Strengthening agricultural water efficiency and productivity on the African and global level

A multi-objective program to enhance the sustainable management of water resources in Burkina Faso, Morocco and Uganda
The agricultural sector plays a key role in the social and economic development of the African continent. However, **productivity levels are far from reaching their full potential** and the improvement of **Agricultural Water Management (AWM)** is highly needed to ensure the **full and sustainable exploitation of water resources**, both from rainfall and for irrigation.

Supported by the Swiss Agency for Development and Cooperation (SDC) and in collaboration with the Partnership for Agricultural Water for Africa (AgWA), the Land and Water Division (CBL) of the Food and Agriculture Organization of the United Nations (FAO) is implementing a comprehensive programme of activities to reduce existing technical gaps and support effective agricultural water governance in 3 pilot African countries: Burkina Faso, Morocco and Uganda.

More specifically, the holistic approach of the program focuses on 5 components:

- **WATER PRODUCTIVITY**: Enhanced capacity for improved crop water productivity in small scale agriculture
- **WATER EFFICIENCY**: Enhanced capacity for increased water use efficiency in small scale irrigation
- **WATER HARVESTING**: Enhanced water harvesting capacity for agriculture
- **WATER AUDITING**: National water audits prepared, taking into consideration different agro-ecological zones
- **WATER POLICY**: Bankable investment projects defined for Burkina Faso and Uganda to mainstream AWM intervention into their National Agriculture Investment Plans and investment profile elaborated for the identification of AWM priorities at national level in Morocco
The pilot sites: Burkina Faso

Vallée du Sourou – Productivity/Efficiency/Accounting

Ben Nafa Kacha Scheme:
Area: 275 ha
Farmers: 247
Main crops: maize, rice and onion
Irrigation: furrow, basin

Boussouma district - Harvesting

"By 2050 global food production would need to increase by 60 percent to feed the more than nine billion people projected to live on our planet”

(Food and Agriculture. Key to achieving the 2030 Agenda for Sustainable Development, 2016)
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Morocco

Province de Haouz – Productivity/Efficiency

<table>
<thead>
<tr>
<th>Secteur R3P2:</th>
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<tr>
<td>Area: 1 500 ha</td>
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<tr>
<td>Farmers: 163</td>
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<td>Main crops: cereals, olives</td>
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<td>Irrigation: gravity</td>
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</tbody>
</table>

Sous bassin de Ghdat - Accounting

Source: CIHEAM Bari

Province de Al Haouz - Harvesting

Tazlida site, Commune Souk El Had Zerkten

Source: Agence du Bassin Hydraulique du Tensift

“Substantial improvements in resource-use efficiency and gains in resource conservation will need to be achieved globally to meet growing and changing food demand”

(The future of food and agriculture. Trends and challenges, 2017)
Uganda

Mubuku catchment and irrigation scheme
Productivity/Efficiency/Accounting

Mubuku irrigation scheme:
Area: 587 ha
Farmers: 160
Main crops: maize, rice, horticultural
Irrigation: furrow, surface

Kinoni site - Harvesting

"The greatest potential increases in yield are in rainfed areas where many of the world's poor live and where managing water is key to such increases"

(Molden, 2007)
Approach of the program

The tools

**AquaCrop**
AquaCrop is the crop growth model developed by FAO to address food security and assess the effect of the environment and management on crop production. It simulates the yield response of herbaceous crops to water and is particularly well suited to conditions in which water is a key limiting factor in crop production. Capitalizing previous case studies, the tool has been piloted in the program to aid in formulating possible changes in crop water management practices aimed at improving crop water productivity levels.

http://www.fao.org/aquacrop

**MASSCOTE**
The FAO-developed “MApping System and Services for Canal Operation Techniques” (MASSCOTE) is a step-wise methodology to evaluate and analyze different components of an irrigation system and then develop a modernization plan. The modernization plan consists of physical, institutional, and managerial improvements in different components to improve water delivery service and cost effectiveness of operation and management. It has been adapted in the program to fit the characteristics of small scale irrigation schemes and provide cost-effective and better performing irrigation systems for farmers.

http://www.fao.org/docrep/010/a1114e/a1114e00.htm

**DISCHARGE**
iMOMO Discharge App is an innovative open-source computational tool for data collection and management. Developed by Hydrosolutions Ltd., it complements traditional water monitoring and management systems in decision-support processes and for stakeholder and information connection. Through the employment of mobile devices, it allows crowd-sourced data collection and participatory observation, as well as synchronization with Cloud and data management on the website. In the Uganda case, it has been employed to foster modernization in low-cost and people-centred monitoring procedures.

https://discharge.ch/
Discovering water harvesting potential through ground surveys and GIS/remote-sensing applications

FAO is currently developing a low-cost methodology to enable the assessment of the water harvesting potential through ground surveys and GIS/remote-sensed data in the three countries. Maps of WH suitability will support decisions on the implementation of new WH structures or the rehabilitation of existing priority ones. The methodology has been adopted for the selection of pilot sites, and it will be applied in the countries at sub-basin level, which represents the most suitable water and land management unit. GIS and Remote Sensing applications included in the methodology can support, on one side, the planning of new WH sites by mapping potential/suitable areas and, on the other, as decision-support tool for the rehabilitation of existing infrastructures.

Diagnostic Tools for Investments (DTI)

The DTI is an integrated platform developed by FAO and AqWA to provide a comprehensive representation of all the dimensions relevant to the management of water resources for agriculture at country level. In the specific, it supports the assessment of needs and potential for investments; the identification of the institutional, legal and policy framework governing the sector; and project-based evaluation of on-going and planned investments

Approach of the program

Timeframe

INCEPTION PHASE - August 2014
The overriding goal of this phase was to maintain ownership through the involvement of a broad range of stakeholders and beneficiaries from all of the concerned countries, ensure that the final project design is endorsed by parties. A Thematic Workshop with all relevant stakeholders from the three countries was carried out in August 2014 to share knowledge, contribute to formulation and prepare for the implementation of Phase I.

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<tr>
<th>Training</th>
<th>Application</th>
<th>Dissemination</th>
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<tr>
<td><strong>PHASE I</strong></td>
<td></td>
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<tr>
<td>Capacity Building programme on AQUACROP</td>
<td>Diagnosis and benchmarking of current water productivity</td>
<td>Report on AquaCrop – Diagnosis Phase</td>
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<td>Calibration and validation of AcquaCrop for the selected sites</td>
<td>Dissemination campaign on farming practices to enhance crop water productivity</td>
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<td>Setting-up of optimal farming practices in demonstration plots and monitoring</td>
<td>Guidelines on Water Productivity for farmers and extension agents</td>
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<tr>
<td>Capacity Building programme on MASSCOTE</td>
<td>Application of MASSCOTE in pilot sites</td>
<td>Report on Water Use Efficiency indicators</td>
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<td>Comparative Analysis of discharge measurements techniques</td>
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<td></td>
<td>Calibration and validation of monitoring systems for discharge measurement from main canal to tertiary canal level</td>
<td>MASSCOTE Water Efficiency Report</td>
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<td>Capacity Building programme on discharge measurement and monitoring</td>
<td>Design and implementation of rehabilitation and improvement plans (shared responsibilities with countries)</td>
<td>Dissemination campaign for the increase of water use efficiency in small scale irrigation and on the results of MASSCOTE’s application</td>
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<td>Capacity Building programme on Flexible Water Services</td>
<td>Diagnostic analysis of current water service and establishment and implementation of Flexible Water Services</td>
<td>Guidelines on Water Use Efficiency for farmers and extension agents</td>
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<tr>
<td>Training</td>
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<td><strong>Capacity Building</strong> programmes on planning, managing and monitoring of Water Harvesting systems for government staff and research institutions</td>
<td>Biophysical diagnostic and technical studies on Water Harvesting</td>
<td>Assessment reports on Water Harvesting at country level</td>
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<td><strong>Capacity Building</strong> programmes on improved Water Harvesting techniques for farmers and agricultural extension agents</td>
<td>On-ground pilot projects</td>
<td>Methodology on Water Harvesting strategy development</td>
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<tr>
<td><strong>Capacity Building</strong> programmes on operation and maintenance of national water resources database</td>
<td>Selection and definition of sites for conducting water accounting</td>
<td>Guidelines on best practices of Water Harvesting for farmers and extension agents</td>
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<td><strong>Capacity Building</strong> programmes on the operation of the DSS water accounting tool</td>
<td>National water resources database supported by water data processing and GIS software</td>
<td>Outreach and awareness campaign on Water Audits results</td>
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<td><strong>Capacity building</strong> programmes on the Diagnostic Tool for Investment and AWM priorities included in the National Agriculture Investment Plans</td>
<td>Hydro-meteorological trend reports and water use assessments</td>
<td>Institutional and policy assessment – from accounting to auditing</td>
</tr>
<tr>
<td><strong>Capacity building</strong> programmes on the Diagnostic Tool for Investment and AWM priorities included in the National Agriculture Investment Plans</td>
<td>Country reports and Institutional/Policy evidence-based analyses</td>
<td>National AWM programs included in the National Investment Plans</td>
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<td>National Investment profiles</td>
<td>Portfolio of bankable AWM projects</td>
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PHASE II - Scaling-up process

Building upon results achieved and harvesting innovation introduced during Phase I of the program, the second phase of the scaling-up process should undertake the expansion of the program to other countries and encourage South-South cooperation.

While FAO will maintain its core role of implementation, the three countries of Phase I will have a more prominent role during implementation and carry out activities pursuing the following objectives: (i) to develop country cooperation; (ii) to promote knowledge transfer and learning in improving AWM; and (iii) to mainstream it into national frameworks and processes. The overall process will, thus, allow the scaling up at regional and global level.

In order to achieve effective results, newly participating countries should have similar characteristics (agro-ecological areas, water availability, integration of AWM into national policies) and, to this scope, they will be selected according to the partnerships forged during Phase I to make sure results are widely disseminated at the international level.
Development of the program
Stakeholders and beneficiaries

**Small scale farmers and family farmers** from the selected pilot areas represented the direct beneficiary target group of the program. Their active engagement during training and implementation phases, has evidently enhanced their knowledge and capacities in AWM, thus improving their livelihoods.

**Research staff at universities and relevant institutions** supported the program’s goals by increasing the technical and scientific research in AWM and fostering innovation to increase productivity and efficiency. As a result of their interest in the program, innovative research to improve AWM was directly transferred into practice.

**Technical experts and extension agents at relevant ministries** benefited from the project by enhancing water management knowledge for small-scale agriculture. Furthermore, they worked in close collaboration with farmers and ensured transfer of knowledge through direct application of acquired.

**Policy and decision makers at relevant institutions** committed to policy change in AWM since inception phase and allowed the adequate frame conditions during implementation. Drawing on the program’s results and findings, institutional actors can now promote the harmonization of AWM policies and the mobilization of dedicated funds for AWM projects.
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AgWA
Partnership for agricultural water for Africa

Schweizerische Eidgenossenschaft
Confédération suisse
Confederazione Svizzera
Confederaziun svizra

Swiss Agency for Development and Cooperation SDC

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