MODULE 17:
CAPACITY DEVELOPMENT FOR CLIMATE-SMART AGRICULTURE

Overview

Complementing and building on the previous modules of the Sourcebook, Module 17 addresses the overarching question on how the transition towards climate-smart agriculture (CSA) practices can be achieved. Given the knowledge-intensive, multi-stakeholder characteristics of climate-smart agriculture, the module illustrates through case studies the necessary practical ingredients to succeed in this transformation. These elements include a comprehensive and gender-sensitive capacity development approach aligned with and driven by national priorities, applying knowledge management and effective learning approaches, facilitating multi-stakeholder processes, strengthening agricultural innovation systems and leveraging information and communication technologies (ICTs) and communication for development (ComDev) approaches.

Key messages

- Making agricultural production and management systems climate-smart is a knowledge-intensive process requiring a comprehensive capacity development approach of all stakeholders that builds on sound assessments of country needs across the individual level, organizational level and the enabling environment.
- Due to the uncertain and dynamic nature of climate change impacts, a transition towards climate-smart agriculture requires socio-institutional learning processes with a strategic approach to skills development for climate-smart agriculture at country level including strong engagement of national and local formal and informal education and training institutions.
- Agricultural innovation systems with public and private research, extension and advisory services play a key role in supporting the transition towards climate-smart agriculture by generating, documenting, blending and sharing indigenous and scientific knowledge, facilitating learning processes and network-based development and innovation.
- In order to improve policy coherence and effectiveness, strengthen local institutions and mainstream CSA into national policies and programmes, it is important to create inclusive, gender sensitive spaces that promote multi-stakeholder dialogue about CSA, such as cross-ministerial roundtables, multi-stakeholder platforms for strategy development and efforts to coordinate regional bodies.
- Information and Communication Technologies (ICT), participatory Communication for Development (ComDev) approaches and knowledge sharing methods are important vehicles to improve access to information and knowledge, facilitate dialogue between stakeholders, and trigger learning across levels with knowledge networks and platforms to provide a venue where the diverse actors can connect.

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17.1 Introduction

How will the transition towards CSA materialize? Who will own and drive this transformation at country-level? What are the national capacities that are in need to be developed and how will countries be supported in this process? Addressing these questions starts with the recognition that making agricultural production and management systems climate-smart is a highly knowledge-intensive process. Therefore, current gaps in knowledge and capacity—particularly at country-level— need to be addressed systematically. Due to the uncertain and dynamic nature of climate change impacts, a transition towards climate-smart agriculture requires a comprehensive capacity development approach that stimulates socio-institutional learning processes and utilizes the innovation potential of agricultural systems.

What do we mean by capacity development and why is it so important for CSA?

"What we need to develop is people, not things,
and people can only develop themselves"

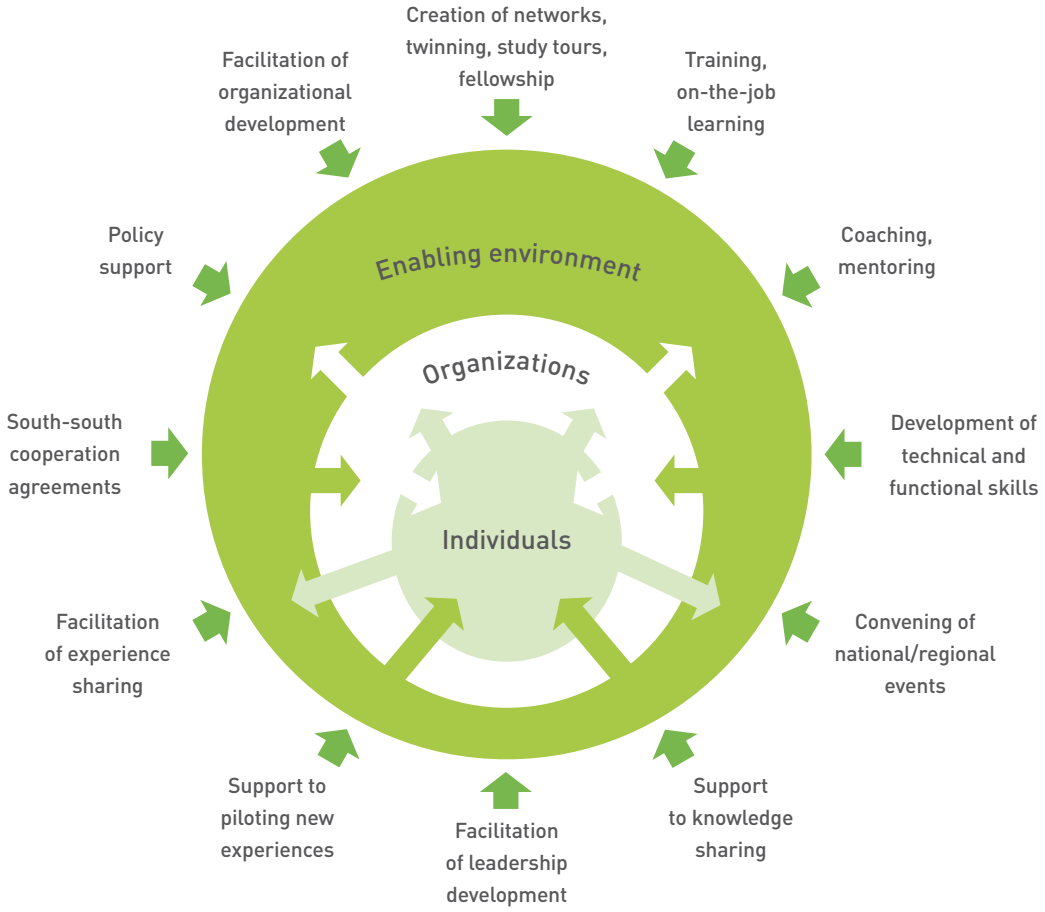
Arusha Declaration, 1967

Capacity is defined as "the ability of people, organizations and society as a whole to manage their affairs successfully. Capacity development (CD) is defined as "the process whereby individuals, organizations and society as a whole unleash, strengthen, create, adapt and maintain capacity...to set and achieve their own development objectives over time" (OECD, 2006). Effective CD goes beyond training, technical assistance and policy support but instead aims to facilitate a sustainable and endogenous development process rooted in national empowerment that enables developing countries to be in the driving seat of their own destiny. In a capacity development approach, developing countries own, lead and drive the development process with external actors (such as FAO) facilitating this change process, thus contributing to more sustainable and impactful results. CD encapsulates both the overall aim of development (i.e. developing comprehensive capacities to strengthen country systems) as well as the process by which more sustainable results with higher impacts can be achieved (i.e. the modality or the "how"). This emphasis on a more comprehensive approach to CD is in line with the international consensus on development effectiveness stating that "without robust capacity—strong institutions, systems and local expertise— developing countries cannot fully own and manage their development processes" (OECD, 2008).

Figure 17.1 illustrates the three different dimensions of CD—the individual, organizational and enabling environment/policy level. The enabling environment dimension addresses the systemic impediments covering political commitment and vision, policy, legal and economic frameworks: national public sector budget allocations and processes; governance and power structures; and incentives and social norms. The organizational dimension includes public and private organizations, civil society and networks of organizations. It addresses strategic management functions, structures and relationships; operational capacities, human and financial resources; and knowledge and information resources and infrastructure. The individual dimension refers to the skill levels and attitudes of individuals. These can be addressed through facilitation, training and competency development (see FAO, 2010a).

To achieve any systemic and more sustainable change, all three dimensions of CD need to be addressed interdependently. This is particularly relevant in the context of CSA, which aims for systemic change in the way food is sustainably produced.

Figure 17.1
Dimensions of capacity development and support modalities



Source: FAO, 2012b

Learning and knowledge sharing play a key role in the capacity development process. Figure 17.1 lists support modalities for supporting and facilitating endogenous, contextualized change processes led by national actors. It covers a wide range of approaches that trigger learning and knowledge sharing, from classical class-room training to more innovative approaches such as South-South cooperation agreements, coaching, institutional twinning and network creation and facilitation. Many innovative approaches in capacity development foster social learning, for example through E-learning or web/ICT-supported multi-stakeholder platforms and networks (FAO, 2011a). For CSA, enabling continuous individual and institutional learning is fundamental given the complexity of the topic and the unpredictable evolution of climate change impacts on farming systems and local communities.

Key methodologies and success factors

A set of success factors for effective capacity development in the agriculture sector can be identified and are shown in Table 17.1. It also features examples specific to the CSA context.

Good capacity development practice recommends addressing all of the above success factors to increase the likelihood of greater long-term success for development interventions. Here we discuss three of the success factors in more detail in the CSA context:

Table 17.1
Success factors for effective capacity development for CSA

Success Factor	Explanation	CSA Examples
Applying a systematic approach across 3-dimensions and develop both technical and functional capacities	CD involves three dimensions (3D) which are interlinked: individuals, organizations and the enabling environment. Successful initiatives usually address all three dimensions. Non-technical (i.e. functional capacities) are increasingly considered a necessary complement to technical CD, as they empower actors to apply the new knowledge/skills effectively, and scale up the intervention's results.	CD for trans-boundary, integrated water resources management comprises technical and negotiation skills (e.g. support of the Lower Mekong River Commission).
National Ownership through aligning programmes with national priorities	National needs and priorities anchored in national ownership, rather than UN agency priorities, should guide interventions. For example, FAO follows country priorities as laid out in Country Programming Frameworks, National Agriculture Sector Plans, Poverty Reduction Strategy Papers, and as per the Aid Effectiveness Agenda. Use national Project Management Unit whenever possible.	Development of national reduced emissions from deforestation and forest degradation (REDD) strategies in line with country strategies. See Box 17.3. Setting up comprehensive CSA policy approaches in Malawi, Zambia and Vietnam
Assessing capacities	Undertaking a careful assessment of needs to diagnose what and whose capacities need to be developed is a fundamental pre-condition for all successful and sustainable development projects. Such assessments ensure the context is understood and existing capacities and needs are identified, allowing the project or programme to be customized to the local situation.	See Box 17.1 for CSA capacity needs assessments in Kenya and Tanzania.
Anchoring programmes to local or national institutions and systems	Sustainable interventions anchor programmes in local or national institutions, national systems, procedures, organizations, and/or budgets are developed to ensure long-term continuity even after external funding for development projects ends.	CSA interventions linked to National Climate Change Commissions or Offices.
Promoting engagement with local & national actors	Encouraging national/local involvement in project/programme identification, formulation, implementation and monitoring and the use of participatory communication approaches ensure the endogenous support essential for sustaining projects in the long term.	The formulation of National Climate Action Programmes/ Plans (NAPAs, NAPs, NAMAs) under the United Nations Framework Convention on Climate Change (UNFCCC) emphasizes this factor. See Box 17.7 on inclusive communication tools.
Using capacity development modalities beyond training	Alongside the delivery of training, other successful capacity development modalities include coaching, South-South cooperation, policy support, support to organizational development, creation of networks and convening for national/regional events.	See Box 17.2 on climate change learning approaches in the Philippines and Figure 17.1
Understanding national or regional contexts	Paying attention to national, regional and sub-regional contexts helps identify key drivers of change.	REDD + interventions have to be based on a sound understanding of the drivers of deforestation in a country.
A long breath—Giving the CD process time	CD takes considerable time, particularly at organizational and policy levels, and it happens gradually. Ensuring a medium to long-term horizon, through different forms, scales or funding mechanisms if necessary, can foster deep-level CD.	The shift in CSA interventions from a project to a programmatic approach supports this
Tracking capacity development	Although complex and challenging due to its non-linear nature of assessing change, tracking national capacity-related activities across the three dimensions is critical to measure progress. Capacity-related indicators should be an integral part of any programmatic results framework including assessing political commitment at country level.	Transformation to CSA practice is knowledge-intensive, requiring learning and change of practice calling for innovative approaches to track this complex change process.

Source: Adapted from FAO, 2011d

Anchoring programmes to local or national institutions and systems

In order to anchor CSA in national institutions it is crucial to support national actors in internalizing changes, such as by:

- facilitating the adoption of new or revised CSA related policies and providing for their implementation as a national priority;
- supporting the incorporation of CSA related knowledge into national curricula;
- implementing new procedures in the functioning of institutions; and/or
- encouraging internal changes that prepare staff to utilize new competencies in daily tasks.

Tracking CD

CD is fundamentally about change. Monitoring the effects of capacity-related interventions is crucial, although the complex and non-linear nature of the CD process makes it difficult to attribute impacts to particular activities. Nevertheless, good CD practice recommends that capacity-related indicators should be an integral part of any programmatic results framework. This includes assessing capacities and political commitment at country-level (FAO, 2013 forthcoming) and establishing a simple and sound monitoring and evaluation system that can help fill in knowledge gaps and demonstrate which approaches work best so that CSA pilot actions can be effectively scaled up (see Module 18 on M&E).

Assessing Capacities

To ensure quality at entry with successful capacity development from the outset, capacity assessments are critical. A capacity assessment can help determine what and whose capacities need to be developed but also provide a benchmark to measure progress and identify what the adoption constraints are and to ensure that the envisioned CD-related interventions for the CSA project address some of these.

An assessment compares the existing capacities across the three dimensions of the capacity system (individual, organizational and enabling environment) with those needed to reach future development results. It is guided by the following key questions: Where are we now? Where do we want to go? What is the best way to get there?

Below, Box 17.1 illustrates the application of the FAO capacity assessment methodology when tailored to CSA projects in Kenya and Tanzania.

Box 17.1
Capacity needs assessment: a tool for planning capacity development interventions in CSA projects in Kenya and Tanzania

Context
In Kenya and the United Republic of Tanzania, a FAO Programme has developed pilot projects to help build climate-smart farming systems. The two pilot projects provide capacity development, including technical support to assist smallholder farmers in adopting climate-smart farming practices. During the pilot projects' initial phase, a capacity needs assessment was undertaken in collaboration with the project partners and FAO country offices. In Kenya, the project partners are the World Agroforestry Center (ICRAF) and the East Africa Dairy Development Project (EADD). In the United Republic of Tanzania, the project partner is Cooperative for Assistance and Relief Everywhere (CARE).

Methodology
The objective of the assessments was to identify and prioritize the capacity needs that must be addressed to mainstream climate-smart agriculture into smallholder farming systems given the existing capacities and gaps at the national, district and project level. The assessments served as the starting point for planning capacity development activities and an excellent opportunity to enhance collaboration among all stakeholders.

The methodology used was based on FAO's Capacity Assessment Toolkit and especially tailored to address climate change adaptation and mitigation in agriculture. The assessments helped identify the main stakeholders, policies, plans and strategies related to climate change already in place. Moreover, the participating stakeholders could assess their own organizational and individual capacities and needs through open discussions and working groups to strengthen ownership. To analyse farmers' capacities and needs regarding the adoption of climate-smart practices, the assessments considered the different existing agricultural land uses and management practices, as well as topical climatic and environmental problems.

The assessment process was carried out on multiple levels and involved a variety of participatory and consultative activities.

At the national level, a stakeholders' mapping and context analysis was carried out with representatives from the Ministries of Agriculture, Livestock, Environment, non-governmental organizations (NGOs), research institutions and United Nations agencies working on climate change.

At the district level (project area), consultative workshops were held with project staff, extension officers and district staff from Ministries of Agriculture, Livestock, Water, Forestry and Environment.

At the project and community level, the assessment team organized focus group discussions with farmers and local leaders, interviewed farmers and conducted field visits.

Outcome
The assessments in Kenya and the United Republic of Tanzania successfully identified entry points for capacity development activities and made recommendations for the promotion and implementation of CSA practices in both pilot projects.

Full assessment reports are available at FAO, 2012a
For Tanzania's report: FOA, 2011b
For Kenya's report: FAO, 2010

Improving technical and functional capacities across the individual, organizational and policy level

In numerous developing countries sector agencies may be developing technical capacities successfully (increasing the competencies to intensify production sustainably or manage natural resources more effectively, for example). However, unless such provisions are adequately integrated into planning and policies, it will not be possible to efficiently scale them up. Moreover, non-technical (i.e. functional) capacity development is often not prioritized. These soft skills include the ability to manage personnel and organizations, good governance principles such as dialogue and communication with stakeholders and resource allocation within policy frameworks that aim for equity and poverty alleviation, transparency and accountability (UNESCO-IHE & UNW-DPC, 2009). Last but not least, the lifelong learning of individuals and organizations is important to keep up with evoking the tasks and trigger innovation. This requires financial, personal and managerial support

mechanisms to foster knowledge generation and sharing. More specifically, in 2010 FAO's renewed corporate approach to CD recommends that the following functional capacities should be enhanced (complementing technical capacity strengthening) to enable countries and regions to plan, lead, manage and sustain change initiatives:

- Implementation capacity: implement and deliver programmes and projects, from planning to monitoring and evaluation.
- Partnering capacity: engage in networks, alliance and partnerships
- Knowledge capacity: access, generate, manage and exchange information and knowledge
- Policy and normative capacity: formulate and implement policies and lead policy reform

Table 17.2 provides some examples of required capacities at the different levels.

Table 17.2
Examples of required technical and functional capacities for climate-smart agriculture by level

	Individual level	Organizational level	Policy level
Technical capacity (technical)	Regularly updated knowledge and skills. Understanding of broader technical context of CSA.	Appropriate knowledge and skills mix, such as agronomic, environmental, engineering, economic, social, legal, financial, institutional knowledge; knowledge on investment procedures	Policy for critical review of knowledge and information; allocation of adequate resources for CSA related capacity development requirements
Implementation capacity (functional)	Skills for CSA project and finance management; personnel/team management/mentoring skills, ability to deliver, leadership, mediation skills.	Ability to set goals/strategies. Financial and people management; staff rotation; incentive systems, project management including proper planning and M&E, ability to deliver in a timely manner.	Sound task assignments and clear mandate of sector agencies; cross-sectoral collaboration mechanisms; sound finance and budgeting systems, facilitating proper organisational management.
Partnering capacity (functional)	Ability to engage stakeholders, apply inclusiveness; capacity for collective action	Transparent decision-making processes (including budgets and plans); accountable procedures for stakeholder consultation and empowerment.	Policy to ensure inclusiveness, transparency and accountability; conducive regulations.
Knowledge capacity (functional)	Desire to keep learning and attend trainings, self reflection of performance; skills for knowledge sharing and management.	Procedures for continuous performance review; mechanisms and rewards to support information/ knowledge exchange and learning; support for communities of practice.	Policy to promote an open work atmosphere and inclusiveness; openness to continuous sector performance review and implementation of adjustments.
Policy and normative capacity (functional)	Ability to meaningfully engage in CSA-related policy and planning processes	Ability to formulate and implement policies and lead policy reform, including climate change mainstreaming in policies.	Capacity to administer legal and institutional frameworks, including those related to UNFCCC.

Source: based on UNESCO-IHE & UNW-DPC 2009, adapted for CSA with different classifications of functional capacities

In many cases, a strategic approach to skills development and learning for CSA is required. For instance, the *One UN* initiative, UN CC:Learn, advocates the development of National Strategies to Strengthen Human Resources Capacities to Advance Green, Low Emission and Climate Resilient Development. It is piloting such

efforts in Benin, the Dominican Republic, Indonesia, Malawi and Uganda (UN CC: Learn, 2012). Such a strategy allows countries to

- Take stock of relevant capacity development and learning initiatives;
- Assess existing human capacities to achieve climate change objectives;
- Identify and prioritize learning interventions in the short, medium and long term; and
- Engage educational and vocational training institutions.

Two concrete learning interventions (farmer field schools [FFS] and e-learning) for boosting technical and functional capacities for CSA are illustrated in Box 17.2.

Box 17.2
Climate change learning approaches in the Philippines

Context
The MDG-F 1656 climate change project, implemented from 2009 to 2012 by the Philippine government and various UN agencies, aimed to strengthen the institutional capacity of the Philippines to adapt to climate change. The project component 3.1, led by the Department of Agriculture and FAO used FFS as an outreach vehicle to spread the pilot projects' demonstration activities alongside other methods such as e-learning, mentoring and hands-on technical trainings.

Methodologies
FFS have a very long tradition in the Philippines as a means of capturing local knowledge and working with farmers to adapt innovative management practices to local conditions based on a sound understanding of the relevant agro-ecosystem. FFS have proved to be successful in providing effective linkages with farming communities, allowing participatory testing and experiential learning while empowering farmers. Having started as FFS for Integrated Pest Management focusing on farmer fields, in the last decade the FFS' scope expanded first into Integrated Crop Management FFS and since then also into FFS that look more broadly from farmer fields to agricultural landscapes as a whole. Thus, Sustainable Land Management (SLM) and watershed scale FFS, pastoralist FFS and climate field schools now also exist.

E-Learning also provides a powerful method for CSA capacity development. It can take various forms, from individual self-study to facilitated online courses, or blend approaches by combining 'face-to-face' workshops and e-learning. The MDG-F project in the Philippines introduced an e-learning tool on planning community-based adaptation to climate change. The tool was developed by FAO and targeted to rural agricultural extension workers. It should be noted that bringing e-learning to rural communities might be challenging if it is not carefully integrated with other learning processes. In the Philippines project, e-learning was introduced after social mobilization and good practice identification had already begun and was followed by field demonstrations that were clearly communicated and easy to understand. In this way, everyone was able to clearly relate e-learning to their own situation and experience and could easily define how to put what they had learnt into practice.

Outcomes
The advantages of combining e-learning with 'face-to-face' interaction (as compared with using either technique in isolation) were as follows:

1. 'Face-to-face' allows for better tailoring and ad-hoc adjustment of training content to specific contexts (prior knowledge of participants and country context; ability to give direct responses to individual participants' questions; embeddedness in the current status of related project activities);
2. E-learning allows participants to refer back to sessions of particular interest after the course, and course CD-ROMs can be copied and disseminated to others;
3. Particularly younger extension workers are eager to use e-learning and to improve their skills with new technology;
4. The introduction of new e-technology using 'face-to-face' methods also takes older, often computer illiterate extension workers who would otherwise have been excluded, into account and brings them on board.

For these reasons, the combination of both methods for capacity development has been a key success factor of the MDG-F1656 climate change project.

Full Report available at FAO and Republic of the Philippines, 2011

17.2 Strategies for improving policy coherence and effectiveness

Building on Module 12 on local institutions and Module 13 on mainstreaming CSA into national policies and programmes, the following two key strategies for improving policy coherence and effectiveness will be discussed: multi-stakeholder processes and efforts to link scientific assessments and decision-making in CSA.

Facilitating multi-stakeholder processes

Facilitating multi-stakeholder processes is a key strategy for improving a conducive enabling environment, including governance. Good and efficient governance of natural resources and the equitable and transparent distribution of benefits lead to the success of many policies and measures aiming for climate-smart agricultural systems. It is important to create inclusive spaces in which multi-stakeholder dialogue about CSA can take place, such as cross-ministerial roundtables, multi-stakeholder platforms for strategy development or the coordination of regional bodies, among others.

The capacity development activities for REDD+ readiness supported by the UN-REDD Programme is one such example. They focus on stakeholder consultation and participation, as well as cross-sectoral coordination in REDD+ planning and implementation in developing countries. Box 17.3 illustrates one of the many methodologies developed in this context.

Box 17.3 Facilitating multi-stakeholder processes to support improved governance—the REDD+ Participatory Governance Assessment in Indonesia

Methodology

The participatory governance assessment (PGA) provides a clear picture of a country's REDD governance situation, identifying gaps and needs through inclusive, participatory, multi-stakeholder processes. The methodology has been developed and tested by the United Nations Development Programme and relies on a partnership between government and civil society to define governance challenges and to develop performance improvement processes. The assessments aim to (i) analyze and obtain credible information; and (ii) trigger public opinion, creating a demand for accountability and thereby ensuring government leadership on improving governance. The framework develops disaggregated governance indicators that feed into a tailored information management system that reinforces domestic accountability over time.

Indonesia was the first UN-REDD country to pilot the PGA methodology. Different stakeholders' views were taken into account to develop a set of governance indicators collaboratively. The assessment looked at three areas of governance in particular: legal and policy frameworks; capacities of REDD+ actors (nationally and sub-nationally), including civil society actors and business entities; and the impact of existing laws and practices. In 2011/2012 a series of meetings were held, including national workshops and provincial consultations with representatives from governments, NGOs, academia and forest business associations. A meeting of the expert panel was also held to further refine the indicators and the methodology. It comprised of government representatives, members of civil society and of academia, as well as governance practitioners and members of the UN-REDD Programme.

Outcomes

Preliminary recommendations from the PGA in Indonesia included: (i) ensure discussions on framework, structure and measurement flow early on, (ii) apply iterative methods that allow for constant tool improvement, (iii) engage external reviewers (in addition to consultations at national and provincial level) for quality assurance. The revised indicator set will serve as a basis for collecting the data necessary to assess REDD+ governance in the Indonesian context. The PGA in Indonesia focused on the following governance issues related to REDD+: spatial and forest planning, rights regulation, forest organization, forest management, forest control, and REDD+ infrastructure.

Full Reports available at UN-REDD, 2012a and 2012b

Linking scientific assessments and decision making

Creating an interface between science, planning and policy is essential for achieving CSA. The following Box (Box 17.4) illustrates efforts to develop simple and robust scientific tools that can guide decision making of farmers on a seasonal and long-term basis.

Box 17.4
CD for farm management strategies to improve crop-water productivity using AquaCrop

Context

It is commonly acknowledged that most climate change impacts will be felt through water. The free AquaCrop software is an important tool for increasing water use efficiency in rain-fed and irrigated agricultural production systems. Developed and applied by FAO and multiple partner institutions, it is mainly intended for practitioners such as those working for extension services, governmental agencies, NGOs, and farmers associations though it is also used by scientists and for teaching. AquaCrop uses a relatively small number of simple input variables to enable easy use while maintaining accuracy and robustness. AquaCrop can serve as a benchmarking tool, comparing the attainable yields against actual yields of a field, farm or region. It can help develop irrigation schedules for different climate scenarios, assess water productivity at various scales and support decision making on water allocation and other water policy actions.

Methodology

In response to the urgent need of significantly raising the number of adequately trained water professionals, FAO, the UN Water Decade Programme on Capacity Development (UNW-DPC) and local partners organized five regional, one week "training of trainers" workshops in 2009/2010. In total, 147 participants from 58 countries and over 100 institutions were trained in the practical applications of AquaCrop, improving their skills in strategic farm management for increased crop-water productivity.

The five local host institutions (mainly research institutions or ministries) in China, Iran, Burkina Faso, Egypt and South-Africa were actively engaged in selecting the participants. The nearly 500 applications contained motivation and reference letters and proof of at least 3 years' professional experience in a related field to ensure that participants would disseminate their newly derived knowledge in their institutions and home countries. Most selected participants received scholarships. 43 percent of them came from academia, 32 percent from national research institutes, 15 percent from ministries or government agencies, 7 percent from international development organizations, 2 percent from private companies and 1 percent from NGOs. The training was delivered by means of lectures and computer-based hands-on exercises. Both the theoretical and practical sessions of these workshops were followed by the participants with high interest and active involvement. The open, interactive approach adopted for the training program was a key factor for its success. Prior to participating, trainees had to complete a questionnaire on capacity development needs in the field of water and food. This was then analyzed in order to assess the specific gaps in terms of individual, institutional and organizational capacity.

Outcomes

Six months after the last workshop, participants were invited to present case studies on their use of the software and to discuss their experiences in training others. The best cases were then presented at the International Commission on Irrigation and Drainage's Asian regional conference held in Indonesia in October 2010. Of the 19 participants that attended, 16 had trained a further 120 people. Finally, a 6th workshop was organized, inviting the strongest case studies from the previous workshops to share their experiences of using AquaCrop in different agro-climatic conditions. The workshop also analyzed the success of former workshops and identified further follow-up activities for participants to undertake within their countries.

Source: UNW-DPC, 2011

17.3 Strategies for knowledge sharing and effective learning

Knowledge sharing and effective learning comprise key components of a comprehensive and more sustainable capacity development approach. Farmers and pastoralists have been dealing with natural climate variability over millennia and have developed a wide range of coping strategies. Many of these remain valid in a climate change context, though scientists expect many to be insufficient to deal with the impacts of climate change in the long term. In addition, much of this indigenous knowledge is likely to be lost as local farming population aged and youth tend to migrate to urban areas or engage in activities other than farming. Therefore, documenting, mobilizing and sharing indigenous knowledge can be vital for safeguarding and further developing local adaptation strategies.

Below, three key strategies for knowledge sharing and effective learning will be discussed: the potential of agricultural innovation systems; the use of ICTs and ComDev approaches for improving access to information; and the role of knowledge networks.

Strengthening agricultural innovations systems to harness the innovation potential needed for CSA

As part of a broader capacity development approach, agricultural innovation systems with public and private research as well as extension and advisory services play a key role in supporting the transition towards CSA by documenting, generating, blending and sharing indigenous and scientific knowledge. Such services facilitate learning processes as well as network-based development and innovation. Knowledge networks and platforms provide a venue in which the various actors can connect. They take diverse forms depending on their target group, for example global or regional platforms for coordination, knowledge exchange or advocacy are very different from field support platforms. Aggregation—through farmer unions, cooperatives or value chains—is a key strategy to minimize transaction costs and upscale CD for CSA. Moreover, the roles, responsibilities and capabilities of both men and women need to be well understood to ensure that both men and women benefit from innovation systems supporting the transition to CSA (see Box 17.5) calling for methodologies and approaches for gender sensitive research as well as extension and advisory services on CSA.

Box 17.5
Developing capacity to understand and address the gender dimensions of climate change and agriculture

Context

A gender-sensitive approach is crucial to achieve CSA. However, little research has been undertaken to understand how men and women are adapting to climate change, mitigating emissions and maintaining food security. Methodologies and approaches for research and development planning are needed.

Methodology

As a contribution to addressing this gap, FAO's Mitigation of Climate Change in Agriculture Programme (MICCA) partnered with the CGIAR Research Program on Climate Change, Agriculture and Food Security (CCAFS) to develop training material on "Gender and Climate Change Research in Agriculture and Food Security for Rural Development".

The objectives of the training material were to: sensitize users to the links between socio-economic and gender issues in the context of climate change in the agriculture and food security sectors; develop the capacity of users to utilize Participatory Action Research (PAR) tools in gathering socio-economic and gender-sensitive information for climate change research and development; help users understand how to analyse field research outputs in a field research setting; apply knowledge gained beyond research to promote gender-sensitive adaptation and mitigation activities in agriculture.

The guide focuses on action research in three areas: (1) the use of climate analogues to assess the possibility of farmer to farmer exchanges; (2) equitable access and use of weather information to minimize risk; and (3) catalyzing CSA.

Drawing on the network of CCAFS research sites, six researchers – two each from Bangladesh, Ghana and Uganda – were trained at FAO, Rome, to test the training materials in their home countries. The testing was followed by a debriefing workshop at which the training materials and research outcomes were discussed. The training material was subsequently revised and disseminated.

Outcomes

The process of field testing and revising the training material was found to be a critical component of developing training documents that are user-friendly and designing research methods that can be carried out under a variety of circumstances. Engaging researchers from different countries enriched the process by involving a variety of perspectives and experiences. In addition, involving researchers in the process of developing the training material was an opportunity to develop their individual capacity to train and disseminate the research methods.

The materials and methods are now being used by CCAFS' scientists to conduct research in CCAFS sites. They will serve to mainstream gender into research and analyses on agriculture and climate change.

The training material is available online at FAO, 2012c
Working papers based on the findings from the field testing are available at FAO, 2012d

Box 17.6 illustrates the role of local innovation in adapting pastoral systems to climate change in Ethiopia and Niger.

Box 17.6
Emerging responses to climate change in pastoral systems in Ethiopia and Niger

Methodology
In 2008, an exploratory study was made into the emerging responses of pastoralists in Ethiopia and Niger in the face of climate change. It examined both technical and institutional innovations developed by pastoralists in families and communities to adapt to new conditions.

Outcomes
The study indicated that pastoralist vulnerability to climate change varies within and between areas and communities. Furthermore, some of their innovations are locally specific and cannot necessarily be scaled up to apply to other areas or communities. However, they do offer starting points for joint action between pastoralists and other stakeholders (e.g. researchers, development agents and government authorities) to deal with changing conditions. Moreover, the study confirmed that pastoralists' increasing vulnerability to climate change can largely be attributed to their marginalisation in decision making about the use of resources.

In Ethiopia and Niger, a wide range of different types of innovation to address food security, sustainable resource management and improved governance within social-political units were identified. Many of these innovations rely on maintaining mobility, an important basis for pastoralist resilience. Local innovations are characterised by flexibility, multi-functionality and a high degree of integration into socio-cultural systems.

It was concluded that local innovation in adaptation to climate change needs to be assessed alongside other environmental, socio-economic and policy measures. Moreover, the focus should not be primarily on specific innovations, but rather on recognising local innovation as a process, and stimulating this process to continue interacting with other stakeholders. Rather than waiting for climate change to happen and then react, proactive ideas for already feasible innovations should be tested, in practice as well as in pastoral policy frameworks. Thus, local adaptation capacities can be strengthened through joint experimentation and other forms of investigative action led by the affected pastoralists themselves.

Source: GebreMichael *et al.*, 2011

Global attention to agriculture as one of the most climate-vulnerable sectors provides an opportunity to accelerate a much-needed reform of extension and advisory services. Extension has long played an intermediary role between farmers and technology suppliers (see Module 12 on institutions). However, the challenge of climate change requires collaboration with more actors and more complex interventions than ever before. This calls for a shift in extension systems (Wageningen University *et al.*, 2010):

- From a focus on introducing new technologies to a focus on institutional change;
- From rural engagement to national-level engagement and from public service delivery to multiple agency advisory provision;
- From practice development to more strategic policy development; and
- From communication for information diffusion to communication for network-based development and innovation and from core service delivery by experts to facilitation.

Effective adaptation involves the use of coherent technical and institutional solutions congruent with contemporary thinking on innovation studies. Today, innovation is no longer associated only with technological advances, but is understood as a successful combination of 'hardware' (i.e. new technical devices and practices), 'software' (i.e. new knowledge and modes of thinking) and 'orgware' (i.e. new social institutions and forms of organization). Climate change adaptation can also be regarded as a process of innovation (Smits, 2002; Leeuwis, 2004).

Improving access to climate and agricultural information using ICTs and ComDev

Bridging the current information and knowledge gap for more inclusive and effective decision-making within CSA is a key challenge. Smallholders are usually based in rural areas far from the traditional providers of agricultural information and advisory services. Successful adaptation to climate change by small producers is not merely a question of developing new adaptation technologies, but depends on ensuring access to them.

ICTs such as radio, television, video, internet, and media and mobile services can play a pivotal role in facilitating the assessment of expected future impacts of climate change on agricultural production systems and landscapes (e-Agriculture). ICTs are powerful tools to improve farmers' access to timely climate and agricultural information. Knowledge and advice facilitate the exchange of experiences among peers and between farmers and various stakeholders while helping to empower local stakeholder groups through increased participation in decision-making processes (Kalas and Finlay, 2009). The information provided through ICTs varies substantially, ranging from technical advice on specific CSA practices or early warning and disaster information on price and market information.

The following two boxes (Box 17.7 and 17.8) illustrate how the use of ICTs can improve access to research information for researchers, development practitioners and extension workers in the context of CSA.

Box 17.7
Advances in ICTs increase the utility of African sites for testing crop varieties

Context

The widespread use of higher-yielding and stress-resistant crop varieties throughout Africa has been frustrated by the variability of African growing conditions and the difficulty of selecting appropriate sites and growing environments to test new cultivars. Innovations may be tested, but they are often not tested in ways that make it more likely that they will be useful to farmers, meaning they are not adopted.

Methodology

To address this situation, the Africa Trial Sites portal enables national and international research organizations to pool their extensive information on trial sites electronically and provides numerous tools (based on ICT advances in bioinformatics, Geographic Information Systems [GIS], and data management) to help farmers, plant breeders, and agronomists evaluate new varieties more efficiently in the field. For some time, much of the data from field trials— representing an enormous investment of research resources over several decades—resided on the shelves of research institutions and was difficult to assemble, analyze on a large scale, and put to use. Now, users can search the portal to access data on trial sites by country, design trials to evaluate cultivars, obtain tools to manage trials (from developing a budget to estimating water stress during the growing season), analyze trial data, view results of spatial analyses, examine data on an interactive Google map, and report results online. They can also rank crop varieties and add comments about their performance at a given site. The website allows the analysis of climate data for any point in Africa as well as climate similarity comparisons between trial sites and other African areas. Finally, the portal includes links to useful resources, such as the websites of participating centres, from whose breeders and gene bank curators anyone can request seed supplies. The combination of African trial site data and interactive data analysis tools has made valuable information widely available to the agricultural research, development and extension community.

Outcomes

As results for cultivars tested in Africa have not been readily available online until now, participants' data is significantly expanding common knowledge of which particular cultivars are suited to which environments (especially those environments subject to stress from disease, pests, or environmental factors, including climate change). International agricultural research centres are beginning to use the portal to standardize their trial site information for a climate research program, drawing in national partners, and they are using Africats.org to standardize their trial site information.

Source: World Bank, 2012

ICTs are also frequently used to support regional, national or sub-regional knowledge networks and enable knowledge exchange between different stakeholders across geographic boundaries. For example, Africa-Adapt is a regional, bilingual knowledge network for climate change adaptation in Africa hosted by the NGO Environment and Development Action in the Third World, the Forum for Agricultural Research in Africa and the Intergovernmental Authority on Development Climate Prediction and Applications Centre, and funded by

Department for International Development and International Development Research Centre. The aim is to facilitate the flow of knowledge on climate change adaptation for sustainable livelihoods between researchers, policy makers, civil society organisations and vulnerable African communities. It uses the latest web-based applications, face-to-face interactions, and other media to share resources and promote learning. Online services are complemented by offline ones, such as an innovation fund offering small grants for new approaches to knowledge sharing; radio-based programming and dialogues in local languages; idea exchange workshops; and a dissemination service for network news and resources.

Box 17.8 illustrates how an information system can help connect farmers, extension services, the private sector, research institutes and NGOs and promote exchange for both for the improved adoption of existing technologies, as well as for signalling demand for new technologies to technology developers and knowledge providers.

Box 17.8
TECA exchange Groups: technologies and practical advice for smallholders

Context
Technologies and practices for small agricultural producers (TECA) (available at http://teca.fao.org/) offers a well-managed IT-based information system for documenting and sharing applied technologies and practices of agriculture for small-scale farmers. FAO technical divisions, FAO partners and FAO projects document technologies and practices successfully applied by small producers, and then share them through TECA. Users can provide comments on featured technologies online. The global TECA platform can be used for information sharing in English, French and Spanish. It allows easy searches, even for rural users with low bandwidth. TECA modules can be provided for decentralized use and local adaptation as well (in local languages, for example).

Methodology
The most recent, interactive version of TECA which hosts discussion groups has been running since 2009. There are currently two discussion groups, one with a regional focus (on Uganda) and one with a subject focus (beekeeping). An active group facilitator, one fully dedicated to the group, has been central to the success of both exchange groups. The role of the facilitator has been to increase awareness of the platform among potential users, bring individuals together and identify their common interests, initiate discussions, engage members to contribute, identify external experts or knowledge when needed, and provide technical assistance relating to the use of the platform. Another factor worth noting is that agricultural students are a very important and active group of participants; introducing them to experience-sharing with various rural actors via the internet platform is a great asset for their future work in agriculture.

Outcome
Lessons from the piloting of TECA's Uganda Exchange Group include:

Promoting the adoption of improved seed varieties through TECA's Uganda Exchange Group
In the Uganda Exchange Group, practitioners, experts, university students, local NGO staff, extension workers and other interested users engage in discussions about pressing issues, such as counterfeited agricultural inputs, difficulties with market access or diseases such as the cassava brown streak disease, but also exchange experiences of indigenous practices with smallholders in Uganda (FAO, 2010c). This way, relevant information and advice reaches those working in the field and ultimately small producers, enabling them to adapt better to the challenges they face.
For example, the use of quick-maturing and high-yielding seed varieties can help farmers adapt to changing weather patterns, shorter and more unpredictable rainfall. While locally adapted varieties were developed by research institutes, their multiplication and dissemination among farmers remains insufficient. This has been a re-occurring topic in the Uganda Exchange Group. In Uganda, new seed varieties developed by the National Agricultural Research Organization, one of TECA's partners, are expected to be multiplied and disseminated through seed companies, i.e. the formal seed market. However, Ugandan agronomists estimate that 95 percent of seeds are supplied through informal channels. A detailed analysis of the situation unfolded in a discussion in TECA's Uganda Exchange Group. Experiences of establishing self-sustaining informal seed systems for soybeans in six pilot districts were also shared. From this engaging exchange the vision for a novel approach emerged, combining formal and informal seed channels.

Knowledge exchange through TECA requires commitment
This is only one example for how sharing information and good practices can promote knowledge-based intervention and policy to improve the livelihoods of smallholders. However, the example also alerts us to the challenges TECA faces. Following and engaging in discussions as a user of TECA or uploading technologies and practices as a partner of TECA requires time and skilled human resources. This commitment to TECA crucially hinges on the understanding that knowledge exchange and joint learning is a prerequisite for the successful application and scaling up of existing technologies and practices as well as the development of new technologies for small producers.

A ComDev approach can also improve the effectiveness of local or national climate change and food security initiatives. It does so by facilitating knowledge exchange and learning among different stakeholders, improving participation and coordination, matching supply and demand for adaptation support services and contributing to mediation in conflict situations (see Box 17.9).

Box 17.9
Communication for Development Strategies and Tools in Community Based Climate Change Adaptation

Context

In 2008, FAO and the Italian Ministry for the Environment and Territory jointly launched the Communication for Sustainable Development Initiative (CSDI), an inter-regional project aimed at promoting ComDev as a means of improving adaptation to climate change, sustainable natural resource management, and food security. CSDI has developed ComDev strategies and services in Bangladesh, Bolivia, the Congo, Jamaica and the Caribbean region, focusing on strengthening rural knowledge and enhancing local institutions' capacities in this field. With the aim to strengthen and scale up related communication services, CSDI has supported the implementation of communication platforms, virtual consultations and publications to enhance dialogue and knowledge exchanges at the regional and global levels. For example, in collaboration with the Bolivian Ministry of Rural Development and Land, CSDI developed a National ComDev Plan. This supports the National Institute for Innovation in Agriculture, Livestock and Forestry (INIAF) in designing and implementing communication strategies and services for agricultural innovation and rural development.

Methodology

Three pilot areas were identified in Bolivia, based on INIAF´s priorities: Yapacaní and the Norte Integrado Region, Yacuiba and Chiquitanía. Participatory processes at the local level were based on three main components:

1. A participatory communication appraisal: this assessment identified local problems and needs, solutions and practices (opportunities) related to production, social and communication issues
2. A local innovation and communication program: strategic guidelines were developed with relevant local partners in response to the findings of the appraisal, with a medium-term projection (3-5 years).
3. Local innovation and communication plans (the Spanish acronym is PLICs): these plans supported the management and implementation of priority communication activities at the field level.

The PLICs were developed within the framework of Espacios Locales de Concertación (local areas of agreement) promoted by the INIAF as venues for dialogue and informed decision-making with the participation of farmers' organisations, small-scale producers, local governments, NGOs and media. The PLICs are operational tools that involve different communication resources and include participatory methodologies which support two-way learning processes, such as Audiovisual Pedagogy or training activities aimed at developing technical and communication capacities at the local level. A set of systematized iKnowledge and Communication Modules including videos, printed materials and audio tracks were developed based on the principles of the Audiovisual Pedagogy methodology:

- Recovery of farmers' traditional knowledge and combination with scientific knowledge;
- Direct reference to the producers' reality (using their own language);
- Practical learning designed for smallholders and rural families;
- Active participation of producers in the collective learning process;
- No interference in productive activities (trainings are carried out where producers live);
- Use of audiovisual tools to overcome literacy barriers in the transmission of knowledge; and
- Choice of technical information appropriate to the different groups.

Outcomes

At the local level, seven intensive training-of-trainers courses on the Audiovisual Pedagogy methodology and the application of Knowledge and Communication Modules were offered to technicians, communication practitioners, extensionists and community agents. A total of 162 people were trained as local innovation operators to act in turn as facilitators and use the modules to train small-scale producers in their local communities. This process involved 52 institutions in the Bolivian innovation system. At the community level, 26 training activities were implemented using the modules. The training activities conducted by the local facilitators have reached overall 489 producers from 54 rural communities.

The full report is available at FAO and CSDI, 2010a and 2010b

17.4 Conclusions

The transition towards CSA practice is a knowledge-intensive learning process involving multiple stakeholders. Realizing CSA practice thus requires a holistic and comprehensive CD approach of all stakeholders involved, based on good practices such as alignment with and driven by national priorities; incorporating the individual, organizational and enabling environment dimensions of CD; and complementing technical with functional competency to strengthen and apply good learning practices.

Due to the uncertain and dynamic nature of climate change impacts, the module illustrated that this transition towards CSA requires socio-institutional learning processes with a strategic approach to skills development at country level including strong engagement of national and local formal and informal education and training institutions.

This module further illustrated why and how the transition to CSA requires new forms of collaboration and partnerships. Strengthening agricultural innovation systems with public and private research, extension and advisory services plays a key role in generating, documenting, blending and sharing indigenous and scientific knowledge as well as facilitating learning processes and network-based development and innovation. The module further provided concrete examples for improving policy coherence and effectiveness through fostering inclusive spaces that promote multi-stakeholder dialogue and enable knowledge sharing and effective learning among a diverse group of stakeholders. The module highlighted that the need to access timely information and knowledge on climate agriculture will increase, and this need can be addressed through leveraging ICTs, participatory ComDev approaches and knowledge sharing methods directly applicable to CSA.

One area that needs more attention due to the uncertain and dynamic nature of climate change impacts and the complexity of agricultural production systems is the field of monitoring and evaluation (see Module 18 on M&E). Here various frameworks have been piloted in the context of CSA, but more studies are needed to ensure their applicability for robust decision-making and a sound M&E of complex, socio-institutional learning processes and the question of how to assess capacities and political commitment at country level.

Notes

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Acronyms

CARE	Cooperative for Assistance and Relief Everywhere
CCAFS	Climate Change, Agriculture and Food Security (research programme)
CD	capacity development
ComDev	communication for development
CSA	climate-smart agriculture
CSDI	Communication for Sustainable Development Initiative
EADD	East Africa Dairy Development Project
FFS	farmer field schools
GIS	Geographic Information System
ICPAC	Climate Prediction and Applications Centre
ICRAF	World Agroforestry Centre
ICT	information and communication technology
INIAF	National Institute for Innovation in Agriculture, Livestock and Forestry
MCC	knowledge and communication module
M&E	monitoring and evaluation
MICCA	Mitigation of Climate Change in Agriculture
NAMA	National Appropriate Mitigation Actions
NAP	National Adaptation Plan
NAPA	National Adaptation Programme of Action
NGO	non-governmental organization
PAR	Participatory Action Research
PGA	participatory governance assessment
PLIC	local innovation and communication plan
REDD	reduced emissions from deforestation and forest degradation
SLM	sustainable land management
TECA	technologies and practices for small agricultural producers (FAO led platform)
UNFCCC	United Nations Framework Convention on Climate Change
UNW-DPC	United Nations Water Decade Programme on Capacity Development

References

FAO. 2010a. *Corporate strategy on capacity development.* (available at http://www.fao.org/fileadmin/user_upload/newsroom/docs/Summary_Strategy_PR_E.pdf)

FAO. 2010b. *Capacity development guiding report for the MICCA programme in Kenya: capacity needs assessment.* Background Report No. 1. (available at http://www.fao.org/climatechange/31605-076f40e684fe6ef434d086f29c000dbd9.pdf)

FAO. 2010c. *Uganda exchange group.* TECA. (available at http://teca.fao.org/group/uganda-exchange-group)

FAO. 2011a. *E-learning methodologies: a guide for designing and developing e-learning courses.* (available at http://www.fao.org/docrep/015/i2516e/i2516e.pdf)

FAO. 2011b. *Capacity development guiding report for the MICCA programme in the United Republic of Tanzania: capacity needs assessment.* Background Report No. 2.

FAO. 2012a. *Learning module 2: FAO approaches to capacity development in programming: processes and tools.* (available at http://www.fao.org/docs/eims/upload/299903/LM2_booklet_en_webready_FINAL.pdf)

FAO. 2012b. *Report of the FAO expert consultation on agricultural innovation systems and family farming.* Rome. (available at http://www.fao.org/docrep/015/an761e/an761e00.pdf)

FAO. 2012c. *Gender and climate change research in agriculture and food security for rural development – training guide.* MICCA. (available at http://www.fao.org/climatechange/micca/75949/en/)

FAO. 2012d. *Gender, climate change, agriculture, & food security.* (available at http://ccafs.cgiar.org/our-work/research-themes/integration-decision-making/linking-knowledge-action/gender-climate-change)

FAO. 2013a (forthcoming). *Acting on food insecurity and malnutrition: the food security commitment and capacity profile.* Methodology paper.

FAO &CSDI. 2010a. *Collaborative change: a communication framework for climate change adaptation and food security.*

FAO & CSDI. 2010b. *Advancing adaptation through communication for development.* Proceedings of the technical session on Communication. Third International Workshop on Community-Based Adaptation to Climate Change, February 2009, Dhaka, Bangladesh. (available at http://www.fao.org/docrep/012/i1553e/i1553e00.pdf)

FAO & Republic of the Philippines. 2011. *MDG-F 1656 project: strengthening the institutional capacities to address climate change in the Philippines.*

GebreMichael, Y., Bayer, W. & Waters-Bayer, A. 2011. Emerging responses to climate change in pastoral systems in Ethiopia & Niger. (available at http://www.agridea-international.ch/fileadmin/10_International/PDF/RDN/RDN_2010/RDN%20_2010_2.pdf)

Kalas, P. & Finlay, A. 2009. *Planting the knowledge seed: adapting to climate change using information and communication technoligies (ICTs).* BCO Alliance Report. (available at www.bcoalliance.org/Climate-Change)

Leeuwis, C. 2004. *Communication for rural innovation: rethinking agricultural extension, with contributions from A.* Van den Ban. Oxford, UK, Blackwell Science.

OECD. 2006. *The challenge of capacity development: working towards good practice.* (available at http://www.fao.org/fileadmin/templates/capacitybuilding/pdf/DAC_paper_final.pdf)

OECD. 2008. *Paris declaration on aid effectiveness and Accra agenda for action.* (available at http://www.oecd.org/dac/effectiveness/parisdeclarationandaccraagendaforaction.htm#Accra)

Smits, R. 2002. *Innovation studies in the 21st century: questions from a user's perspective.* Technological Forecasting and Social Change, 69: 861—883.

UN CC: Learn. 2012. *Developing a national strategy to strengthen human resources and skills to advance green, low emission and climate resilient development: a guidance note to support phase 1 of UN CC:Learn pilot projects.*

UNESCO-IHE & UN-Water Decade Programme on Capacity Development (UNW-DPC). 2009. *Capacity development for improved water management.* (available at http://www.crcpress.com/product/isbn/9780415573986)

UNW-DPC. 2011. *Capacity development for farm management strategies to improve crop-water productivity using aquacrop: lessons learned.* Knowledge Publication Series No.7. (available at www.unwater.unu.edu/file/get/222)

UN-REDD. 2012a. *Participatory governance assessments.* (available at http://www.un-redd.org/NewsCentre/Support_to_Effective_Governance/tabid/5543/Default.aspx)

UN-REDD. 2012b. *Moving ahead with Indonesia's REDD + participatory governance assessment.* (available at http://www.un-redd.org/Newsletter26/Indonesia_REDD_PGA/tabid/79443/Default.aspx)

Wageningen University & UNU-MERIT & FAO. 2010. *Facing the challenges of climate change and food security: the role of research, extension and communication institutions, by C.* Leeuwis and A. Hall. Report assignment commissioned by FAO Research and Extension Branch. Rome.

World Bank. 2012. *ICTs as enablers of agricultural innovation systems.* Module 6. ICT Sourcebook. (available at http://www.ictinagriculture.org/ictinag/sourcebook/module-6-icts-enablers-agricultural-innovation-systems)

Additional Resources

AFAAS (African Forum for Agricultural Advisory Services), University of Greenwich & Forum for Agricultural Research in Africa (FARA). 2011. *Emerging approaches for responding to climate change in African agricultural advisory services: challenges, opportunities and recommendations for an AFAAS climate change response strategy.* (available at http://www.fara-africa.org/media/uploads/library/docs/fara_publications/afaas_climate_change_ver09.pdf)

Africa Adapt. 2011. *(available at http://www.africa-adapt.net/)*

e-Agriculture: *References and resources on the use of information and communication technology (ICT) in the agricultural and rural development sectors, developed by the community of practice with support from FAO and other organizations.* (available *at http://www.e-agriculture.org/)*

FAO. 2011c. *Climate change for forest policy-makers - an approach for integrating climate change in forest programmes in support of sustainable forest management.* (available at http://www.fao.org/forestry/climatechange/64862/en/)

FAO. 2011d. *Learning module 1: enhancing FAO´s practices for supporting capacity development of member countries.* (available at http://www.fao.org/docs/eims/upload/298016/LM1_hi_res_IDWGsite.pdf)

FAO. 2011e. *Climate change for forest policy-makers: an approach for integrating climate change in forest programmes in support of sustainable forest management.* Excerpt (see separate document).

FAO. 2011f. *Climate change and food security.* Interactive Learning Course. (available at http://www.foodsec.org/DL/elcpages/food-security-courses.asp?pgLanguage=en&leftItemSelected=food-security-courses)

FAO. 2012e. *MICCA report on capacity assessment (available at http://www.fao.org/climatechange/30495-09a7077298edf4c3e9afa64237ade4f90.pdf)*

FAO. 2012f. *Learning module 3: FAO good learning practices for effective CD.* (available at http://www.fao.org/docs/eims/upload/301361/LM3_Final_en_webready_and_for_CD_9_5_12.pdf)

FAO. 2013b (forthcoming). FAO capacity development learning module: organizational analysis and development.

FAO Capacity Development Portal. (available *at http://www.fao.org/capacitydevelopment/)*

FAO Climate Change Capacity development Portal (available at *http://www.fao.org/climatechange/learning/*)

FAO Communication for Development Programme. (available *at http://www.fao.org/oek/communication-for-development/en/)*

FAO & CSDI. 2011. *The role of information and communication technologies for community-based adaptation to climate change.*

FAO & IFAD. 2012. *Innovative rural institutions good practices in building to increase food security.*

Kalas, P and Spurk, C. 2011. *Deepening participation and improving aid effectiveness through media and information and communication technologies (ICTs).* SDC Working Paper. http://siteresources.worldbank.org/EXTGOVACC/Resources/MediaandICTs.pdf

Pieron, M. 2012. *Bonding and bridging in capacity development networks to address wicked water challenges.* Delft University of Technology in cooperation with KWR Watercylce research Institute. (MA thesis)

PROLINNOVA. 2011. *Strengthening local resilience to climate change.* Policy brief. (available at http://www.prolinnova.net/sites/default/files/documents/thematic_pages/climate_change_pid/2011/prolinnova_policy_brief_climate_change_june_2011_lowres.pdf)

Stockholm Resilience Centre. 2012. *Knowledge systems and learning.* Insight Policy Brief. No. 6. (available at www.stockholmresilience.org/download/18.1fc8315a135cb03b559318/Insights-knowledge.pdf)

UNW & DPC. 2010. *Curriculum development for water and climate change.* Knowledge Publication Series No.5. (available at www.unwater.unu.edu/file/get/44)

United Nations Development Programme. 2013. *Capacity Development Programme.* (available at http://www.undp.org/content/undp/en/home/ourwork/capacitybuilding/overview/)