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Water and Environment Support
in the ENI Southern Neighbourhood region

Concept Note

Regional Training and Study Tour on optimal irrigation management

Activity Number: RW-7-REG/ST

April, 2023

COMPONENT	Component 2
WES TOPIC:	Topic 2: Water Efficiency Gains at Decentralised Level Topic 4: Enhancing Water Efficiency and Productivity in Agriculture
WES SUBTOPIC	Subtopic 4.1: Water Use Efficiency in Agriculture
DIMENSION	Dimension 2 Capacity Building

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WATER AND ENVIRONMENT SUPPORT (WES) IN THE ENI SOUTHERN NEIGHBOURHOOD REGION

The "Water and Environment Support (WES) in the ENI Neighbourhood South Region" project is a regional technical support project funded by the European Neighbourhood Instrument (ENI South). WES aims to protect the natural resources in the Mediterranean context and to improve the management of scarce water resources in the region. WES mainly aims to solve the problems linked to pollution prevention and the rational use of water.

WES builds on previous similar regional projects funded by the European Union (Horizon 2020 CB/MEP, SWIM I and II, SWIM-Horizon 2020 SM) striving to create a supportive environment and increase the capacity of all stakeholders in the partner countries (PCs).

The WES Partner Countries are Algeria, Egypt, Israel, Jordan, Lebanon, Libya, Morocco, Palestine, Syria, and Tunisia. However, to ensure the coherence and effectiveness of EU funding or to promote regional cooperation, the eligibility of specific actions can be extended to neighbouring countries in the Southern Neighbourhood region.

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ABBREVIATIONS

CB/MEP	Capacity Building/Mediterranean Environment Programme
EC	European Commission
ENI	European Neighbourhood Instrument
EU	European Union
KE	Key Expert
NKE	Non-Key Expert
PCs	Partner Countries
ST	Study Tour
SWIM	Sustainable Water Integrated Management
SWIM-Horizon2020 SM	Sustainable Water Integrated Management – Support Mechanism Project
UNEP-MAP	United Nations Environment Program - Mediterranean Action Plan
UfM	Union for the Mediterranean
WES	Water and Environment Support

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1. INTRODUCTION

Agriculture consumes more than 70% of the available water throughout the Mediterranean and the largest part of freshwater resources withdrawals, while both food and water demands are on the increase due to rapidly increasing population and changes in lifestyle. Water availability is, in addition, significantly affected by climate change and variability, while stormwater and wastewater are increasing. The latter should be properly introduced into the available water cycle.

Because of the increasing challenge of water scarcity, there is an urgent need to improve water management, at both farm and irrigation scheme levels. Overexploitation of water resources, particularly groundwater, is beyond the sustainability limits in the project countries. The irrigation agencies and/or water users associations (WUAs), which are responsible for the management of water at the scheme level, must implement comprehensive management strategies for the limited water resources. These strategies should focus on helping farmers improve their irrigation practices to conserve water and improve yield, allocating irrigation water in a more efficient, reliable, and equitable ways, and ensure the economic sustainability of the irrigation schemes and the GDAs.

In view of the above and as part of the WES project workplan for the fourth year (2022-2023) related to the Regional Activities, **a regional training focusing on optimal irrigation management and practices** (RW-7-REG) and a **Study Tour** (ST) on the same topic **will take place in Bari, Italy**, over a five-day period (**12-16 June 2023**).

This Concept Note addresses the regional training and the study tour on optimal irrigation management and practices

2. OBJECTIVES AND EXPECTED OUTCOMES

The purpose of the specific regional training activity RW-7-REG is to build the capacity of the project countries (PCs) on optimal irrigation management and practices using appropriate irrigation methods for improved irrigation efficiency and water productivity and highlighting the benefits of using treated wastewater and rainwater harvesting. The training will be combined with a Study Tour (RW-7-ST) in Italy, an advanced country in this field and will be providing examples of hands-on practices followed.

Throughout the training event, participants will be introduced to:

A. optimal management of collective irrigation systems, water allocation and distribution and its impact on productivity, in order to:

1. understand the importance of irrigation water use efficiency in the context of water resources management at the collective irrigation scheme/network level;
2. know the concepts of water management at the collective irrigation scheme/network level, including irrigation water allocation and distribution (water delivery schedule) and its impact on water productivity at the farm level;

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3. know the concepts of planning, designing, and operating collective pressurized irrigation distribution systems to provide reliable, adequate, timely and equitable irrigation water supply as it relates to on farm water productivity;
4. get introduced to the main considerations for the optimal design of collective irrigation systems.
5. Learn about the concepts and the importance of hydraulic analyses of collective systems to provide optimal services to farmers.
6. learn about the specific considerations associated with irrigation using treated wastewater reuse;
7. learn about available tools that allow for an optimal design and analysis of collective pressurized irrigation systems.

B. optimal on-farm irrigation management and its impact on irrigation efficiency and water productivity, in order to:

1. understand the importance of irrigation efficiency in the context of water resources management at the farm level
2. know the concepts of water efficiency and productivity in agriculture and the links between the different definitions used in the literature to express water efficiency at different scales (collective irrigation schemes, farm level)
3. learn about the parameters/considerations affecting the variability in the water efficiency of a crop.
4. get introduced to the different technologies used for optimal irrigation at the farm level including the use of smart irrigation
5. learn about the specific considerations associated with irrigation using treated wastewater reuse focusing on technical and environmental aspects
6. get introduced to the tools available for efficient irrigation water management, estimating yields and developing irrigation schedules at the farm level
7. get introduced to the applications of renewable energies in on-farm irrigation.

Other objectives include the enhancement of the ability of the trainees to:

1. Implement rapid exercises in addressing practical problems;
2. Promotion of north to south and south to south exchange and experience sharing through:
   a. Presenting practical examples also from a European context, as needed;
   b. Facilitating the exchange of experiences between participating practitioner and discussing real situations in their own countries;

   c. Cross-fertilisation between the WES DEMO projects and this project on the subjects related to optimal irrigation management and treated waste water reuse with a view to promote preservation of water resources under increasing water scarcity;

   d. Dissemination of related WES demo projects results and outcomes to date.

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3. Field visits to show case examples of experience in optimal irrigation management at both the collective irrigation scheme/network and farm levels including the use of smart irrigation technologies and treated wastewater reuse, in addition to the utilisation of renewable energy in irrigation at the farm level.

3. APPROACH TO MEET THE TRAINING OBJECTIVES

To achieve the training objectives, a highly dynamic, interactive, facilitated, and participatory approach will be adopted, making use of professional learning tools such as:

1. Presentations by trainers and by the participants.
2. Facilitated round table discussions.
3. Personal and/or national perspectives.
4. Break-out sessions engaging the participants in group discussions and group work with the Non Key Experts (NKEs) who will steer and facilitate these discussions, with the aim to apply what they have learnt during the training
5. Visual aids (videos) to facilitate understanding by the participants.
6. Hands-on exercises.
7. Study tour to enhance the learning process and expose the participants to success stories in the management of irrigation systems at the scheme and on-farm levels under water scarce conditions

The training will also consider pressing interests that are identified during the sessions. Pre and Post training assessment will provide specific feedback on the impact of the training on the understanding of fundamentals and concepts and knowledge acquired in the field.

Copies of the training material will be prepared by the trainers and provided to all participants on line. A certificate of attendance will be awarded to all participants at the end of the regional training.

The language of the training will be English. Interpretation services will be provided.

4. RESOURCES FOR PARTICIPANTS

The resources that are intended to be provided to participants are:

1. PowerPoint presentations.
2. Groups discussions.
3. Case studies and group exercises.
4. Field visits in the region of Bari and Foggia (north of Bari)/Italy with successful experience in irrigation management; using practices which are effective, relevant, and implementable in the WES Project Countries (PCs).

5. PROPOSED PROGRAMME OF THE REGIONAL TRAINING AND STUDY TOUR

The regional training and the study tour will be carried out along five full days during June 12-16, 2023. The overarching topic of each day is:

- Day 1 (Monday, June 12, 2023): Water management at the collective irrigation scheme/network level – Part 1.
- Day 2 (Tuesday, June 13, 2023): Water management at the collective irrigation scheme/network level – Part 2, field visit
- Day 3 (Wednesday, June 14, 2023): On-farm irrigation management including on-site training.
- Day 4 (Thursday, June 15, 2023): Non-conventional water resources in agriculture – Part 1.
- Day 5 (Friday, June 16, 2023): Field visit related to treatment and reuse of wastewater in irrigation.

Day 1, and 4 will be classroom training days, while days 2 and 5 will be dedicated for a field visit to a local Water User Association and treated wastewater reuse project; respectively, **and Day 3** will combine classroom training with on-site training**. All training days** will include cross-cutting activities to ensure better understanding of optimal irrigation management practices at the respective levels (irrigation network and on-farm) including management of treated wastewater in irrigation), capitalisation on the training, and sharing lessons learned.

Relevant examples from Tunisia and Egypt,etc. will be presented, and these examples from Italian context will be discussed and put into the Mediterranean context. Emphasis of such examples will focus on demonstrating:

- The importance of adequate system design in irrigation management at both levels (collective irrigation network and on-farm)
- Best practices for optimal on-farm irrigation management.

Case studies from the South-Mediterranean region will also be presented. In this regard, presentations of relevant on-going WES demonstration projects will also be solicited to present the findings and outcomes of their projects:

- Day 1: Enhance the resilience of vulnerable communities through efficient water solutions and addressing climate change in the Eastern area of Khan Younis in the Gaza Strip – implemented by Oxfam in Gaza;
- Day 4:
    - Part 1: Saving Water, Growing Crops: remote-controlled irrigation system to address water scarcity and promote preservation of available freshwater resources – implemented by Istituto Oikos in Lebanon;

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- Part 2: Water efficient Innovative Solutions Portfolio for Enhancing Resilience – WISPER implemented by Istituto per la Cooperazione Universitaria Onlus – ICU Onlus in Jordan and Tunisia

The regional training and the study tour will facilitate the exchange of experiences between trainers and all the participants.

5.1 DAY 1: WATER MANAGEMENT AT THE COLLECTIVE IRRIGATION SCHEME/NETWORK LEVEL – PART 1

The specific topics of this day are:

- Concepts for the management of pressurised collective irrigation systems (management strategies, technologies (ex: delivery control), and governance).
- Design for management of pressurised irrigation systems.
- Performance analysis of large-scale pressurized irrigation systems.
- Operation and management (water allocation for reliable and equitable water supply): : Capitanata case study
- Hydraulic modelling of collective irrigation distribution systems using DSS (e.g., COPAM)
- Cross-cutting - Capitalisation and lessons learnt: Presentation of related WES Demo Project in Lebanon: Saving Water, Growing Crops: remote-controlled irrigation system to address water scarcity and promote preservation of available freshwater resources.

5.2 DAY 2: WATER MANAGEMENT AT THE COLLECTIVE IRRIGATION SCHEME/NETWORK LEVEL – PART 2, FIELD VISIT

The specific topics of this day are:

- Field visit to a local Water User Association “Capitanata Consortium” near Foggia
  - Showcase infrastructure including the main components of the system such as the pumping stations, control and monitoring systems, and delivery points (hydrants).
  - Demonstrate optimal management strategies and practices in the management of collective irrigation networks and on farm irrigation systems as they impact water use efficiency and productivity,
  - Demonstrate the WUA role in the optimal management of irrigation schemes, and the importance of control and monitoring of water allocations.
  - Demonstrate the role of the WUA in cost recovery and maintenance of the irrigation schemes.
- Cross-cutting - Capitalisation and lessons learnt:
  - Presentation from the managers of the “Capitanata Consortium”: experience learned from the consortium since its establishment.

Time of departure from the hotel and logistics will be communicated and agreed during the first training day. Time of arrival at the hotel at the end of the study tour will depend on traffic.

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5.3 DAY 3: ON-FARM IRRIGATION MANAGEMENT INCLUDING ON-SITE TRAINING

The specific topics of this day are:

- Interfacing off- and on-farm irrigation systems: constraints and opportunities for a better management.
- Solar energy for sustainable agriculture
- Innovative solutions towards enhanced on-farm management.
- **On site training (afternoon @CIHEAM Bari):** Technical Tour demonstrating the digital agriculture lab, research for development experimental site (showing advanced approaches in on-farm irrigation management using smart irrigation technologies, including the use of sensors for collecting weather data; smart controllers of irrigation, and soil moisture sensors for irrigation scheduling in addition to solar energy/agrivoltaic systems to improve farmers' access to energy and their income).
- Practical exercises to enhance the participants' understanding of the basics of implementing innovative solutions to irrigation management at the farm level.

5.4 DAY 4: NON-CONVENTIONAL WATER RESOURCES IN AGRICULTURE – PART 1

The specific topics of this day are:

- Transitioning to a Water-Smart Society.
- Reclaimed water treatment, standards, and reuse: Apulia Region context.
- A user-friendly tool for a sustainable reuse of reclaimed water in agriculture.
- Monitoring for irrigation management
- Exercises to enhance the participants' understanding of the main concepts and help them apply the tools/methodologies as they learn them.
- Explore international guidelines to compare and interpret the difference between water quality standards for reuse in agriculture
- Cross-cutting - Capitalisation and lessons learnt:
    - Presentation of WES Demo Project in Gaza: Enhance the resilience of vulnerable communities through efficient water solutions and addressing climate change in the Eastern area of Khan Younis in the Gaza Strip implemented by in Gaza
    - Presentation of WES Demo Project in Jordan and Tunisia: Water efficient Innovative Solutions Portfolio for Enhancing Resilience – WISPER implemented by in Jordan and Tunisia

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5.5 DAY 5: NON-CONVENTIONAL WATER RESOURCES IN AGRICULTURE – PART 2

Field visit related to treatment and reuse of wastewater in irrigation aiming to expose the participants to the best practices in the management of treated wastewater for agriculture.

The specific topics of this day are:

- Water treatment process
- the importance of monitoring sustainable reuse of reclaimed water in agriculture.
- Demonstration case study of olive and pomegranate orchards irrigated with reclaimed water.

Time of departure from the hotel and logistics will be communicated and agreed during the 5th training day. Time of arrival at the hotel at the end of the study tour will depend on traffic.

6. PROPOSED DATES AND LOCATION

The regional training and study tour will be implemented as a live event in the premises of CIHEAM – Mediterranean Agronomic Institute of Bari, Italy. The proposed dates are Monday-Friday, June 12-16, 2023.

The five days will be full days. As mentioned before, **Days 1 and 4** will be classroom training days, while **Days 2 and 5** will be dedicated for field visits, and **Day 3** will combine classroom training followed by on-site training. The starting time for the field visits will be at 8:30and for day 1 and at 8:00am for day 5 to reach the visited sites on time, while the classroom training will start at 09:00am local time. The morning session will be four hours including a short break. The afternoon session will be two hours and half including a short break. The lunch break will be 1.5 hours. Any variation will be decided per day based on mutual agreement with the participants.

Participants will be requested to be present at the venue on time.

7. TRAINERS OF THE REGIONAL TRAINING AND STUDY TOUR

The regional training and study tour will be implemented by the Non-Key Experts (NKEs) under the supervision of the Water Key Expert (KE) of the WES project, Ms Suzan Taha. The NKEs providing the training are:

Dr Nicola LAMADDALENA (Head of the Land & Water Department and Deputy Director CIHEAM Bari, Italy):

Holding a MSc in Hydraulic Engineer at Polytechnic of Bari and a PhD. in Irrigation Engineering at the Technical University of Lisbon, Mr Lamaddalena has been working for more than 25 years on agricultural engineering and water resources management, with a focus of design, performance analysis and management of large scale distribution systems, new delivery technologies with associate modelling development under water scarcity conditions, governance models of Water Users Associations. He served as University Professor at the Polytechnic of Bari (Italy) and provided consulting services to public and private sectors. Scientific and technical activities have been

conjugated with the management of many water-related development projects in Southern Europe, North Africa and Near East, also in cooperation with International Research Centres and Universities. Dr Lamaddalena is a member of the International Section Board on Land and Water - CIGR (International Commission of Agricultural and Biosystems Engineering) and is the Chairman of the Task Team for the preparation of the Policy workshop on "Water for Food Security and Nutrition" (FAO-CFS, 2015) and a Special Rapporteur at the Policy workshop on "Water for Food Security and Nutrition" - FAO-CFS 42.

Dr Roula KHADRA (Scientific Administrator/Principal Researcher CIHEAM Bari, Italy):

Roula Khadra holds a post-doctoral position in economic optimization of on-plot irrigation management under conditions of water deficit and salinity, a doctorate in the development of an integrated tool for the analysis of irrigation water systems in water scarcity conditions (Mediterranean agriculture), with a post-graduate degree in land and water resource management: irrigated agriculture. Her master's degree focused on performance analysis of large-scale on-demand irrigation systems. She has twenty (20) years of proven research experience in the areas of: sustainable agriculture under water scarcity conditions, analysis and development of the performance of large-scale irrigation systems, the implementation of modernization procedures, effective implementation of participatory irrigation management processes in collaboration with local institutions across the Mediterranean, as well as land use planning programs (Systems of decision support) and impact analysis and the design and implementation of WUA monitoring and evaluation systems.

Dr Abdelouahid FOUIAL, Independent Consultant, CIHEAM-Bari, Italy

Mr. FOUIAL is a Holder of a doctorate in civil engineering and MSc. in land and water resources management, with proven experience in project management, consulting services in the management of water and solar energy in agriculture, providing and developing tailor-made training for students, engineers, technicians and farmers, etc., in the fields of agricultural water management, irrigation, and solar energy in agriculture.

Abdelouahid FOUIAL will facilitate the implementation of the regional training and the study tour.

All experts are **fluent English and French speakers**. Both Roula KHADRA and Abdelouahid FOUIAL are **speakers of Arabic language**.

8. TARGET PARTICIPANTS

The intended audience of this activity includes technical directors of Irrigation Water Authorities, Water Users Associations, and relevant experts from the Ministries of Water/Irrigation/Agriculture including irrigation extension engineers, key educated farmers, farmers' associations and selected NGOs active in the field.

The activity will benefit managers and technical personnel in organisations responsible for irrigation systems planning, design and operation and maintenance; decision makers and administrators involved in different aspects of irrigation water management in the PCs; local organisations and Water Users Associations delegated with the supply and distribution of irrigation water;

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representatives from the private sector involved in the provision of irrigation technology and support services, and key educated farmers.

Three (3) participants per WES partner country will be invited to the regional training and the study tour representing as much as possible the different stakeholders mentioned above. Representatives of up to two (2) regional NGOs of relevance will be invited and selected through the Bluegreen project and its network. Representatives from three (3) WES Demonstration projects of relevance will also be invited (NGOs).

Accordingly, the total number of participants to the regional training and study tour is estimated at 30. With this total number of participants, plenary classroom training is the most suitable form of training.

9. REQUIREMENTS FROM THE PARTICIPANTS

As -mentioned before, the regional training and study tour is a live event in CIHEAM, Bari, Italy. There is no opportunity for virtual participation. The regional training will not be recorded nor filmed. Physical presence is required.

Interpretation services will be provided. The training material presented by the NKEs will be in English. The NKEs will present and discuss in English. Understanding written English will give an advantage.

10. GENERAL PRINCIPLES

- **Short sessions:** The programme per day will be divided in two sessions of maximum three (3) hours each.
- **Overall duration is one (1) week:** Starting Monday, June 12, 2023, and closing Friday, June 16, 2023, end of day.
- **Background material provided in advance:** Highlighting the most important parts of the sessions to avoid spending too much time on details during the sessions.
- **Material provided** for each session in pdf version of slides.
- **Strict time keeping:** To keep the training dynamic, timing will be reminded at the beginning of the morning and afternoon session. NKEs and participants will be reminded by the facilitator.
- **Good coordination team**: For each session, the role of the NKEs, facilitator, and the interpreters must be defined in advance.
- **Presentations maximum 45 mins with questions**: Making references to the background materials, focusing on the understanding of key concepts, and having challenging exercises.
- **Short polls after/during presentation** to keep the attention of participants and get direct feed-back (using tools such as Mentimeter and Kahoot!).

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- **Quiz at the beginning and end of the training (after all sessions have ended):** A general "**baseline" quiz** for all sessions - to check if concepts are familiar to the participants and/or well understood - will be performed **prior to the start of the regional training** and **the same quiz after all sessions are completed allowing** to check the progress in knowledge acquisition through the educational/training interventions.
- **Building a community**: it is important to develop relationships between participants from the same country for future development of optimal irrigation management practices and from different countries to allow exchange of experiences during, between and after the regional training and study tour.

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