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WATDEV

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

National Research Council of Italy

Suomen ympäristökeskus
Finlands miljöcentral
Finnish Environment Institute

ISRIC
World Soil Information

ASARECA
Transforming Agriculture for Improved Livelihoods

Water & Land Resource Centre
Addis Ababa University

KALRO

Heliopolis University
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Climate Smart WATer Management and Sustainable DEVelopment
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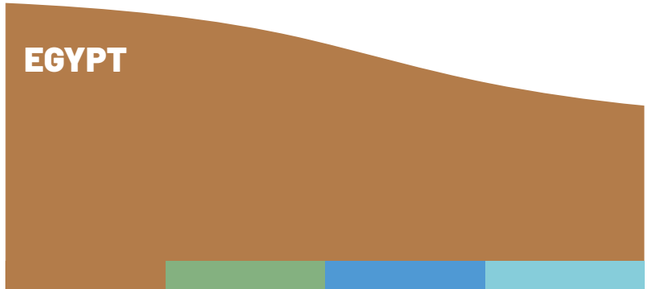
From the Selection of the Best Management Practices to the Identification of Scenarios

Stakeholder Forum 2024, CIHEAM Bari



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Pagg. 10 KALRO

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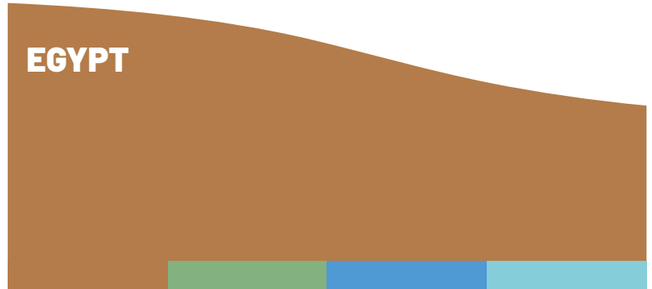

INDEX

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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CIHEAM BARI

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:

National Research Council of Italy

CNR-IPSP
The National Council for Scientific Research, Institute for Sustainable Plant Protection *(Italy).*

Suomen ympäristökeskus
Finlands miljöcentral
Finnish Environment Institute

SYKE
Finnish Environment Institute *(Finland).*

ISRIC World Soil Information

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

ASARECA
Transforming Agriculture for Improved Livelihoods

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

WATER & LAND RESOURCE CENTRE
Water & Land Resource Centre
Addis Ababa University

WLRC
Water and Land Resources Center *(Ethiopia).*

جامعة هليوبوليس للتنمية المستدامة
Heliopolis University for Sustainable Development

HU
Heliopolis University *(Egypt).*

WRC
Water Research Centre *(Sudan).*

KALRO

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 Egypt are the following:

MANURING

Manuring is an important best management practice for agriculture due to its numerous benefits for soil health, plant growth, and overall productivity.sustainability.

INTERCROPPING TREES WITH CROPS

Intercropping is a sustainable farming practice that involves cultivating two or more crops, one of which can be a tree, simultaneously on the same piece of land.

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 Egypt is:
The Sekem Farm, Belbies District (Sharkia Governorate)

5.

The Study area

SEKEM FARM, BELBIES DISTRICT (SHARKIA GOVERNATORATE)

CLIMATE

Sekem Farm falls within the East Nile Delta. This region has a desert climate, with long, dry summers and brief, temperate winters. Rainfall occurs between October and March, providing a crucial period of moisture. Summers are long and dry, with average temperatures ranging from 19.7°C to 34.7°C, while winters are short and mild, with temperatures between 7.4°C and 18.4°C.

LAND USE

Sharkia Governorate is densely populated with a flourishing agricultural industry. The fertile, flat lands support a variety of crops, including cotton, corn, rice, wheat, soybeans, peanuts, sesame, and citrus fruits. The governorate produces approximately 35% of the total Egypt's wheat.

MAIN CHALLENGES

The widespread use of chemical fertilizers and pesticides has resulted in soil and groundwater contamination, posing a serious threat to the ecosystems and public health. Wastewater disposal in canals exacerbates the issue, with contaminants seeping into groundwater.

Overexploitation of groundwater leads to saline intrusion.

OPPORTUNITIES

Sekem Farm presents an opportunity to showcase and scale out technical solutions to mitigate environmental degradation. By adopting BMPs, Sekem Farm could serve as a model for neighbouring areas. Through knowledge transfer and collaboration, Sekem Farm has the potential to catalyse positive change and promote sustainable agriculture practices across the region.

6. THE AWARENESS-RAISING MEETING WITH THE FARMING COMMUNITY IN BELBIES (EGYPT)

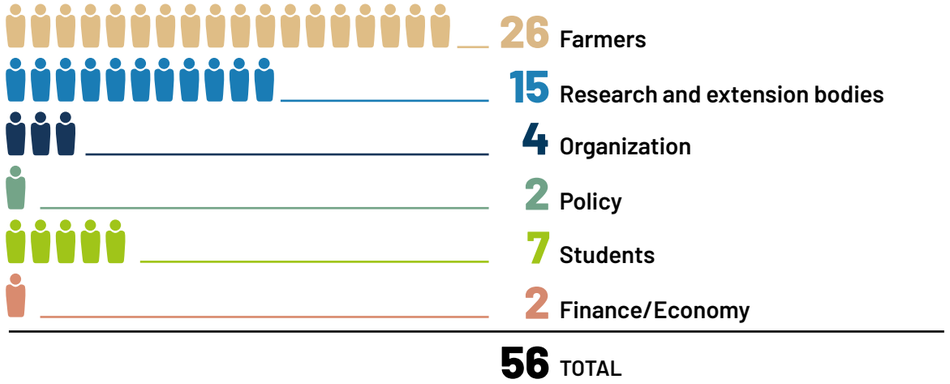
Sekem Farm - Belbies, July 30, 2023

After selecting the agricultural Best Management Practices (BMPs) for Egypt, a local awareness-raising meeting was held on July 30, 2023, in Sekem Farm, Belbies (Egypt), hosted by Heliopolis University. The meeting was also attended by online participants.

This 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; (ii) increase farmers' and community's awareness of potential BMPs impacts; (iii) share with farmers' ways of how to improve sustainability, efficiency, and productivity of selected BMPs for their study area; and (iv) collect feedback, perceptions, and information needed to implement the selected BMPs and prioritize the BMPs objectives for different sustainability dimensions.

This dissemination and awareness-raising event was attended by Egyptian stakeholders, including farmers, local authorities, the private sector as well as staff and students from universities. In total, the meeting was attended by 56 people (11 women, 45 men) as shown in the Table 1 below.

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



The awareness-raising meeting was facilitated by ASARECA and Heliopolis University and was attended by stakeholders from SEKEM Farm, Heliopolis University, and 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 Egypt, as shown in Table 2 below.

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

COMPOSTING

Key focus areas	Recommendations for improvement
• Application of compost manure: training farmers to make compost, makes its application more cost-effective. • Use of special bacteria to fasten the decomposition of compost manure. • Knowledge and other resources required to make good compost. • Use of social media channels such as: WhatsApp, Twitter and Facebook to increase awareness.	• On-farm demos to increase adoption of compositing

INTERCROPPING WITH TREES/AGROFORESTRY

Key focus areas	Recommendations for improvement
• Suitable tree crops for intercropping with other crops. • Sourcing of seedlings and planting.	• Use fruit trees to increase benefits

WATER USERS' ASSOCIATION

Key focus areas	Recommendations for improvement
• Water quality issues. • Water requirements: training of farmers on how to know how much water the crop needs to avoid wastage	• Need for a mobile app that can enable farmers to receive information on water quality on their phones • Support by the government required to identify the water requirements of different areas and give this information to farmers so that there is efficient use of water

Stakeholders argued that the selected BMPs (composting, intercropping trees with crops/ agroforestry, water users' association) were adaptable to the local conditions, cost-effective, and have the potential to deliver multiple benefits.

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 below.

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

COMPOSTING Concern/Feedback

- Efficiency of animal manure: there is not enough animal manure among farmers due to the limited number of livestock owned by the farmers.
- Generally limited use of compost: there is a need to have a pilot/model demonstration in each village then other farmers/villages can copy.
- Animal manure takes a longer time to decompose. Need to look for innovative ways that facilitate faster decomposition of organic matter.
- Need to sensitize relatives and other social networks about BMPs

INTERCROPPING WITH TREES/AGROFORESTRY Concern/Feedback

- There is a gap between farmers and extension agents to advise on the best practices about intercropping.
- Knowledge and knowledge sharing is very important to support dissemination and adoption of practices.

WATER USERS' ASSOCIATION Concern/Feedback

- How to keep farmers engaged in the WUAs activities including attending meetings is a challenge.
- Sustainability of the WUA is also a challenge.
- A lot of conflict concerning the leadership of the association. Quarrels as to who should be in the leadership position.
- Some farmers still use conventional means of irrigation. Need for them to adopt modern means of irrigation.
- Incentives and penalties should be put in place as a way of addressing the challenges.

The last phase of the awareness meeting entailed an exercise aimed at collecting from local stakeholders their perceptions about the 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.
The meeting participants were then asked to select one objective under each sector, by voting.

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

The results of the prioritization of the objectives for the implementation of the BMPs are shown in Table 4 below:

Table 4 - Prioritization of the Objectives for BMPs (Composting, Intercropping 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	3
	• To respect traditional/historical practice(s) in the area	2
Policy	• **Supported by the Government**	**1**
	• Legislation/Regulations clarity	3
	• Compliant with national regulations	2
Governance	• **Organizations support to learning about BMPs**	**1**
	• To improve cooperation among all value chain actors	3
	• To improve collaboration between institutions and value chain actors	2
Economy	• To make farm costs manageable	2
	• To increase crop production	3
	• **To increase farmer's income**	**1**

b) ENVIRONMENTAL DIMENSION

Sub-dimension	Objectives	Rank
Groundwater	• To avoid groundwater pollution	3
	• **To enhance water quality**	**1**
	• To ensure suitable groundwater access.	2
Soil	• To prevent soil erosion	3
	• To help crops grow better.	2
	• **To maintain soil health**	**1**
Crop	• To make crops productive	3
	• **To make crops healthier.**	**1**
	• To make crops resistant to pests and diseases	2
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	2
	• To make the air cleaner	3
	• **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	• No. of people employed by value chain, by country, by gender
2. To contribute to reducing/mitigating social conflicts	2.1 Social inclusiveness	• 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	• No. of community members accessing social key services (e.g., schools, health facilities)
	2.3 Social trade-off	• 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	• 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	• 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	• Number of plans or strategies supporting BMP implementation
6. Compliant with national regulations	6.1 Policy feasibility	• 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	• 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	• 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	• 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	• 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	• 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	• 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	• Level of Nitrate content of groundwater
14. To enhance water quality.	14.1 Ensure water quality level	• 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)	• 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	• 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	• Soil Organic Carbon (t ha^{-1})
18. To help crops grow better.	18.1 Soil fertility	• Soil fertility (SOM, N, P_2O_5, K_2O) • Farmers' perception of soil fertility

Sub-dimension: Crop

Objectives of BMPs' implementation	Theme	Indicators
19. To make crops productive.	19.1 Crop productivity	• Production yield of crop per unit of cultivated area (t ha^{-1})
20. To make crops healthier.	20.1 Crop healthy	• 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	• 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	• Level of Nitrate content of groundwater
23. To enhance water quality.	23.1 Ensure water quality level	• Level of water salinity (standard methods) • Level of biological contamination (E. Coli, IBA, ...)
24. To keep water flow safe.	24.1 Risk reduction potential	• 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	• GHG emissions per ha/yr
26. To make the air cleaner.	26.1 Environmental impact	• 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	• 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

Sekem Farm - Belbies, March 4-5, 2024

After attending the 1st Module of the training for trainers (ToT) in CIHEAM Bari in December 2023, Heliopolis University, in cooperation with ASARECA, organized a follow-up training workshop on 4-5 March 2024 in Sekem Farm-Belbies, Egypt.
This follow-up training aimed to (i) adapt, share, and disseminate the knowledge on Best Management Practices acquired during the ToTs; (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 Composting, Intercropping, and Water Users' Association.

STAKEHOLDERS' COMPOSITION

This follow-up training in Egypt was attended by about 60 participants (men 37, women 23). The participants were smallholder farmers from El-Sharkia Governorate, University staff and students, NGOs, extension agents, local technicians and practitioners engaged in agricultural projects' development and/or assistance to farmers.

GROUP WORK ON BMPs FOR MODELLING SCENARIOS

The farmers were divided into four groups. Each group was required to answer key questions concerning the selected BMPs for the study area in Egypt.
After the group discussions, participants reported back to the plenary session the following main findings:

COMPOSTING

- Farmers have limited knowledge of how to use manure and plant waste for making compost. Composting is thus used in its raw form (not fully processed) and has negative effects.
- The farmers are convinced that they should buy high-quality compost from authentic sources .

INTERCROPPING WITH TREES/AGROFORESTRY

- Intercropping with citrus trees is a profitable BMP, but the trees need a lot of care. In between (3-5m) vegetables are grown, such as clover, beans, onions, and garlic during the winter season and intercrop citrus trees with maize, peanuts, green pepper, and sesame during the summer season;
- Integrated pest management and integrated crop management is needed.

WATER USERS' ASSOCIATION

- There is a shortage of surface water, so groundwater is used, but there are increasing energy needs and related high costs for pumping. The groundwater is getting deeper (e.g., in east El-Ismaillia Canal lands). On the western side of El-Ismaillia Canal lands, small diesel pumps are used for irrigation of crops (rice & maize) with shallow depths. Drip irrigation is used widely on the eastern side of El-Ismaillia Canal lands. In all areas, the cost of energy is high, so the farmers' profitability is low. This needs to be resolved via the application of the BMPs.
- Water salinity is high in the area, thus affecting crop production. Water logging is a challenge in West El-Ismaillia Canal lands due to seepage.
- Water distribution systems are inefficient.

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 30, 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 Egypt; (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 Objective	Theme	Indicators
Socio-cultural	1. To generate job opportunities for locals	1.1 Social co-benefits	• No. of people employed by value chain, by country, by gender (specify NUTS level, time period)
Policy	4. Supported by the Government	4.1 Enabling conditions	• Level of endorsement or support by the local governments aggiungere. (Likert scale) • No. of plans or projects or programs supporting the implementation of the practice

Sub-dimension	*Prioritized objectives*	*Theme*	*Indicators*
Governance	7. Organizations support learning about BMPs	7.1 Enabling conditions	• 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
Economy	12. To increase farmer's income.	12.1 Economic co-benefits	• 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	14. To enhance water quality.	14.1 Ensure water quality level	• Level of water salinity (standard methods) • Level of biological contamination (E. Coli, IBA, ...)
Soil	17. Maintain soil health	17.1 Soil health	• Soil Organic Carbon (t ha^{-1})
Crop	20. To make crops healthier.	20.1 Crop healthy	• Amount of fertilizers/ pesticides per unit of crop (Residues level in the product) • Nutrient (N, P) use efficiency (kg product/kg N, P)
Surface water	24. To keep water flow safe.	24.1 Risk reduction potential	• 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	• 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?