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Climate Smart WATER Management and Sustainable DEvelopment for Food and Agriculture in East Africa



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Climate Smart WATER Management and Sustainable DEvelopment for Food and Agriculture in East Africa

From the Selection of the Best Management Practices to the Identification of Scenarios

Stakeholder Forum 2024, CIHEAM Bari

KENYA

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Climate Smart WATer Management and Sustainable DEvelopment
for Food and Agriculture in East Africa

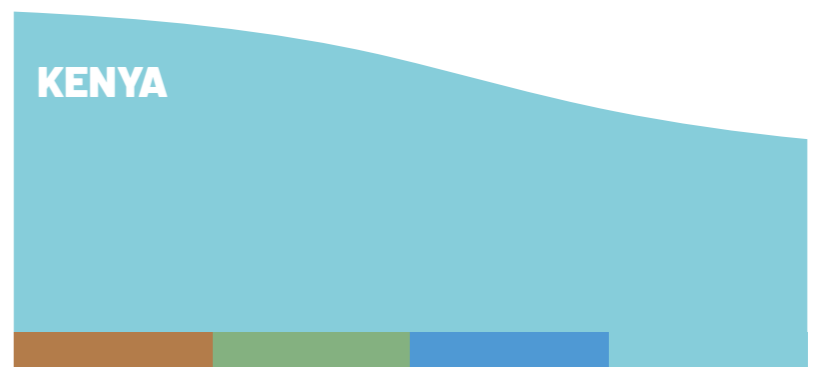
From the Selection of the Best Management Practices to the Identification of Scenarios

Stakeholder Forum 2024, CIHEAM Bari



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1.

WHAT IS THE PROJECT WATDEV ABOUT?

The project WATDEV - Climate Smart WATER Management and Sustainable DEVELOPMENT for Food and Agriculture in East Africa and Egypt is funded by the DeSIRA Initiative of the European Union and aims to increase the sustainability of agricultural water management and resilience of agroecosystems to climate change in East Africa, more particularly in Egypt, Ethiopia, Kenya, and Sudan, all of which score poorly on the Human Development Index and where the scarcity or limited availability of water resources and climate conditions are severely compromising agricultural production and food security.

SPECIFIC OBJECTIVES:

National Ministries and Research Institutions will be able to improve their knowledge and management of water in agriculture.

Farmers and local actors will gain new skills in innovative and sustainable solutions for water management.

EXPECTED RESULTS:

1. Identify the best fitting Best Management Practices (BMPs) and Innovations in project countries,
2. Enhance the implementation of BMPs/innovations in study areas,
3. Perform the BMPs /Innovations upscale and out-scale scenarios,
4. A modeling toolbox available for Researchers and Institutions,
5. Strengthened knowledge and capacity building and established regional "Water Knowledge Hub".

2. THE PARTNERSHIP



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The Italian Agency for the Development Cooperation (AICS) is the Executive Body and assures the overall project coordination and monitoring. The International Centre for Advanced Mediterranean Agronomic Studies - Institute of Bari (CIHEAM Bari) is the technical and scientific project lead partner.

The partners are:



CNR-IPSP

The National Council for Scientific Research, Institute for Sustainable Plant Protection (Italy).



SYKE

Finnish Environment Institute (Finland).



ISRIC

International Soil Reference and Information Centre, independent research foundation (The Netherlands).



WLRC

Water and Land Resources Center (Ethiopia).



WRC

Water Research Centre (Sudan).



ASARECA

Association for Strengthening Agricultural Research in Eastern and Central Africa (Uganda).



HU

Heliopolis University (Egypt).



KALRO

Kenya Agricultural & Livestock Research Organization (Kenya).

3. THE STAKEHOLDER FORUM OF WATDEV

MAIN FUNCTIONS AND OBJECTIVE

The main function of the Stakeholder Forum is to give recommendations and inputs to the WATDEV project regarding the work plan and relations with beneficiaries, local actors, and communities. The Stakeholder Forum could be invited to participate in project events when needed in Kenya, Sudan, Ethiopia, Egypt, or other countries.

DUTIES AND RESPONSIBILITIES OF THE STAKEHOLDER FORUM



Take stock of activities carried out during the project



Provide recommendations for further actions



Facilitate the dialogue with representatives of a wider range of actors, including local communities, extension services, local and national decision-makers, the private sector, and the research and academia



Ensuring project adherence to local communities' needs and national priorities

COMPOSITION OF THE STAKEHOLDER FORUM

The Stakeholder Forum is composed of **twenty members (five members from each country)** coming from **Kenya, Sudan, Ethiopia, and Egypt**. The Members are from the following stakeholder categories:



Policy and decision-makers in the fields of agriculture and management of natural resources with a major focus on agriculture water and land management. For this purpose, a representative of governmental authorities within the territory of the Study sites will be highly recommended to be part of the Stakeholder Forum



The private sector active in the field of agriculture, natural resource management, water management, soil degradation, ecosystem management, agricultural inputs, and agricultural equipment



Representatives of farmer organizations, land users, or community leaders



Representatives of the scientific, academic, and technical communities in Kenya, Sudan, Ethiopia, and Egypt.



4. THE MULTI-ACTOR REGIONAL MEETING

Nairobi, March 8, 2023

On March 8th, 2022, the 1st Stakeholder Forum of the WATDEV project took place in Nairobi. High-level representatives of the Republic of Kenya's Ministry of Agriculture, project partners, and Stakeholder Forum members gathered to review the community's needs and the communities' ability to work together in the four different study areas. Stakeholder Forum members and project partners were then divided into working groups. They selected the best agricultural management practices for each country, to address the specific needs raised by rural communities to support a sustainable and efficient use of water in agriculture and resilient agroecosystems. They also identified the implementation sites where the selected practices will be studied and applied.

The agricultural Best Management Practices (BMPs) validated by the Stakeholder Forum in Kenya are displayed in the table below.



AGROFORESTRY

Agroforestry promotes the simultaneous cultivation of crops and the management of trees to enhance productivity, conserve natural resources, and improve environmental sustainability.



WATER USERS' ASSOCIATION

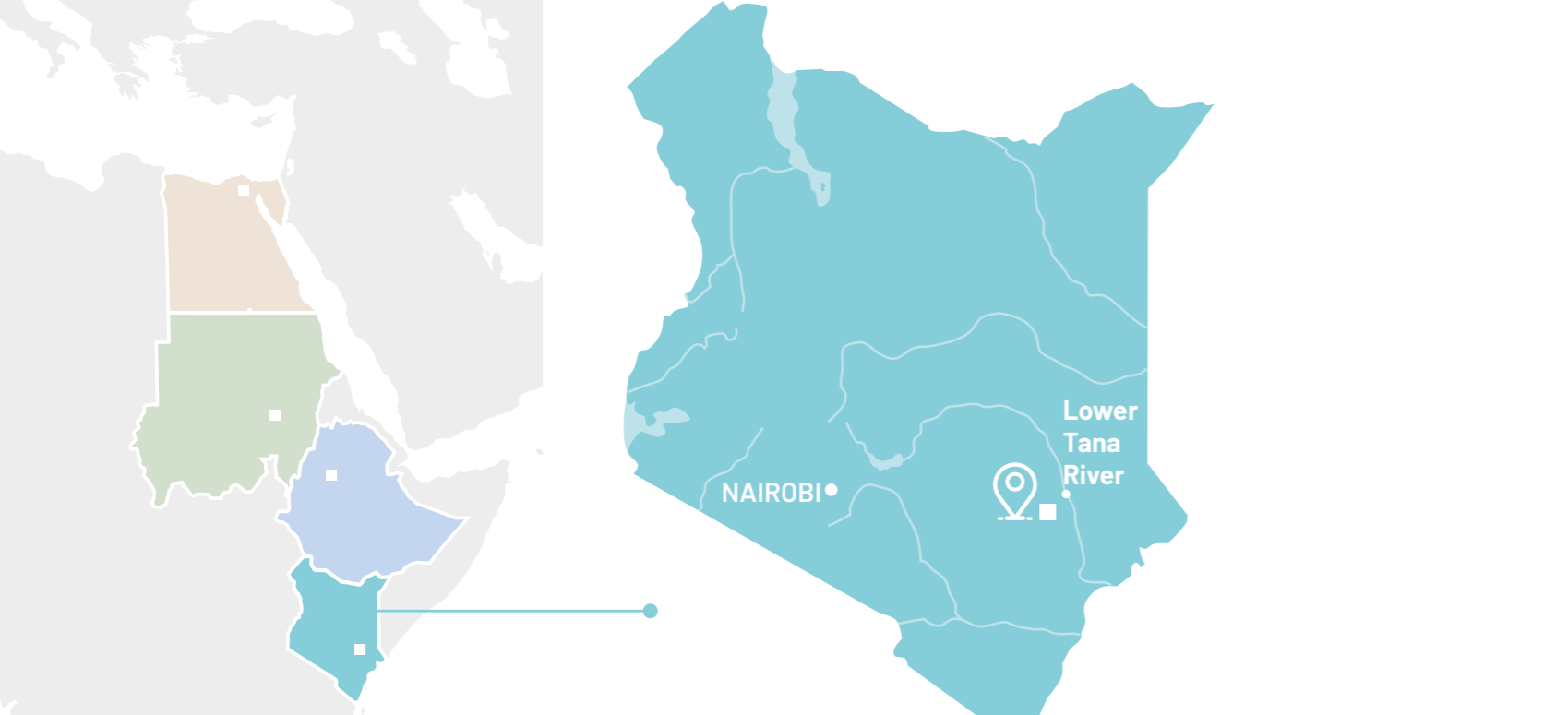
Water Users' Associations (WUA) bring individuals and organizations together to ensure equitable water allocation, conservation, and sustainable water management practices.

Moreover, the stakeholders subdivided by country identified the specific areas where the selected BMPs/innovations should be implemented.

The area where the BMPs and Innovation will be simulated and implemented in Kenya is:



The Hola Irrigation Scheme and Bura Irrigation Scheme, Lower Tana River (Tana River and Kilifi Counties)



5.

Study area



LOWER TANA (TANA RIVER AND KILIFI COUNTIES)



■ CLIMATE

The study area is the region watered by the lower part of the Tana River. It has subtropical steppe climate. The region lies about 500 m asl and water is scarcely present, with high evapotranspiration and high temperatures, ranging from 28°C in July to 31°C in March. The average annual precipitation is 58 mm.

■ LAND USE

In the area, some people practice mixed farming (mainly Industrial crops such as sugar cane, biofuels, and horticulture) while others are purely livestock keepers (pastoralists).

■ MAIN CHALLENGES

Among the issues concerning agricultural water use and land management are fluctuating water levels in main rivers, notably the Tana, causing meandering and damage to cultivated fields near riverbanks. Additionally, water scarcity during dry seasons, wet season flooding, and damages resulting from peak rainfall events pose challenges. Soils are leached and poor in quality. Overstocking, exceeding carrying capacity by 23%, stresses grasslands in the Tana Basin. Furthermore, land encroachment by invasive species, particularly *Prosopis juliflora* (mathenge), is a concern.

■ OPPORTUNITIES

The area presents high potential for farming (industrial crops e.g. sugar cane, biofuels, horticulture). The lower Tana River area presents an interesting case of the nexus between food security and conflict over resources, especially water and land.



6. THE AWARENESS-RAISING MEETING WITH THE FARMING COMMUNITY IN LOWER TANA RIVER (KENYA)

Lower Tana River, July 18, 2023

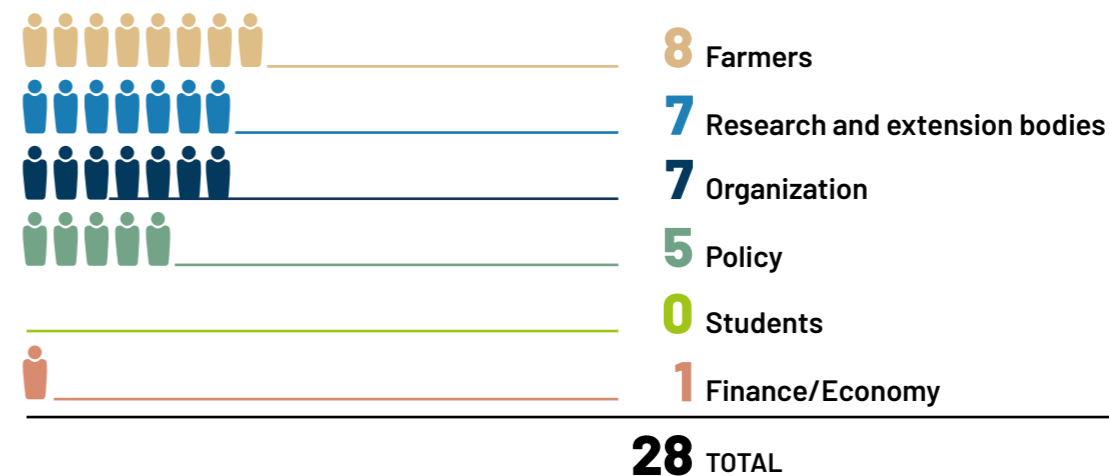
After selecting the agricultural Best Management Practices (BMPs) for Kenya, a local awareness-raising meeting was held on July 18, 2023, in the lower Tana River (Kenya). The meeting was hosted and coordinated by the Kenya Agricultural & Livestock Research Organization (KALRO) and facilitated by the Association for Strengthening Agricultural Research in Eastern and Central Africa (ASARECA), with the participation of representatives from institutional partners Agenzia Italiana per la Cooperazione allo Sviluppo (AICS) and CIHEAM Bari.

The meeting aimed to (i) present to local communities WATDEV project goals and activities; (ii) increase farmers' and local communities' awareness of the negative impacts of adopting certain practices in a non-sustainable way; (iii) increase farmers' and community's awareness of potential BMPs impacts; (iv) share with farmers' ways of how to improve sustainability, efficiency, and productivity of selected BMPs for their study area; and (v) collect feedback, perceptions, and information needed to implement the selected BMPs and prioritize the BMPs objectives for

different sustainability dimensions.

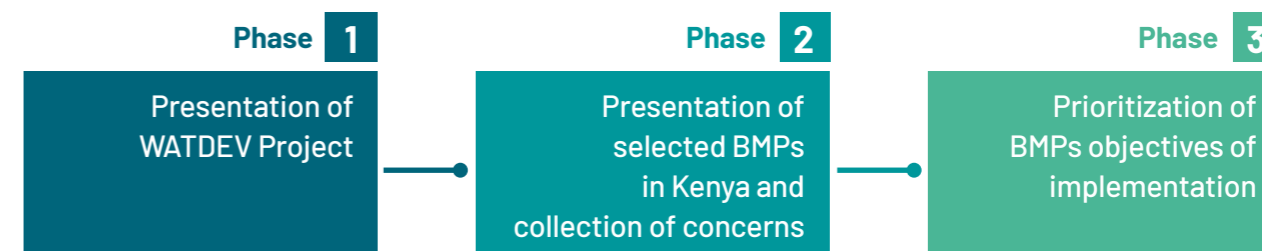
The event was attended by stakeholders from various categories of stakeholders, including policymakers, research and extension bodies, community organizations, and local citizens, for a total of 28 participants.

Table 1 - Participants in the awareness-raising meeting in Kenya by stakeholder category





The awareness meeting was facilitated by ASARECA and KALRO and attended by local stakeholders and the CIHEAM Bari.

The awareness-raising event featured three distinct phases:



After the presentation of the WATDEV project, the participants shared some remarks for each best management practice selected for Kenya, as shown in Table 2 below.



Table 2 - Remarks on the implementation of the BMPs in Kenya.

 AGROFORESTRY	
Key focus areas	Recommendations for improvement
<ul style="list-style-type: none"> Capacity building of the community members on the various BMPs, especially agroforestry: (i) skills for agroforestry management, (ii) suitable species for an irrigation scheme, (iii) fruit trees for livelihood improvement, (iv) tree species for soil nutrient improvement, fodder, and woodlots, and (v) trees suitable for intercropping with other crops. 	<ul style="list-style-type: none"> Showcase agroforestry demos. Agroforestry should be done in the areas designated for the household settlement (1 acre each)
 WATER USERS' ASSOCIATION	
Key focus areas	Recommendations for improvement
<ul style="list-style-type: none"> Training of WUAs on water management issues 	<ul style="list-style-type: none"> Water harvesting from the Tana River into dams, reservoirs, or water pans in times of plenty so that there can be a continuous supply for irrigation, even in the hinterland. Engage policy and legislation on land use.

STAKEHOLDERS FEEDBACK

Whereas farmers and other stakeholders appreciated the selected BMPs, they also expressed some concerns that need to be investigated and addressed by the project. Some of these concerns are highlighted in the Table 3 below.

Table 3 - Concerns/Feedback from Stakeholders (by BMP)

 AGROFORESTRY Concern/Feedback	
<ul style="list-style-type: none"> Limited skills among the various community members on agroforestry issues. Need to build capacity for agroforestry implementation The irrigation scheme is expanding very fast, yet the issues of water availability have not been addressed. This poses a challenge is water availability Climatic changes affecting water availability and creating competition in demand within the irrigation scheme Conflicts within the irrigation scheme between the livestock keepers and crop farmers 	
 WATER USERS' ASSOCIATION Concern/Feedback	
<ul style="list-style-type: none"> The land tenure system (leasehold) within the irrigation scheme may limit how much farmers can do in terms of agroforestry 	

The last phase of the awareness meeting entailed an exercise aimed at collecting from local stakeholders their perceptions about their objectives of the implementation of BMPs. During this exercise, the facilitator displayed Table 4 in which the main objectives for different sectors of sustainability were listed for each selected BMP.

PRIORITIZATION OF THE BMPs OBJECTIVES (BY DIMENSION AND SUB-DIMENSION)

After a very engaging plenary discussions, all the participants were allowed to score individually and the results were aggregated as shown in Table 4 below.

Table 4 - Prioritization of the Objectives for BMPs (Agroforestry and Water Users' Association)

a) SOCIO-ECONOMIC DIMENSION		
Sub-dimension	Objectives	Rank
Socio-cultural	• To create job opportunities for locals	1
	• To contribute reducing / mitigating social conflicts	2
	• To respect traditional/historical practice(s) in the area	3
Policy	• Supported by the Government	1
	• Legislation/Regulations clarity	2
	• Compliant with national regulations	1
Governance	• Organizations support to learning about BMPs	1
	• To improve cooperation among all value chain actors	1
	• To improve collaboration between institutions and value chain actors	1
Economy	• To make farm costs manageable	2
	• To increase crop production	1
	• To increase farmer's income	1

b) ENVIRONMENTAL DIMENSION

Sub-dimension	Objectives	Rank
Groundwater	• To avoid groundwater pollution	3
	• To enhance water quality	2
	• To ensure suitable groundwater access.	1
Soil	• To prevent soil erosion	1
	• To help crops grow better.	1
	• To maintain soil health	2
Crop	• To make crops productive	1
	• To make crops healthier.	2
	• To make crops resistant to pests and diseases	3
Surface water	• To avoid surface water pollution	3
	• To enhance water quality	2
	• To keep the water flow safe	1
Atmosphere	• To minimize greenhouse gases emissions	3
	• To make the air cleaner	2
	• To ensure a healthier environment for the community	1

7. THE FEASIBILITY INDICATORS

Each BMP/Innovation selected to be simulated in the study areas was subjected to a participatory feasibility and sustainability analysis. Established during the 3rd Modelling Working Group meeting in Turin (Italy, October 10, 2023) a group of experts belonging to ASARECA, CIHEAM Bari, and KALRO, elaborated a set of indicators for each objective of implementation of the BMPs and each sustainability dimension.

Across the 2 sustainability dimensions (Socio-economic and Environmental) and the 9 sub-dimensions (Socio-cultural, Policy, Governance, Economy, Groundwater, Soil, Crop, Surface water, and Atmosphere), a set of indicators is developed through literature review and experts' elicitation. This process was carried out from October to December 2023.

a) SOCIO-ECONOMIC DIMENSION

Sub-dimension: Socio-cultural

Objectives of BMPs' implementation	Theme	Indicators
1. To generate job opportunities for locals	1.1 Social co-benefits	<ul style="list-style-type: none"> No. of people employed by value chain, by country, by gender
2. To contribute to reducing/mitigating social conflicts	2.1 Social inclusiveness	<ul style="list-style-type: none"> No. of people implementing the BMP (disaggregated by sex, gender, vulnerable people) No. of women and youth participating in decision-making
	2.2 Social co-benefits	<ul style="list-style-type: none"> No. of community members accessing social key services (e.g., schools, health facilities)
	2.3 Social trade-off	<ul style="list-style-type: none"> Community attitudes and perceptions on the BMPs trade-offs
3. To respect traditional/historical practice(s) in the area	3.1 Socio-cultural/human acceptability	<ul style="list-style-type: none"> Community attitudes and perceptions on their acceptability of BMPs Community attitudes and perceptions on their identity preservation

Sub-dimension: Policy

Objectives of BMPs' implementation	Theme	Indicators
4. Supported by the Government	4.1 Enabling conditions	<ul style="list-style-type: none"> Level of endorsement or support by the local governments No. of plans or projects or programs supporting the implementation of the practice
5. Legislations/Regulations Clarity	5.1 Policy feasibility	<ul style="list-style-type: none"> Number of plans or strategies supporting BMP implementation
6. Compliant with national regulations	6.1 Policy feasibility	<ul style="list-style-type: none"> No. of national, regional, or local policies and regulations that are aligned with the BMP activities Value (in US\$) of the government's contribution to the implementation of the BMPs in the target communities

Sub-dimension: Governance

Objectives of BMPs' implementation	Theme	Indicators
7. Organizations support learning about BMPs	7.1 Enabling conditions	<ul style="list-style-type: none"> No. of farmers accessing agricultural extension services from extension agencies No. of organizations providing agricultural extension services to farmers Number of farmers trained on BMP GAPs or practices

8. To improve cooperation among value chain actors	8.1 Enabling conditions	<ul style="list-style-type: none"> No. of value chain linkages established. No. of agreements among value-chain actors/yr
9. To improve collaboration between institutions and value chain actors	9.1 Enabling conditions	<ul style="list-style-type: none"> No. of collaborative projects or initiatives in the target area (jointly established between local actors and institutions)

Sub-dimension: Economy

Objectives of BMPs' implementation	Theme	Indicators
10 To make farm costs manageable.	10.1 Micro-economic viability	<ul style="list-style-type: none"> Crop Yields (Tons/Ha) Benefit-cost ratio of production Price-Cost Ratio (compares selling price to the cost of production) Cost saving (US\$) because of BMP adoption
11. To increase crop production.	11.1 Diversification of the production	<ul style="list-style-type: none"> Crop yield (total production (Kg)/ Total land area (ha)) Proportion of new crop enterprises
12. To increase farmer's income.	12.1 Economic co-benefits	<ul style="list-style-type: none"> Total household Net farm income (GFI- Total production costs & expenses) % increase in net farm income

b) ENVIRONMENTAL DIMENSION

Sub-dimension: Groundwater

Objectives of BMPs' implementation	Theme	Indicators
13. To avoid groundwater pollution.	13.1 Risk reduction potential	<ul style="list-style-type: none"> Level of Nitrate content of groundwater
14. To enhance water quality.	14.1 Ensure water quality level	<ul style="list-style-type: none"> Level of water salinity (standard methods) Level of biological contamination (E. Coli, IBA, ...)
15. To ensure suitable groundwater access.	15.1 Access to resource(s)	<ul style="list-style-type: none"> Intensity of water use by agriculture: amount of irrigation water (mc) used per unit of cropped land (ha) Technical efficiency (mc) and economic efficiency (€) in water use Depth to groundwater (m) (groundwater at much lower depths is more preferred and accessed because of low salinity) No. of community members with access to water rights or secure water resource allocations

Sub-dimension: Soil

Objectives of BMPs' implementation	Theme	Indicators
16. To prevent soil erosion	16.1 Risk reduction potential	<ul style="list-style-type: none"> Proportion of the area affected by soil erosion (%) Average soil loss (t ha⁻¹ yr⁻¹)
17. To maintain soil health	16.1 Soil health	<ul style="list-style-type: none"> Soil Organic Carbon (t ha⁻¹)
18. To help crops grow better.	18.1 Soil fertility	<ul style="list-style-type: none"> Soil fertility (SOM, N, P2O₅, K₂O) Farmers' perception of soil fertility

Objectives of BMPs' implementation	Theme	Indicators
19. To make crops productive.	19.1 Crop productivity	<ul style="list-style-type: none"> Production yield of crop per unit of cultivated area (t ha⁻¹)
20. To make crops healthier.	20.1 Crop healthy	<ul style="list-style-type: none"> Amount of fertilizers/pesticides per unit of crop (Residues level in the product) Nutrient (N, P) use efficiency (kg product/kg N, P)
21. To make crops resistant to pests and diseases.	21.1 Crop resistance to pests/diseases	<ul style="list-style-type: none"> Trend in pesticide use

Sub-dimension: Surface water

Objectives of BMPs' implementation	Theme	Indicators
22. To avoid surface water pollution.	22.1 Risk reduction potential	<ul style="list-style-type: none"> • Level of Nitrate content of groundwater
23. To enhance water quality.	23.1 Ensure water quality level	<ul style="list-style-type: none"> • Level of water salinity (standard methods) • Level of biological contamination (E. Coli, IBA, ...)
24. To keep water flow safe.	24.1 Risk reduction potential	<ul style="list-style-type: none"> • Annual flood frequency (exceeding a certain threshold) • Proportion of land prone to flood risks (%)

Sub-dimension: Atmosphere

Objectives of BMPs' implementation	Theme	Indicators
25. To minimize greenhouse gases emissions.	25.1 Environmental impact	<ul style="list-style-type: none"> • GHG emissions per ha/yr
26. To make the air cleaner.	26.1 Environmental impact	<ul style="list-style-type: none"> • Carbon storage and sequestration in the crop ($t\ CO_2\ ha^{-1}$)
27. To ensure a healthier environment for the community	27.1 Risk reduction potential	<ul style="list-style-type: none"> • Air Quality Index (AQI)





8. THE TRAINING OF TRAINERS AND CAPACITY BUILDING COURSE: WATER, SOIL, AND CROP MANAGEMENT IN A CLIMATE-SMART AGRICULTURE

Bari - Italy, December 11-16, 2023

The primary aim of the Training and Capacity Building initiative is to empower local stakeholders in effectively implementing Best Management Practices (BMPs) and Innovations within their respective regions and communities. Emphasis is placed on advocating for the adoption of targeted BMPs while nurturing sustainable development. The training program comprises three modules, each spanning a week.

The 1st module took place from December 11th to 16th, 2023, hosted at the International Centre for Advanced Mediterranean Agronomic Studies (CIHEAM) in Bari - Italy.

Experienced lecturers were professionals in soil science, genetics, agronomy, and engineering, and officers from valued international organizations such as FAO.

Fifteen delegates from universities and local governing bodies in Kenya, Ethiopia, and Egypt,

alongside an additional five participants joining remotely from Sudan, were selected by WATDEV project Partners to attend the 1st module of the Course. Participants included junior researchers, government officials, and extension workers actively involved in the implementation of BMPs and innovation projects within their respective regions.

After the training, participants will collaborate closely with local partners to transfer the newly acquired knowledge to local farmers, thereby promoting sustainable development within their communities.

	Name	Surname	Gender	Affiliation
KENYA	Laura Mikali	Dema	female	County Renewable Officer, County Department of Environment, Water, Forestry and Natural Resources
	Alex	Kubende	male	County Director of Agriculture, Tana River County
	William	Jillo	male	County Irrigation Engineer
	Anita Ijayi	Nunu	female	Crop agronomist (rice), Kenyan Agriculture and Land Research Organization (KALRO)
	Obadiah Kiarie	Kuria	male	National Irrigation Authority – Tana Irrigation Scheme
SUDAN	Ahmed Alsiddig	Elshaikh	male	University of Khartoum, WRC
	Eslam Ahmed	Mohamed	female	Agricultural Research Corporation
	Amani Ahmed	Idris	female	Agricultural Research Corporation
	Ali Mohamed	Elhaj	male	The Hydraulics Research Center (HRC-SUDAN)
	Mohammad Osman	Babiker	male	Gezira Scheme Authority

	Name	Surname	Gender	Affiliation
ETHIOPIA	Deribew Shanko	Negewo	male	Associate Researcher, Water and Land Resource Centre (WRLC)
	Tilahun	Mulugeta Bitew	male	Head of Horticulture and Water Management Department, Mech Wereda Agriculture Office
	Hibret	Andualem Jembere	male	Koga Branch Office, Ministry of Irrigation and Lowlands
	Bekure	Melesse Beyene	male	Agronomist, Water and Land Resource Centre
EGYPT	Rehab	Ibrahim	female	Research assistant at the Egyptian Biodynamic Association
	Buthaina	Elhosieny	female	Project Coordinator at the Egyptian Biodynamic Association
	Hend	Hany Hafez Mohamed	female	Administration Egyptian Biodynamic Association
	Salma	Wael Eladly	female	Research assistant, Faculty of Engineering, Heliopolis University
	Mahmoud Moustafa Mahmoud	Eid	male	Research Assistant, Faculty of Organic Agriculture, Heliopolis University





9. THE FOLLOW-UP TRAINING WORKSHOP IN THE STUDY AREA

Hola - Tana River, April 8-9, 2024

After attending the 1st Module of the training for trainers (ToT) in CIHEAM Bari in December 2023, KALRO, in cooperation with ASARECA, organized a follow-up training workshop on 8-9 April 2024 in Hola - Tana River, Kenya.

This follow-up training aimed to (i) adapt, share, and disseminate the knowledge on Best Management Practices acquired during the ToT; (ii) work with stakeholders to select the list of feasibility indicators that best describe the situation in the case study areas from the socio-economic and environmental point of view; (iii) discuss with local stakeholders their ideas for scenarios to be developed and simulated with the WATDEV modelling tool.

Training was provided on Agroforestry and Water Users' Association.

STAKEHOLDERS' COMPOSITION

This follow-up training in Kenya was attended by 66 people (22 women and 44 men) as representatives from ASARECA, KALRO, ISRIC, the National Irrigation Authority (NIA), Pwani University, the County Extension Officer, and CIHEAM (joining online), along with farmers from the Hola Irrigation Scheme.

GROUP WORK ON BMPs FOR MODELLING SCENARIOS

In the participatory session, local stakeholders were asked for their ideas for future scenarios to be developed and eventually simulated with the WATDEV modelling tool. Farmers were grouped into 5 groups according to their Areas. Area 1 was represented by the largest number of farmers (about 20 persons). This area is closest to the town of Hola and has the largest problems with water availability as they are the furthest away from the intake. Area 2, 3, 4-5 combined, and 6 were represented by smaller groups (4-6 persons). Each group was required to answer key questions concerning the selected BMPs for the study area in Kenya.



After the group discussions, participants reported back to the plenary session the following main findings:

AGROFORESTRY

- Agroforestry is envisaged in three specific locations: 1) along feeder canals for stabilisation of canal banks and avoiding soil erosion; 2) in specific designated areas (corridors) as windbreaks; and 3) surrounding irrigated areas as windbreak.
- The tree species selected include fruit trees (mango, citrus, pawpaw, coconut), indigenous trees and fodder trees. Fruit trees are suggested to enhance farm income, indigenous trees for environmental purposes and fodder trees to reduce conflicts between pastoralists and farmers.

WATER USERS' ASSOCIATION

There are major challenges with water availability in the scheme, especially near the tail end. Suggestions were:

- An extension of the canal to be able to irrigate by gravity or, alternatively, by installing solar pumping to reduce the high fuel cost of pumping water from Tana River into the Hola irrigation scheme.
- Seasonal desilting and cleaning of the main canals to ensure water can reach the irrigation areas.
- Increase storage in the irrigation system by constructing more reservoirs enabling irrigation areas to better control water allocation. This is also specifically a requirement in case of solar pumping, to have night storage.
- Field land levelling to have a better water distribution over the irrigated fields, to reduce water consumption and increase water use efficiency

THE FINAL LIST OF SELECTED INDICATORS FOR EACH PRIORITIZED OBJECTIVE OF IMPLEMENTATION OF THE BMP

The community of stakeholders worked to select indicators for each objective of implementation of the BMPs that they had prioritized during their Awareness Meeting on July 18, 2023 (see Chapter 6). In selecting the indicators among the overall list (see Chapter 7), the following aspects were considered: (i) how the indicators apply to the local conditions or how they accurately describe the local conditions; (ii) availability of data; and (iii) ease of accessing data. Moreover, the stakeholders discussed the following aspects: (i) which feasibility indicators apply to Kenya; (ii) modalities for data collection; (iii) key stakeholders to be involved in data collection; and (iv) plans and timeframe for data collection.

The stakeholders selected the following indicators:

a) SOCIO-ECONOMIC DIMENSION

Sub-dimension	Prioritized Objectives	Theme	Indicators
Socio-cultural	1. To generate job opportunities for locals	1.1 Social co-benefits	<ul style="list-style-type: none"> • No. of people employed by value chain, by country, by gender (specify NUTS level, time period)

Sub-dimension	Prioritized Objectives	Theme	Indicators
Policy	4. Supported by the Government	4.1 Enabling conditions	<ul style="list-style-type: none"> Level of endorsement or support by the local governments (Likert scale) No. of plans or projects or programs supporting implementation of the practice
	6. Compliant with national regulations	6.1 Policy feasibility	<ul style="list-style-type: none"> No. of national, regional, or local policies and regulations that are aligned with the BMP activities Value (in US\$) of government's contribution to implementation of the BMPs in the target communities
Governance	7. Organizations support learning about BMPs	7.1 Enabling conditions	<ul style="list-style-type: none"> No. of farmers accessing agricultural extension services from extension agencies (No. of extension contacts) No. of organizations providing agricultural extension services to farmers Number of farmers trained on BMP GAPS or practices

Sub-dimension	Prioritized Objectives	Theme	Indicators
Governance	8. Improve cooperation among value chain actors	8.1 Enabling conditions	<ul style="list-style-type: none"> No. of value chain linkages established. No. of agreements among value-chain actors/yr
	9. Improve collaboration between institutions and value chain actors	9.1 Enabling conditions	<ul style="list-style-type: none"> No. of collaborative projects or initiatives in the target area (jointly established between local actors and institutions)
Economy	11. Increase crop production.	11.1 diversification of the production	<ul style="list-style-type: none"> Crop yield (total production (Kg)/Total land area (ha)) Proportion of new crop enterprises
	12. To increase farmer's income.	12.1 Economic co-benefits	<ul style="list-style-type: none"> Total household Net farm income (GFI- Total production costs & expenses) % increase in net farm income

b) ENVIRONMENTAL DIMENSION

Sub-dimension	Prioritized Objectives	Theme	Indicators
Groundwater	15. Ensure suitable groundwater access.	15.1 access to resource(s)	<ul style="list-style-type: none"> No. of community members with access to water rights or secure water resource allocations
Soil	16. To prevent soil erosion	16.1 Risk reduction potential	<ul style="list-style-type: none"> Area affected by soil erosion (% , Km²): Proportion of the area affected by soil erosion (%)
	17. Maintain soil health	17.1 Soil health	<ul style="list-style-type: none"> Soil Organic Carbon (t ha⁻¹)
Crop	19. To make crops productive.	19.1 Crop productivity	<ul style="list-style-type: none"> Production yield of crop per unit of cultivated area (t ha⁻¹)
Surface water	24. To keep water flow safe.	24.1 Risk reduction potential	<ul style="list-style-type: none"> Annual flood frequency (exceeding a certain threshold) Proportion of land prone to flood risks (%)
Atmosphere	27. To ensure a healthier environment for the community	27.1 Risk reduction potential	<ul style="list-style-type: none"> Air Quality Index (AQI)





10. THE 2nd STAKEHOLDER FORUM OF THE WATDEV PROJECT: TASKS AND PARTICIPATORY SCENARIOS DEVELOPMENT

Bari - Italy, May 13, 2024

On 13th May, the 2nd Stakeholder Forum of the WATDEV project will take place at CIHEAM Bari Campus "Cosimo Lacirignola", in Valenzano (Bari - Italy).

The Stakeholder Forum members along with the Project Partners will examine and discuss the progress made through the project's activities and the outcomes of the meetings held in the study areas, to define the next steps.

Following the presentation of the functionalities of the WATDEV modelling tool, the Stakeholders Forum members and the local Partners will provide useful hints to tailor the modelling tool for the final users' needs.

Moreover, under the guidance of the Modelling Workgroup, participants will be asked to draft desired scenarios based on the implementation of BMPs/Innovation at the basin scale.

PARTICIPATORY DEVELOPMENT OF FUTURE SCENARIOS



ACTIVITY I: INDICATORS

The Stakeholder Forum Members will be shown the indicators on which the toolbox can provide output among the ones chosen by farmers in their study area (see Chapter 9).

In this exercise, we would like you to indicate:

- Which model output (or: indicator) is relevant for you?
- On which timescale: daily, monthly, seasonal and temporal extent (e.g. for 1 year, 10 years, 30 years?).
- Are there any indicators missing that you really would like to see as toolbox output.





ACTIVITY II: TYPES OF SCENARIOS

You will be displayed different types of scenarios. Each of them will be briefly explained and an illustration will be given:

- Blanket application of one BMP
- Spatial differentiation of BMP application
- Application of a combination of BMPs
- Optimization of spatial allocation of BMPs

In this exercise, we would like to know, for each type of scenario:

- Are you interested in this type of scenario?
- Briefly indicate why and how would you use this type of scenario?
- (where relevant) Which BMP would be interested in applying? Please give as much detail as possible
- (where relevant) Indicate on the provided maps where you would implement this scenario



ACTIVITY III: DESIGN THE MOST RELEVANT SCENARIOS (MAX 3) FOR YOUR STUDY AREA

Now that the indicator and types of scenarios have been reviewed, please describe and design the most relevant scenario for your study area.

Give as much detail as possible:

- Which type of scenario do you choose? (see exercise II)
- Which BMPs do you consider?
- Draw the locations of BMP implementation on the map
- What is the timeline of the scenario?
- What are the most important objectives (i.e. what do you want to achieve)?
- What are the most important indicators (i.e. the model output) that you are interested in obtaining from the model for this scenario?



