camera

Director General

Directorate General for Sustainable Development,
Enverinment Damage,
European Union and International Affairs

Italian Ministry of Environment, Land and Sea

ACRONYMS

AGs	Action Groups
CA	Conservation Agriculture
CABI	Centre for Agriculture and Biosciences International
CBI	Coffee-Banana Intercropping
CCAFS	CGIAR Research Programme on Climate Change, Agriculture and Food Security
CGIAR	Consultative Group on International Agricultural Research
CIHEAM	International Center for Advanced Mediterranean Agronomic Studies
CIMMYT	International Maize and Wheat Improvement Center
CN	Concept Note
COP	UNFCCC Conference of Parties
CREA	Council for Agricultural Research and Agricultural Economics Analysis (Italy)
CSA	Climate-Smart Agriculture
CSOs	Civil Society Organizations
CSVs	Climate-Smart Villages
DG DEVCO	European Commission's Directorate-General for International Cooperation and Development
EEAG	Enabling Environment Action Group
EPIC	FAO's Economics and Policy Innovations for Climate-Smart Agriculture
FAO	Food and Agriculture Organization of the United Nations
FFS	Farmer Field School
FU	Facilitation Unit
GACSA	Global Alliance for Climate-Smart Agriculture
GCAA	Global Climate Action Agenda
GCP	Government Cooperation Programme
GDP	Gross Domestic Product
GFAR	Global Forum on Agricultural Research
GHG	Greenhouse Gas
HL	High-Level
IACSA	International Alliance of Climate-Smart Agriculture
IAG	Investment Action Group
IMELS	Ministry of Environment, Land and Sea (Italy)
IMM	Integrated Manure Management
IPCC	Intergovernmental Panel on Climate Change
ISFM	Integrated Soil Fertility Management
ISNM	Integrated Soil Nutrient Management
ISPRA	Institute for Environmental Protection and Research (Italy)
KAG	Knowledge Action Group
LDCs	Least Developed Countries
MAE	Ministry of Environment (Ecuador)
MAGAP	Ministry of Agriculture, Livestock, Aquaculture and Fisheries (Ecuador)
MiPAAF	Ministry of Agricultural, Food and Forestry Policies (Italy)
M&E	Monitoring and Evaluation
MoU	Memorandum of Understanding
NARS	National Agriculture Research Systems
NDCs	Nationally Determined Contributions
NGOs	Non-Governmental Organizations
PICSA	Participatory integrated climate services for agriculture
Q&A	Question and Answer
RAS	Rural Advisory Services
REDD+	Reducing Emissions from Deforestation and Forest Degradation in Developing Countries
SC	Strategic Committee
SDGs	Sustainable Development Goals
SOC	Soil Organic Carbon
SOM	Soil Organic Matter
SPIS	Solar-Powered Irrigation Systems
TORs	Terms of Reference
UN	United Nations
UNFCCC	United Nations Framework Convention on Climate Change
WWF	World Wildlife Fund

INTRODUCTION

This publication is intended to provide an overview of the successes reached by the implementation of Project GCP/GLO/534/ITA "*International Alliance on Climate-Smart Agriculture*", funded by IMELS and implemented by FAO.

The IMELS has fostered, within this project, knowledge sharing on CSA, the creation and the implementation of GACSA, and the development of initiatives to support developing countries in their international commitments for climate change and sustainable development in the field of agriculture and food security. The various activities and products described in this publication, show the successes of the project in supporting efforts of filling knowledge and implementation gaps, while developing assessments and tools for promotion and implementation of CSA actions. The Project successfully supported the development of several knowledge products such as technical briefs, compendia and e-learning courses, providing a solid base for strengthening capacity on CSA. Over the course of the Project, diverse consultative events (such as workshops, seminars and webinars), were organized, facilitating the knowledge exchange amongst experts, researchers and practitioners. These served as a venue for debate and discussions on defining priority work areas and outputs, as well as to share experiences and lessons learned, providing space for partnerships between the various groups of stakeholders, aimed at building a strong knowledge community that may have a significant role in implementing CSA across countries and regions.

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1 GENERAL OVERVIEW

The impacts of climate change are reducing the capacity of natural resources (biodiversity, soil and water) to sustain the food demand of the world's increasing population. Food security and climate change are therefore interlinked challenges that need to be addressed simultaneously. Increasing resource efficiency in agriculture and building resilience to climate risks are the key actions for undertaking these challenges. This implies a significant transformation of agriculture and food systems, with concerted action and coordinated involvement of all stakeholders on along-term perspective. To this end, CSA is an integrated approach that helps guide actions and develop agricultural strategies to effectively support development and ensure food security under the threat of climate change. As defined by FAO at the 2010 The Hague Conference on Agriculture, Food Security and Climate Change, CSA is composed of three main pillars:

1. sustainably increasing agricultural productivity and incomes;
2. adapting and building resilience to climate change;
3. reducing and/or removing Greenhouse Gases (GHG) emissions, where possible.

More specifically, CSA aims to achieve food security, climate change adaptation and mitigation, providing the means to help stakeholders from local to national and international levels identify agricultural strategies suitable to their local conditions, taking into consideration the social, economic and environmental context where it will be applied. Hence, CSA relates to both on- and off-farm actions. The different elements which can be integrated into a climate-smart agricultural approach include:

- management of farms, crops, livestock, aquaculture and fishery to better manage resources, produce more with less while increasing resilience;
- ecosystem and landscape management to conserve ecosystem services that are key to increase resource efficiency and resilience;
- services for farmers and land managers to create an environment conducive to the implementation of the necessary changes.

Moreover, CSA is not a single specific agricultural technology or practice that can be universally applied, but an integrated approach that requires context-specific assessments to identify the suitable agricultural technologies and practices as well as the barriers to their adoption by farmers, and the appropriate solutions in terms of policies, strategies, actions and incentives.

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2 THE IMELS-FAO PROJECT *"INTERNATIONAL ALLIANCE ON CLIMATE-SMART AGRICULTURE"*

Although there has been a rapid uptake of the term CSA by national and international organizations, the implementation of the approach is still atan early stage and equally challenging mostly due to lack of tools, capacity and experience, considering that climate-smart interventions are highly location-specific and knowledge-intensive. To address the need of developing CSA knowledge and capacity, and that of strengthening international coordination and collaboration on CSA, IMELS and FAO have signed in March 2014 a MoU for the implementation of a project specifically aiming at establishing an international partnership on CSA, in order to promote the climate-smart approach for food security and as a contribution to the agricultural sector's response to climate change. The IMELS financed the MoU with USD 2.13 million.

With the objective to support selected countries in their implementation efforts of the CSA principles, developing CSA knowledge tools, supporting capacity and strengthening international coordination and collaboration on CSA, the project has been built around the following main goals aimed at:

- supporting the creation and the enlargement of a global alliance that can enhance knowledge, provide policy support, enhance investment and financing opportunities, mobilize funds and generate the assessments, tools and methodologies to allow national and local stakeholders to identify and adopt the appropriate farming systems, practices and technologies that address food security and climate change:
  - facilitating the realization of meetings, conferences and events to create networking and friends of GACSA groups;
  - ensuring the realization of GACSA Governance structure;
  - supporting the GACSA Facilitation Unit (FU) and Action Groups (AGs), particularly the Knowledge Action Group (KAG), in achieving its results;
  - facilitating and encouraging the adhesion of other partners to GACSA.
- ensuring the sharing of information and knowledge through different capacity building, communication and extension channels, linked to universities, technical institutions and

national and local entities. This would include engaging in developing countries' centres of excellence and research centres:

- facilitating consultations to identify knowledge needs on CSA through online consultations, workshops, webinars;
- ensuring the realization of technical communication materials on CSA, such as practice and policy briefs, compendia, video and e-learning courses.

Based on the first years of project results and on the signature of the Paris Agreement and adoption of the 2030 Agenda for Sustainable Development that created a new scenario and new opportunities at the international level, IMELS and FAO agreed to explore the development of initiatives, studies and possible projects in order to respond to a continuous request by developing countries for support in implementing their agriculture-related climate change adaptation and mitigation commitments under the NDCs and in the context of the SDGs, also as a tool in the context of the IMELS bilateral cooperation programme, with a special focus on Least Developed Countries (LDCs). Given these premises, feasibility studies have been developed in three countries (Botswana, Ecuador and Ethiopia). Likewise, Side Events on agriculture, resilience and forestry to increase awareness on CSA have been organized at UNFCCC Conferences of Parties (COPs).


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BOX 1

GACSA - GLOBAL ALLIANCE FOR CLIMATE-SMART AGRICULTURE

WHO ARE WE?

As the sole global multi-stakeholder apolitical platform for climate-smart agriculture, an integrated knowledge-intensive approach, the Global Alliance for Climate-Smart Agriculture (GACSA) seeks to catalyze collaborative action to accelerate the scaling up of CSA through its members' own initiatives, engagements and programs.

OUR VALUE PROPOSITION

GACSA is integral to fulfilling global ambitions and agenda as well as national commitments on Sustainable Development and Climate Action contributing to the implementation of the 2030 Agenda and Sustainable Development Goals (SDGs) and the Paris Agreement.

GACSA will inspire the development of innovative evidence-based options that are context-specific, and advocate for the use of robust methods for measuring the impact of its participants' collective CSA actions expressed in terms of expected achievements globally, or within specific countries (implementation of Nationally Determined Contributions (NDCs) or regions, where possible specifying quantitative progress towards internationally agreed goals such as the SDGs.

GACSA will work to develop enabling environments that encourage people to adopt CSA through accessing (a) appropriate national or international expertise, (b) lessons from pilot studies, and (c) resources needed to establish the necessary operating principles, extension services and farmer support schemes.

OUR MISSION

To address the challenges facing agriculture, food security and nutrition by harnessing the wealth and diversity of resources, knowledge, information and expertise, from and between its members, in order to stimulate concrete initiatives at all levels.

continued overleaf

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WHAT DOES GACSA DO?

GACSA is an independent alliance, governed by more than 230 of its members and works towards three core action-oriented functions:

- Convening – bringing people and institutions together to generate or scale up action at global, egional and national levels;
- Connecting – breaking down silos, building synergies, bridging the knowledge-uptake gap, ostering integrated approaches, brokering partnerships to ensure that actions get taken;
- Communicating – fostering co-learning, co-creation of knowledge and knowledge-sharing to facilitate the development of sound bankable projects.

GACSA'S STRATEGIC OBJECTIVES

1. Providing voluntary and inclusive multi-stakeholder platforms to foster dialogue and learning leading to action, allowing a diversity of views, across disciplines and sectors, geographical boundaries and political affiliations;
2. Leveraging multi-institutional action to generate problem-solving knowledge and partnerships to advance the uptake of CSA at scale;
3. Providing easy access to integrated and updated information and knowledge on CSA through a service-oriented and purpose-built CSA knowledge management system.

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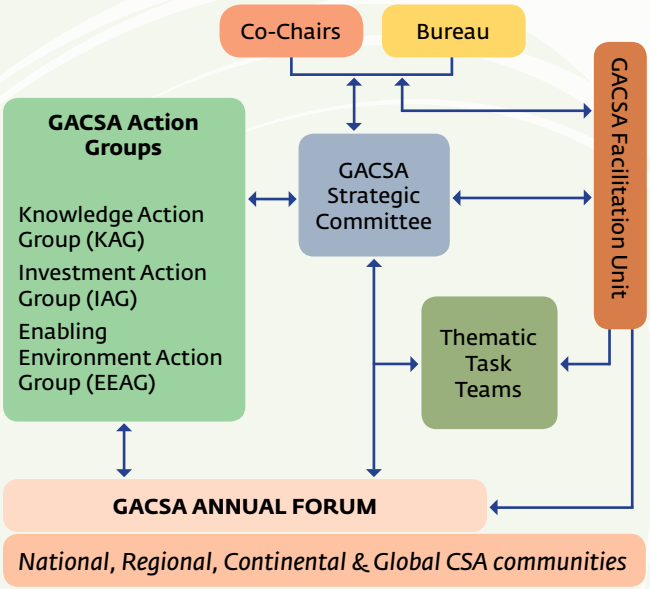
HOW IS GACSA COMPOSED?

GACSA's work is delivered by three Action Groups and governed by a Strategic Committee led by two Co-Chairs, enabled by a Bureau and supported by a Facilitation Unit, including a Regional Engagement Task Team:



HOW TO JOIN GACSA

GACSA is a voluntary platform open to governments, businesses, farmers organizations, civil society groups, producer organizations, research bodies and intergovernmental entities that agree with its vision as outlined in its Framework Document (www.fao.org/3/a-au667e.pdf) and its Strategic Plan (www.fao.org/3/CA1216EN/ca1216en.pdf).

- Member or observer status does not create any binding obligations. Each member determines the nature of its participation according to its needs and priorities.
- Individuals cannot be members (only organizations), but they can join any of the 3 Action Groups.
- There is no fee for participation.

To become a member, observer or for more information, contact the GACSA Facilitation Unit or visit our website:

GACSA-Facilitation-Unit@fao.org

www.fao.org/gacsa

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3 CREATION AND IMPLEMENTATION OF THE GLOBAL ALLIANCE FOR CLIMATE-SMART AGRICULTURE

Since its inception, the IMELS-FAO Project has supported initiatives to raise awareness and develop a common consensus on the need to create an international alliance on CSA. This has enabled the creation of the Global Alliance for Climate-Smart Agriculture (GACSA), launched in September 2014 at the Climate Summit in New York, USA, hosted by the UN Secretary-General Ban Ki-moon with the aim of engaging leaders and solicit for climate action in areas that can significantly contribute to reducing GHG emissions and strengthening resilience – i.e. agriculture, cities, energy, financing, forests, pollutants, resilience and transportation.

During the first months, the project support focused on identifying and organizing the governance structure of GACSA. After the launch of the Alliance, the Project has supported the establishment and the organization of the FU and activities in the AGs of GACSA.

The project activities that have enabled the realization and implementation of the GACSA and the dissemination of knowledge are manifold. In support of the Alliance's governance, the Project has supported the organization of Strategic Committee (SC) meetings, ensuring that decisions taken during the meetings are carried out. In addition, it has been supporting different consultative activities, including virtual teleconferences and international workshops allowing the preparation of the roadmap and work plans of the AGs, and the endorsement of the governance structure by the involved stakeholders.

Moreover, project support allowed the establishment of a governance structure for the Alliance, in particular for the three AGs, to initiate activities within each group and harmonize the activities amongst themselves. Based on the well-established contacts with members and non-members of GACSA, the Project continues its support in brokering collaboration between partners on new knowledge products and activities under the KAG, well beyond the end of its role as a co-convener of the KAG.

Since its inception in 2015, the Enabling Environment Action Group (EEAG) has commissioned six case studies assessing the state of CSA implementation in Costa Rica, France, Ireland, Malawi, Tanzania and Viet Nam. These case studies were carried out in 2016 with the support of local stakeholders actively engaging in information collection and dialogue. The Project has supported the realization of these case studies at the technical, administrative and organizational level.

In 2017, the Project supported the realization of a case study for Italy on CSA (see Box 2) and other activities related to the collaboration between AGs.


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The Project has supported the organization of teleconferences and participated in a workshop organized by the Investment Action Group (IAG) on 5 May 2015, in London, United Kingdom, to arrange the collaboration with AGs and to carry on the dialogue with possible partners.

In July 2017, the Project supported the organization of a workshop on Metrics for CSA convened by the three AGs and facilitated by the IAG to identify gaps in metrics for investing in CSA, to develop a roadmap, and ultimately a set of products to address those gaps and promote sound investments in sustainable, climate-smart practices. Such metrics will also consider the necessary biophysical and environmental factors to making sustainable investments in CSA. Almost 50 participants from different stakeholder groups attended the workshop.

Support by the Project was also provided to the organization of the GACSA Annual Fora in 2016 and 2017. These GACSA Annual Fora were held at FAO headquarters in Rome from 14 to 16 June 2016 and from 12 to 14 December 2017, gathering more than 250 participants from across the world. They enhanced the exchange of knowledge and lessons learned concerning issues related to CSA implementation. Support by the Project consisted in the coordination of the overall organization and logistics of the conferences, and the facilitation of dialogue towards building consensus between GACSA members and other interested stakeholders; additional support included setting of priorities and approval of the overall direction, strategy and programme of work of GACSA. The Project organized several sessions and workshops during the first two conference days. The third day was dedicated to and programed by the three AGs and Regional Alliances. On the margins of the Annual Fora, the Project also supported the organization of the SC meeting and, building upon the outputs of the first KAG International Workshop held in Montpellier on 5 March 2015, the organization of the second KAG International Workshop, that allowed to identify the key elements and the knowledge products to be developed between 2016, 2017 and 2018.

Project support also enabled the participation of GACSA to international events such as the Climate Week in New York, USA, the Global Science Conferences on CSA, the Committee on World Food Security, the Global Climate Action Summit in California, the COP22 in the Kingdom of Morocco and the COP23 in Germany (see Box 8).

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BOX 2

ITALY CASE STUDY

Italy is characterized by high heterogeneity in terms of territorial and agricultural features, with unique biodiversity and variegated agricultural production systems. Yet the country is facing the consequences of climate change, e.g. desertification phenomena and an increase in extreme climate events. In this context, Italy has been actively involved in undertaking actions and developing ad hoc policies to overcome the challenges of climate change and promote climate-smart agricultural practices.

The major national entities enabling and supporting CSA policies are, at the institutional level, the Ministry of Environment, Land and Sea (IMELS) and the Ministry of Agricultural, Food and Forestry Policies (MiPAAF), major National Research Agencies such as the National Research Council and the Council for Agricultural Research and Agricultural Economics Analysis (CREA), the Institute for Protection and Environmental Research (ISPRA),and regions and autonomous provinces at the local level. Other important actors and stakeholders involved in this process are public and private service providers, agricultural and forestry enterprises, as well as other representatives of the agribusiness sectors and innovation brokers and facilitators.

One of the highpoints regarding CSA promotion in Italy is the implementation of several programmes and projects on Conservation Agriculture (CA), as a CSA approach to overcome soil fertility loss and erosion. Italy shows in fact one of the highest mean annual soil loss rates in the Mediterranean region. These initiatives are enabling the promotion and implementation of CA in 15 regions of Italy. Among other important initiatives implemented at the national level, is the development of a National CSA "Hub", i.e. an Italian-based community of practice to establish a local platform for a climate-smart transformation of the regional and national agricultural sector.

The role of universities as a constant vehicle of knowledge dissemination, as well as the relationship between Italian agrifood industries and technological innovation, are being additional assets to the promotion and implementation of CSA approaches in the Italian agricultural context.

The International Alliance of Climate-Smart Agriculture(IACSA)Project is a relevant part of the case study, contributing to the promotion and enhancement of best practices of CSA not only within national boundaries, but also outside the territory through international cooperation activities.

KNOWLEDGE NEEDS, PRIORITIES AND ANSWERS FOR CLIMATE-SMART AGRICULTURE

4

4.1 Identification of CSA knowledge needs

Since its development as a concept in 2010, CSA has become an increasingly accepted approach. However, considerable knowledge, investment and stakeholder participation are still required to implement CSA effectively. To coordinate these efforts, a KAG has been established to bring practitioners together to articulate a vision for future knowledge systems in support of successful CSA. This emphasis on partnerships, together with a common understanding of CSA and joint knowledge systems are vital, as CSA needs to be implemented at village or landscape level to be truly evolutionary.

The Project allowed FAO to take a leading role in the KAG, first as one of the two KAG co-conveners from the establishment of the KAG until the end of 2016, then as one of the facilitators of the group, together with 15 other members, and lastly, as leader of the sub-group on extension services. As a KAG co-convener, FAO led consultative activities that allowed to define and assess KAG's priority areas[1] and outputs. These activities included two extensive online consultations[2], the first held in April 2014 with the specific aim of identifying the knowledge priorities and products, and the second in September-October 2014, to collect inputs for the development of the identified knowledge products (for further details on these consultations' findings, please see the Summary Report). After the first online consultation, in June 2014 the KAG held a regional consultative meeting in Hanoi, Viet Nam, involving over 140 participants, to evaluate the online consultation results and identify possible areas of collaboration on CSA initiatives at the regional and interregional level (see Box 3). Based on the mentioned activities and results, in March

1 *These had been identified based on discussions held at the CSA Science Conferences in Wageningen, Kingdom of the Netherlands (2011) and at the University of California in Davis, USA (2013), as well as earlier exchanges of the CSA KAG.*

2 *For a summary of the two consultations:* drive.google.com/file/d/0B6HKuH_LGjffMzIzVlBDYo1qTzg/view


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2015 the First International Workshop of KAG was organized in Montpellier[3], in the context of the Third Global Scientific Conference on CSA, where over 100 attendants held discussions around the priority work areas identified and gathered inputs for the development of KAG's action plan for the inception year of the Alliance.

Since then, the support of the Project to the activities of the KAG has focused on the generation and sharing of CSA knowledge. The Project has been organizing several online consultations, webinars and workshops that served the dissemination of CSA knowledge and building of participants' understanding and capacities on CSA, but also helped to generate debate, identify priorities and gather inputs for the development of new CSA knowledge products. Many of these activities were facilitated through FAO's online community of practice on "Climate change and agriculture sectors". The knowledge products developed by the Project comprise a range of documents to support the implementation of CSA, including practice briefs, reviews and compendia on various CSA-related topics, as well as an action plan to improve data quality, quantity, demand-driven and integrated models on CSA. Knowledge needs for extension services have been identified together with the necessary elements for designing a relevant research agenda on CSA.

The Project has worked on developing e-learning courses based on the FAO CSA Sourcebook chapters on Water Management for CSA and on Sustainable Soil and Land Management for CSA,and a video on CSA for policy makers. Two e-learning courses were developed, in English and in French.

At the regional level, Project support was provided for the organization of the Central Asia CSA workshop held in Bishkek, Kyrgyzstan, in 2016, which enabled the identification of the region-specific CSA knowledge needs, creating the basis for a way forward and further dialogues on the implementation of CSA approaches in the region.

3 *Report of the First International Workshop of KAG:* *www.fao.org/3/a-ax503e.pdf*

1st Online Consultation

- Identify knowledge priorities
- Identify knowledge products

Hanoi Regional Consultation

- Participatory evaluation of online consultation results
- Identify potential areas of regional and cross-regional collaboration and CSA initiative

2st Online Consultation

- Definition of product structure and contents
- Inputs to product development

Montpelier Workshop

- Inputs for development of KAG action plan

BOX 3

HANOI REGIONAL CONSULTATION

This consultative meeting was part of the formal preparatory work for launching the Global Alliance for Climate-Smart Agriculture (GACSA) at the UN Secretary General's Climate Summit in September 2014. The event took place from 18 to 20 June in Hanoi, Viet Nam, co-organized by the Governments of the Netherlands, South Africa and Viet Nam, with support from the Consultative Group on International Agricultural Research (CGIAR) and its Research Programme on Climate Change, Agriculture and Food Security (CCAFS), the Global Forum on Agricultural Research (GFAR), the Government of Italy and FAO through the Project "International Alliance on Climate-Smart Agriculture". The consultative meeting gathered over 140 representatives of regional and sub regional organizations, National Agriculture Research Systems (NARS) and Farmers Organizations from Sub-Saharan Africa and Latin America.

The key objectives of the Regional Consultation in Hanoi were to:

- inform participants on what is CSA, the vision and added value of the Alliance;
- take stock of requirements, specific needs and contributions from the Asian Region;
- offer a venue for dialogue between regions and different stakeholders;
- evaluate if priority areas under the AGs are in line with the regional priorities;
- identify potential areas of regional and cross-regional collaboration and CSA initiatives;
- list general interest of stakeholders to be part of the CSA Alliance.

The consultation enabled the development of a dedicated session on Knowledge, organized by the Project in collaboration with FAO's Economics and Policy Innovations for Climate-Smart Agriculture (EPIC) programme, during which discussions were held around the first three global priorities in the knowledge area (inclusive Knowledge system, technical intervention and evidence base of CSA) that had emerged from the first online consultation results.

Participants agreed on focus areas with urgent needs to be prioritized in the South-East Asian context, together with related activities that could be undertaken and the entities to be involved.


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4.2 Products of the Knowledge Action Group

Resulting from different consultative activities, a range of knowledge products to support CSA implementation have been developed through the contributions of experts and their respective institutions and organizations. The Project has been supporting the realization of these products as a co-convener of the KAG, as a facilitator of the sub-group on extension, and as an author. Furthermore, as a KAG co-convener, the Project specifically ensured that authors respected deadlines and that the defined peer review be finalized.

Products developed under the KAG framework of activities include: practice and policy briefs, case studies, reviews, compendia and extension tools. Topics explored in these knowledge products were further discussed during webinars and learning events that were held throughout the implementation of the Project (***see following sections/ Boxes 4-7***). Webinars, on their part, were intended to create debates and disseminate the knowledge products developed by KAG, and to receive feedback and gather inputs on CSA needs, activities and improvements for future work of the KAG on CSA.

Following is a list of the developed knowledge products based on Project contribution:

As a KAG co-convener (practice briefs):

Integrated Soil Fertility Management:

- Contributions of Framework and Practices to Climate-Smart Agriculture;
- Site-Specific Nutrient Management: Implementation guidance for policymakers and investors;
- Coffee-Banana Intercropping (CBI);
- Integrated Manure Management (IMM).

As a facilitator:

- Cornell's Climate-Smart Farming Program (*case study*);
- Institutionalizing the "Science Field Shops": Developing Response Farming to Climate Change (*case study*);
- Practical extension manual for implementing Climate-Smart Agriculture (*extension tool*);
- Climate-Smart Pest Management-Implementation guide for policymakers and investors (*practice brief*).

As an author:

- Compendium on Climate-Smart Irrigation (*compendium*);
- Compendium on Climate-Smart Agriculture and Extension (*compendium*);
- Enabling advisory services for Climate-Smart Agriculture (*policy brief*);
- A Gender-responsive approach to Climate-Smart Agriculture (*practice brief*);
- Solar-Powered Irrigation Systems (SPIS): A clean-energy, low-emission option for irrigation development and modernization (*practice brief*);
- Supplemental Irrigation: A promising climate-smart practice for Dryland Agriculture (*practice brief*);
- Quesungual and Kuxur Rum: Ancestral agro-forestry systems in the Dry Corridor of Central America (*practice brief*),
- A review of existing examples of successful index-based insurance for scaling-up (*review*).


COMPENDIUM Climate-Smart Irrigation
Compendium on Climate-Smart Irrigation
PRACTICE BRIEF Climate-smart agriculture
Solar-Powered Irrigation Systems: A clean-energy, low-emission option for irrigation development and modernization
Julian Schnetzer and Lucie Pluschke
PRACTICE BRIEF Climate-smart agriculture
Supplemental Irrigation: A Promising Climate-Smart Practice for Dryland Agriculture
Vinay Nangia, Theib Oweis, Francis H. Kemeze and Julian Schnetzer
PRACTICE BRIEF Climate-smart agriculture
Quesungual & Kuxur Rum:
POLICY BRIEF Enabling advisory services for CSA
Enabling advisory services for climate-smart agriculture
Rasheed Sulaiman V
PRACTICE BRIEF Climate-smart agriculture
A Gender-responsive Approach to Climate-Smart Agriculture
Sibyl Nelson and Sophia Huyer
REVIEW Index-based insurance for Climate-Smart Agriculture
Improving climate risk transfer and management for Climate-Smart Agriculture
A review of existing successful examples of index-based insurance for scaling up
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GLOBAL ALLIANCE FOR CLIMATE-SMART AGRICULTURE

BOX 4

PRODUCTS OF THE KNOWLEDGE ACTION GROUP (KAG) DEVELOPED AS AN AUTHOR – PRACTICE BRIEFS

A Gender-responsive approach to Climate-Smart Agriculture: the focus of this brief is on the application of a gender-responsive approach to CSA, implying that realities, special needs and priorities of both men and women are recognized and sufficiently addressed in the design and application of CSA. Such an approach would, therefore, recognize the skills and specific needs of both men and women, and should be monitored by gender-sensitive indicators defined by specific criteria.

Solar-Powered Irrigation Systems (SPIS): this brief explores the potential of SPIS for climate change mitigation by replacing fossil fuels as an energy source. Such systems can also provide a reliable source of energy for irrigation in remote areas that are not connected to the electricity grid and with irregular supply of liquid fuels. Through SPIS, resilience to drought may be strengthened, especially where climate change is projected to increase incidence of droughts, and the overall food security.

Supplemental Irrigation: A promising climate-smart practice for Dryland Agriculture: this brief focuseson the benefits of supplemental irrigation for increasing productivity and climate change resilience in dryland cropping systems. Supplemental irrigation -the addition of irrigation water to essentially rainfed crops during critical crop growth stages,– allows to optimize yields in a context of yield-limiting rainfall amounts. It also reduces the risk of yield losses or crop failure due to prolonged dry spells and provides flexibility to adapt the timing of the cropping season to changing climate patterns.

Quesungual and Kuxur Rum: Ancestral agro-forestry systems in the Dry Corridor of Central America: this brief describes agro-forestry systems that integrate ancestral and scientific knowledge and their multiple benefits for crop productivity, smallholder livelihoods, and climate change adaptation and mitigation. Benefits include increased yields and food security, erosion protection, water retention and avoided GHG emissions due to the abandonment of slash-and-burn practices.

BOX 5

PRODUCTS OF THE KNOWLEDGE ACTION GROUP (KAG) DEVELOPED AS AN AUTHOR – POLICY BRIEFS, COMPENDIA AND REVIEWS

Enabling advisory services for climate-smart agriculture (policy brief): the content of this brief draws on lessons learned emerged during the webinar "*Enabling advisory services for climate-smart agriculture*" that took place in Spring 2017 within the FAO-facilitated online Community of Practice for Agriculture Sectors and Climate Change (see *section on webinars* developed by KAG). The document highlights the need for creating a conducive enabling environment for Rural Advisory Services (RAS) to play their role in facilitating the adoption of CSA practices and building resilient food and agricultural systems.

Compendium on Climate-Smart Irrigation (compendium): this publication provides an overview of the impacts of climate change on irrigated agriculture, possible response options, and climate change mitigation potential in the sector. It analyses different irrigation practices and systems from a CSA perspective, identifies requirements and options to make these more climate-smart, and discusses policies, planning approaches and tools to provide integrated and inclusive planning, together with an enabling environment for climate-smart irrigation.

Compendium on Climate-Smart Agriculture and Extension (compendium): the compendium shows how extension services are contributing to achieve CSA by disseminating climate information, as well as technologies and information on production practices for climate adaption through innovative approaches. It provides examples of more than 20 different approaches with over 30 contributions from 17 institutions, including international agencies, academia and research institutes, Governmental institutions, the Private Sector and NGOs.

A review of existing examples of successful index-based insurance for scaling-up (review): this document provides an overview of significant experiences where index-based insurance schemes have been applied worldwide, with the aim of exploring the function of index-based risk transfer instruments in light of the challenges posed by climate change, and pave the way for the scaling-up of success initiatives. The document is a collection of contributions by experts from CCAFS, Celsius Pro, the International Maize and Wheat Improvement Center (CIMMYT), Columbia University, the World Wildlife Fund (WWF) and FAO.


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4.3 Knowledge sharing on CSA

As mentioned, in the framework of the Project various activities were developed with the aim to share knowledge and create dialogue and debate on CSA. These included webinars, debates in communities of practice, online consultations, workshops and e-learning courses, and a video. While developing such activities, the Project created a database of almost 800 CSA experts, integrating it in the community of practices of FAO.

4.3.1 Knowledge Action Group webinars

The Project has been organizing webinars enabling debate on CSA practices and issues. The webinars also provided a platform for the dissemination of knowledge products developed by KAG and the reception/gathering of feedback and inputs on CSA needs, activities and improvements for future work on CSA.

The webinars were developed throughout 2016 and 2017 and covered a wide range of topics, exploring themes and aspects necessary to disseminate and/or scale-up CSA practices and experiences. On this note, special attention was given to communicating and giving support to farmers that are widely acknowledged as the key players in promoting the behavioural change required for the transition to CSA production systems. Thus, extension services – also known as Rural Advisory Services (RAS),- have been widely discussed as the main leverage to empower farmers in facing climate change, providing the means for the understanding of its implications and the participatory identification and design of appropriate context-specific strategic solutions. For RAS to develop their full potential in supporting farmers, it is necessary to be embedded in a conducive environment, where training, funding, cooperative intersectoral and multilevel partnerships can be successfully designed, accessed and established with the aim of building on and scaling-up successful initiatives.

BOX 6

WEBINARS AND LEARNING EVENTS HELD IN THE FRAMEWORK OF THE ACTIVITIES BY KAG

"Promoting Climate-Smart Agriculture Through Extension: An Overview of Existing Tools and Services", 5 May 2016. The presentations provided practical examples on extension tools and services to promote CSA. Key recommendations emerging from the presentations, as well as from the Question and Answer (Q&A) sessions and the panel discussions, were the following: a. link the discussion on CSA metrics and indicators to the discussion on extension for CSA; b. the extension systems together with farmers can support data collection for the reporting, measurement and monitoring of indicators, and extension practitioners can also provide valuable input to the development of metrics; c. promote partnerships and linkages between extension providers, including public and private stakeholders, in order to improve coordination and develop synergies; and d. strengthen the (i) use of information systems and tools and (ii) the application of the landscape approach in extension systems.

"Practices to Scale-Up Climate-Smart Agriculture", 19 May 2016. During the webinar, four of the practice briefs developed by KAG were discussed, namely: a) CSA: Site-Specific Nutrient Management; b) Coffee-Banana Intercropping – an intimate relationship with triple wins; c) Gender in Climate-Smart Agriculture; and d) Definition, Implementation, and Adoption of

continued overleaf

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Integrated Soil Fertility Management in Sub-Saharan Africa. Main areas and actions identified as requiring attention for CSA promotion were the following: i) the need to build the business case for CSA practices, given that the profitability of CSA practices was identified as the main driver for their adoption; ii) the policy aspect, the need for GACSA to support Governments to develop policies that enable the adoption of CSA, as in some cases, and based on the examples provided in the presentations, national policies may impede the adoption of CSA practices. Gaps at the policy level were also attested in relation to gender; and iii) the need for promoting diversification of cropping systems.

"Communicating on climate change with farmers-Rural advisory services helping to face uncertainty", 13 December 2016. The webinar was divided into two sessions, namely:"Case of advisory services: climate information supporting farmers' decision-making–PICSA (Participatory integrated climate services for agriculture) approach" and "Communicating on climate change with farmers-Rural advisory services helping to face uncertainty". The webinar aimed to cover issues and effective solutions in communicating climate change to farmers. Main key messages from this webinar were: a) Rural Advisory Services (RAS) are crucial for supporting food producers while tackling the challenges of climate change to food security and human development; b) the PICSA approach is a valuable tool while working with farmers in facing climate change as it helps reduce risk and increase resilience; c) farmers are the key element for boosting the behavioural change required to adopt climate-smart practices and should thus be adequately supported to get a full understanding of what climate change is and what implications it has for their livelihood; and d) participatory decision-making tools are highly envisaged to strengthen the engagement of farmers while designing context-specific climate change strategic options.

Specific attention was then given to the discussion of index-based insurance tools as risk transfer instruments due to the uncertainty related to climate change, as different initiatives have been launched in recent years, providing evidence for analysing benefits and shortcomings for scaling-up.

Lastly, one learning event was specifically organized to initiate an exchange of knowledge and experiences on irrigation in the context of CSA, following-up to the expression of interest by the CSA knowledge community, identifying water management as one of the main areas to be explored, with good practices being shared and systematized.

4.3.2 E-learning courses and video

The Project has developed two e-learning courses on CSA in collaboration with FAO experts. The two courses are on"Water management for CSA" and on"Sustainable soil and land management for CSA", and are based on the FAO CSA Sourcebook chapters related to these topics. Both courses have been produced in English and in French. In addition, a video on CSA for policy makers has been produced to underline the importance of including the CSA approach in climate change strategies. The courses and video will be launched at the COP24 in Poland, in December 2018.

BOX 7

WEBINARS AND LEARNING EVENTS HELD IN THE FRAMEWORK OF THE ACTIVITIES BY KAG

"Enabling advisory services for climate-smart agriculture", (webinar), 29 March 2017.
The webinar explored the relevance of creating a conducive environment to fulfill the potential of RAS in providing support to farmers in the adoption of climate-smart practices. Evidence in this sense was provided drawing from the experience of Costa Rica. Key messages emerging from the webinar were: a) communication and ability to share and manage knowledge came as a major issue; institutional arrangements to store and share knowledge in a participatory manner are essential; b) strong policy frameworks are important to stimulate CSA through RAS; c) connecting farmers, researchers, consumers and policy makers is necessary in the current context; and d) cooperation between the private and the public sectors is paramount for the implementation of effective actions locally in the framework of multilevel national strategies.

"Index-based insurance for risk management in climate-smart agriculture", (webinar), 4 May 2017.
From the presentations, Q&A sessions and the panel discussion held during this webinar, it emerged that: a) index-based insurance is a promising solution for supporting smallholder food producers facing climate change worldwide; b) it is still in the work-in-progress phase, with several initiatives being tested in different geographic areas at different levels of aggregation; c) paramount for the implementation of tailored index-based insurance programmes is the cooperation of a wide range of stakeholders, with the collaboration between public and private institutions being particularly relevant; and d) communication and active engagement of food producers (i.e. farmers, pastoralists) is needed to design and implement appropriate contracts suiting their needs.

"Irrigation in Climate-Smart Agriculture – Challenges and Responses", (learning event), 14 June-4 July 2017.
This learning event was organized to initiate an exchange of knowledge and experiences on irrigation in the context of CSA, considering that water management was one of the main areas of interest identified by the CSA knowledge community. The event consisted in a four-week long online discussion and a webinar. Overall, the event underlined the importance of building sustainable, efficient and effective agriculture systems. Sustainable water use needs joint planning at the watershed level and fair sharing of water between different sectors, ensuring water and food security, and avoiding maladaptation to changes. Building irrigation systems should be based on a careful assessment of water resources, to avoid depletion of natural resources.

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PROJECT SUPPORT TO COUNTRY CSA ACTIONS 5

There were various regional and country-focused activities among those undertaken by the Project.Adopting a country-based lens to promote CSA is increasingly necessary, as several countries identified the potential for the agricultural sectors to deliver climate change adaptation and mitigation synergies, while promoting the generation of economic, environmental and social co-benefits. Currently, more than 30 countries explicitly refer to CSA in their NDCs, specifically mentioning adaptation-mitigation synergies. This points to the acknowledged relevance of taking structured actions in these sectors, as well as the opportunity for international cooperation in this direction. Therefore, the international community is called to strengthen the technical and functional capacities of (State and Non-state) agricultural stakeholders to respond to climate change. For instance, enhancing ministries' capacities to generate and disseminate agro-meteorological data, as well as to deliver climate-smart extension services, is vital to scaling-up climate action for agriculture. Similarly, producers' organizations and other local institutions must be acknowledged for the key role they hold: if properly capacitated, they can support their members to assess climate-related risks and opportunities, with the aim of adopting practices that are climate-smarter. In this respect, the Project has been exploring possibilities to collaborate with developing countries, to support themin achieving their international commitments for climate change and sustainable development in the field of agriculture and food security.

5.1 "Central Asia activities on Climate-Smart Agriculture" workshop

Against this backdrop, the Project supported the organization of the Central Asia Regional CSA Workshop, held in Bishkek, Kyrgyzstan, from 12 to 14 July 2016, by preparing and leading a session on knowledge to identify gaps and capacity needs for CSA implementation in the Central Asia Region, where the effects of climate change are already producing negative impacts on the agro-ecosystem and on rural livelihoods.

As a preliminary activity to the Workshop, with the support of the Project, an online survey was prepared on "Central Asia activities on Climate-

Smart Agriculture", in collaboration with the FAO's Regional Office for Europe and Central Asia (FAO-REU) and other four divisions, including the Climate and Environment (CBC), the Agricultural Development Economics (ESA), and the Partnerships, Advocacy and Capacity Development (DPS) divisions. The survey allowed to take stock of the challenges posed by climate change to the agriculture sector and to food security in the Central Asian countries, and to identify needs and gaps on CSA, as well as the potential interventions to address these challenges. The survey results, outlined below, constituted the basis for the preparation of the knowledge session of the Workshop.

Results of the online survey "Central Asia activities on Climate-Smart Agriculture"

Major challanges posed by Climate Change	▪ Increased impact of natural hazards, such as floods, droughts, storms; ▪ Reduced water resources or increase of salinity; ▪ Reduced groth and productivity; ▪ Increased diseases and parasites for products and livestock.
Agricultural and rural development intervention needed	▪ Sustainable management of resources and production.
Main constraints for transitioning to more sustainable, resilient and efficient production systems	▪ Lack of or limited collaboration and communication among relevant stakeholders; ▪ Limited available mechanism for knowledge sharing and capacity building; ▪ Lack of access to extension and finance supports.
Policy and institutional support mechanism needed	▪ Support to scaling-up CSA activities, policies and practices; ▪ Support to farmers; ▪ Ability to make decisions.
Important improvements needed to ensure sharing and effective use of knowledge/evidence base created	▪ Identification of economic supports; ▪ Creation of information mechanisms to buid synergies and identify options.
Availability of data (socio economic, environmental and climate related data)	▪ Needs for information or data available and increase of sharing data when available.

The Workshop brought together various regional and national delegates, from Ministries, universities and research institutes, International Organizations and donors engaged in the five Central Asian countries. The objectives of the event were to raise awareness and build capacity to undertake CSA approaches, as well as to determine collective priority interventions at national and regional levels. This included the identification of the needed knowledge, tools and technical support, linking them to ongoing and new projects.

The results of the discussions held during the *CSA knowledge, research and capacity building session* highlighted the need for precise follow-up actions:

- the implementation of a cross-country synthesis of gaps and challenges;
- the creation of linkages to other Regional Initiatives and FAO programmes in the region;
- the development of a regional CSA Strategy which addresses Central Asian countries' and regional priorities;
- the establishment of a permanent information and advocacy campaign for raising awareness, so as to ensure the willingness and commitments of the National Governments and other stakeholders;
- the undertaking of consultations for the formulation and agreement on the vision of CSA, to ensure a clear pathway;
- the creation of relevant mechanisms to ensure the sustainability of the programme (i.e. funding is of the utmost importance);
- the consideration of CSA as a collective action and a multi-stakeholder process, hence the incorporation of participatory/inclusive principles from the initial stage of strategy development;
- the development and endorsement of the CSA strategy at regional and national levels, as well as a subsequent action plan, setting up a Monitoring and Evaluation (M&E) system with a defined baseline and targeted indicators.

5.2 Feasibility studies for CSA project initiatives in Botswana, Ecuador and Ethiopia

To endorse CSA actions at country level, the Project has also supported the elaboration of feasibility studies in Botswana, Ecuador and Ethiopia, aimed at building project opportunities for CSA promotion and implementation on the ground. Preliminary project Concept Notes (CNs) were proposed by IMELS for each country, that were later reviewed by FAO Offices and experts in the countries. Three missions were fielded to develop the feasibility studies presented to IMELS.

BOTSWANA

The feasibility study was conducted in Botswana for the proposed IMELS Project "Integrating indigenous practices for climate-smart agriculture (CSA) into crop and livestock production systems in Botswana". The project is proposed to be built around the following outputs:

1. take stock of indigenous knowledge practices and existing CSA technologies, practices and approaches based on the different farming systems and agro-ecological zones of Botswana;
2. conduct awareness-raising workshops for policy and decision makers (at national and district levels), CSOs, Private Sector and development partners on adoption of indigenous practices and CSA best practices;
3. develop indigenous and CSA best practice guidelines;
4. enhance subregional learning and sharing of experiences.

The feasibility study was conducted to collect relevant information and explore opportunities for collaboration in a future project with the line ministries of Botswana for climate change, agriculture, livestock and forestry, and other national and regional stakeholders, and to analyse possible collaboration with stakeholders in Botswana towards the development of a project proposal arising from the CN. The feasibility study findings revealed that the proposed CSA project is highly relevant and consistent with the country's national development objectives for achieving climate change adaptation and mitigation under the UNFCCC. The country is in fact already facing climate change impacts in terms of land degradation, loss of productive arable and livestock grazing land. Livestock contributes 80 percent of the country's GDP and plays a key role in sustaining rural households that constitute half of the country's population. The proposed CSA project offers great potential to simultaneously address current problems of low crop and livestock productivity, enhancing resilience of the agricultural production systems and community livelihoods against climate change, and reducing GHG emissions. The feasibility study has identified the potential project sites (Bubirwa, Gantsiand Kgalagadi regions) and recommended a value chain approach to project implementation. Four value chains were identified: beef, cereal-legume, indigenous vegetables/ horticulture and small stock. Through these four value chains, the project could link with the Government's main development projects currently focusing on providing smallholder farmers with subsidized agricultural inputs, infrastructure support and access to domestic and livestock drinking water.

The project is recommended to focus on capacity development and could be implemented in two phases: the first focusing its activities on technical training, and the second on practical implementation to generate evidence and success cases for CSA scaling up.

ECUADOR

The feasibility study was conducted to assess the scope for the proposed IMELS Project "Climate-

Smart-Agriculture in Cocoa under an Agro-forestry System". The Project aims at promoting the agro-forestry system in cacao production. Ecuador is the largest exporter of fine flavour cocoa, and although cocoa's primary production systems are diverse, monoculture is the prevailing production system with an increasing use of the high productive cocoa clone CCN51, causing genetic erosion and consequently loss of biodiversity, exacerbated by the effects of deforestation. Contrarily to monoculture, biodiversity benefits of cocoa are most commonly linked to traditional agro-forestry systems such as the *Chakra*, which allows for sustainable use of the rainforest by combining cultivation of the Ecuadorian finest aromatic cacao, controlled timber extraction, production of staple food, and conservation of medicinal plants. In addition, few measurements on the carbon storage in the *Chakra* systems provided evidence of relatively high quantity of sequestration when compared to the primary forest in the same area. To this end, the proposed project could add value and complement agro-forestry practices with the CSA approach, jointly addressing production aspects and climate change mitigation and adaptation. A case in point being the enhancement of the cocoa genetic preservation, whichis not receiving much attention in the country. By addressing cocoa biodiversity conservation together with supporting agro-forestry systems, the Project can have a high impact in the cocoa growing zones. To reach these outcomes, the proposed project interventions resulting from the feasibility study are:

1. the integration of conservation elements into productive landscapes through shaded cocoa agro-forestry systems (demonstration plots) and *Chakra* System enhancement;
2. the analysis of the potential for cocoa agro-forests on carbon sequestration as an option within the Reducing Emissions from Deforestation and Forest Degradation in Developing Countries(REDD+) Action Plan;

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3. the creation of nurseries for the conservation of cocoa diversity;
4. the implementation of capacity building activities for cocoa producers and rural extension professionals;
5. the improvement of entrepreneurial and business capacities of the cocoa producers association to increment the income of cocoa local farmers;
6. the strengthening of the supply chain of cocoa and the provision of support to producers in the post-harvest process, traceability, processing and marketing in international markets.

The feasibility study has identified some possible risks to the implementation of the project. The most relevant are: i) lack of coordination between the Ministry of Environment (MAE), the Ministry of Agriculture, Livestock, Aquaculture and Fisheries (MAGAP)and other stakeholders; ii) limited national counterpart contributions, and iii) cultural change resistance among farmers. These risks can be overcome based on lessons learned and FAO experience in the country, by: a) establishing a coordination framework within MAE and MAGAP, local Governments and farmers' associations; and b) promoting the continued livelihoods diversification via demonstrative pilot projects, involving the communities in the designed actions from early phases of the project.

ETHIOPIA

FAO has carried out the feasibility study for the IMELS proposed Project "Crop biodiversity as approaches to improving agricultural productivity, adapt to climate change and increased commercialization of small holder farmers - Ethiopian durum wheat". Ethiopia is a centre of diversification of durum wheat, displaced for several decades by improved bread wheat varieties. The feasibility study has revealed that there is a renewed interest in durum wheat, both as a commodity, particularly for pasta production, as well as an adaptation strategy to the increasing frequency of incidences of wheat rust, considering that durum wheat varieties are generally more resistant to this disease than bread wheat varieties. The study has also identified limiting factors that require attention for the development of the durum wheat sector including: i) the current subsidies on imported wheat; ii) the limited promotion and availability of seed of recently released durum wheat varieties; and iii) the lower yields –at least in years with good weather conditions,– of durum wheat as compared to bread wheat. The project is proposed to be developed around five main tasks:

1. introduce and produce varieties of wheat, adapted to different agro-ecological zones, and able to withstand ecological and environmental challenges;
2. introduce innovative soil management practices helpful to enhance soil carbon stock and soil functions for climate change mitigation and reduced CO_2 emissions, as well as for increased resilience and climate change adaptation;
3. enhance smallholder engagement, develop and provide services that improve access to information, and strengthen the capacity to produce, acquire, exchange and utilize information;
4. develop partnership strategies to carry out market growth opportunity (e.g. enhance contacts with pasta producers);
5. strengthening capacity building on measurement and M&E, to ensure project implementation and build on good practices to mainstream and scale-up these interventions.

Through the feasibility study, an assessment of options and requirements for the implementation of the proposed tasks was carried out, as well as an assessment of prioritization of these tasks based on the proposed budget. For Task 1, the activities proposed aim at supporting the conservation of the genetic diversity for Ethiopian durum wheat landraces, as well as involving farmers in participatory variety selection to identify varieties that are suitable to the specific locations and at the same time, attractive to potential buyers, especially wheat mills and durum wheat processing

industry like pasta producers. For Task 2, the Farmer Field School (FFS) approach is proposed to identify the most appropriate option for soil fertility management in each location directly with the concerned farmers, as carbon sequestration potentials and acceptance by farmers of different practices may vary from location to location. Task 3 can be achieved by designing other Tasks in a participatory way, such as participatory variety selection under Task 1 or FFS under Task 2. For Task 4, the replication of the model of contract farming is considered, already applied by a project of the Italian Development Cooperation Agency. Finally, Task 5 should strengthen capacities necessary to implement the other tasks; options are therefore flexible and depend on the focus set for the project. Project sites should be selected in proximity to the interested wheat mills/pasta processing plants to allow for their involvement in the participatory variety selection and create mutual interest and potential for subsequent market linkages, e.g. through contract farming.

Based on the prospective budget allocated to the project, the feasibility study has identified the activities that should be prioritized. These priorities include those focused on climate change adaptation, which provide the most immediate benefit to smallholder farmers. The identification and promotion of adapted varieties of durum wheat (under Task 1) together with elements of smallholder engagement (Task 3) and capacity building (Task 5), are therefore recommended as focal project activities. Should additional funding be provided, the project could integrate those activities addressing climate change mitigation, i.e. under Task 2.

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6 IMELS-FAO COLLABORATION AT COP22 AND COP23

The Paris Agreement recognizes the importance of food security as part of the international response to climate change. As such, COP22 was an opportunity *to share the importance* of the linkages between climate change, agriculture and food security. Agriculture sectors are key in addressing climate change.

In this context, IMELS and FAO have decided to further collaborate to organize specific activities at the COP22 in Marrakesh, Morocco.

This collaboration was agreed to be carried out through the recruitment of two consultants by FAO under the Project and to be hosted by the FAO Representation in Morocco. The two consultants have supported all the activities related to the implementation of the following areas of work:

1. the preparation of the Global Climate Action Agenda (GCAA) High-Level (HL) segment, focusing mainly on the agricultural sectors in relation to their prominence in developing countries' intended NDCs;
2. the preparation of Action Days for the agricultural sectors;
3. the preparation of a key Side Event on CSA and Food Waste.

Following this fruitful and successful experience in the context of the UNFCCC, IMELS and FAO decided to continue their collaboration for developing an IMELS-FAO Side Event during COP23, with the aim of sharing the results achieved by the project.

BOX 8

SIDE EVENTS ON CSA AT THE COP22 IN MARRAKECH, MOROCCO

JOINT ITALY-FAO SIDE EVENT ON "CLIMATE-SMART AGRICULTURE AND FOOD WASTE"

On 16 November 2016, within the framework of the UNFCCC COP22 in Marrakech, IMELS and FAO, in collaboration with the International Center for Advanced Mediterranean Agronomic Studies (CIHEAM), organized and promoted a Side Event focusing on the solutions offered by CSA to tackle food losses and waste.

The event also saw the participation of HL Officers from MiPAAF, the Ministry of Agriculture of the Kingdom of Morocco and GACSA Co-Chair, Mr Martin Bwalya.

Saving food and avoiding waste is one of the key actions that FAO identified to address the impacts of climate change on food security in its "FAO's work on climate change" document presented at the 21st Conference of the Parties of the UNFCCC in Paris, 2015. In fact, according to FAO, currently one third of the food produced is either lost or wasted. The global costs of food wastage amount to about USD 2.6 trillion per year, including USD 700 billion of environmental costs and USD 900 billion of social costs. Furthermore, FAO estimates that food loss and waste generate about eight percent of the global annual GHG emissions.

Within FAO's descriptive framework, Food Waste is delimited by two other notions, food lossand food wastage, where:

- Food loss refers to a decrease in mass (dry matter) or nutritional value (quality) of food that was originally intended for human consumption. These losses are mainly caused by inefficiencies in the food supply chains, such as poor infrastructure and logistics, lack of technology, insufficient skills, knowledge and management capacity of supply chain actors, and lack of access to markets. In addition, natural disasters play a role.
- Food waste refers to food appropriate for human consumption being discarded, whether it is kept beyond its expiry date or not, or left to spoil. Often this is because food has spoiled but it can be for other reasons such as oversupply due to markets, or individual consumer shopping/eating habits.

Italy is fully committed to reduce food losses and waste as a priority of its food and environmental policies, along the path launched during the EXPO 2015 "*Feeding the Planet, Energy for Life*". Specifically, the Side Event allowed to present the new Italian national law on reduction of

food waste, adopted by the Italian Parliament in August 2016. Italy is indeed in the global forefront to fight food losses and waste, as Italy's Former Minister for the Environment, Mr Gian Luca Galletti, often recalled in several global *fora*.

The Side Event fostered the debate on how to address food losses and waste and its strict interlinkages with the initiatives aimed at promoting a CSA approach in all its three pillars, particularly to show Italy's and FAO's joint efforts thus far, and to discuss and valorize them in an international context, with a view to promote the integration of the economic, social and environmental components for a sustainable development.

GACSA SIDE EVENT ON "INVESTMENT OPPORTUNITIES FOR SCALING-UP CLIMATE-SMART AGRICULTURE"- ITALIAN PAVILION

The IMELS hosted a GACSA Side Event in the Italian Pavilion at COP22 in Marrakech on 12 November 2016, with the scope of contributing to the call for innovative approaches to resource mobilization for scaling-up CSA.

The current global climate finance landscape shows that agriculture is generally underfunded and that only a small portion of the agricultural finance trickles into CSA funding. CSA has a recognized role in identifying solutions for food security and climate change mitigation and adaptation. These solutions, to be effective, should be implemented at scale, requiring substantial investments.

The Side Event, moderated by GACSA Co-Chair, Ms Mi Nguyen, involved leading experts from the African Development Bank, CCAFS, IMELS, the Technical Centre for Agricultural and Rural Cooperation, and the World Farmers' Organization. Topics of discussion included investment opportunities for CSA in the future and building on lessons learned from current success stories.

BOX 9

SIDE EVENT ON CLIMATE CHANGE AND AGRICULTURE AT THE COP 23 IN BONN, GERMANY

Joint Italy-FAO-DG DEVCO Side Event on "Fostering Agriculture in NDCs: Challenges and Opportunities for Africa"

On 14 November 2017, within the framework of the UNFCCC COP23 in Bonn, IMELS and FAO, in collaboration with the European Commission's Directorate-General for International Cooperation and Development (DG DEVCO), organized and promoted a Side Event focused on identifying concrete initiatives at the field scale to support developing countries in implementing NDCs on mitigation/adaptation of climate change, and in meeting SDGs.

The event saw the participation of HL Officers from DG DEVCO, MiPAAF, the Ministry of Water and Environment of Uganda and FAO.

During the Side Event, it was explained that FAO and the European Union share a multitude of partnerships spanning many years, with the common goal of eradicating extreme poverty and hunger around the world. Climate change adaptation and mitigation is an increasingly important area of collaboration, hence a new joint initiative to foster the place of agriculture in the implementation of the NDCs was presented. A new programme in Uganda designed to promote landscape approaches, in order to increase climate change resilience and take advantage of the co-benefits between adaptation and mitigation, illustrated how NDCs can be translated in the field at the level of farmers' practices.

In addition, the collaboration between the IMELS and FAO through the Project "International Alliance on Climate-Smart Agriculture" was presented. The presentation highlighted the Project's support to the generation and dissemination of CSA knowledge at global, regional, national and local scales, and its efforts to support countries in applying the CSA approach in the implementation of their NDCs and in meeting the SDGs.

CONCLUSIONS

The Project enabled to create an important basis for charting a path forward to CSA mainstreaming into agricultural systems, and for turning the CSA approach into concrete actions, in support of research, policies and programmes that can help agriculture move along the sustainability trajectory. The Project activities supporting knowledge provided the right direction in the definition and interpretation of the CSA approach, and in the distinction between CSA and non-CSA practices. The various consultative activities enabled the identification of global and regional CSA needs through a participatory approach, leading to the development of comprehensive knowledge products and capacity building activities, which constitute a good basis for country capacity development. The technical and organizational support provided to GACSA and its AGs has facilitated a strong collaboration with Member Nations, NGOs and research centres. By setting these premises and pillars, the Project could then orient its actions towards the development of concrete CSA activities at field and country level. The expected realization of the three CSA country projects in Botswana, Ecuador and Ethiopia will enable to concretize the joint efforts undertaken, while paving the way for a broader adoption of CSA practices and inclusion of climate-smart agricultural approaches into national plans. The positive outcomes derived from the Project genuinely reveal the importance of Government agencies, farmers, food businesses and researchers to collaborate and join forces, to help countries around the world ensure sustainable, long-term food stability in the face of population and climate change challenges.

NOTES

Agriculture and climate change

Challenges and opportunities at the global and local level
Collaboration on Climate-Smart Agriculture

This publication is intended to provide an overview of the successes reached by the implementation of Project GCP/GLO/534/ITA "International Alliance on Climate-Smart Agriculture", funded by IMELS and implemented by FAO.

The IMELS has fostered, within this project, knowledge sharing on CSA, the creation and the implementation of GACSA, and the development of initiatives to support developing countries in their international commitments for climate change and sustainable development in the field of agriculture and food security.

The various activities and products described in this publication, show the successes of the project in supporting efforts of filling knowledge and implementation gaps, while developing assessments and tools for promotion and implementation of CSA actions.

The Project successfully supported the development of several knowledge products such as technical briefs, compendia and e-learning courses, providing a solid base for strengthening capacity on CSA.

Over the course of the Project, diverse consultative events (such as workshops, seminars and webinars), were organized, facilitating the knowledge exchange amongst experts, researchers and practitioners.

These served as a venue for debate and discussions on defining priority work areas and outputs, as well as to share experiences and lessons learned, providing space for partnerships between the various groups of stakeholders, aimed at building a strong knowledge community that may have a significant role in implementing CSA across countries and regions.

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