

PROMOTING SUSTAINABLE IRRIGATION MANAGEMENT AND NON-CONVENTIONAL WATER USE IN THE MEDITERRANEAN – PROSIM

J.J. Alarcón*, F. Pedrero-Salcedo, A. Parra
Department of Irrigation, Centro de Edafología y Biología Aplicada del Segura
(CEBAS-CSIC), P.O. Box 164, 30100 Espinardo-Murcia, Spain

*jalarcon@cebas.csic.es

Abstract

PROSIM project faces the challenge of water use for irrigation focusing on both water demand and supply for irrigation. The project brings innovative solutions combining water use efficiency and no conventional water resources (NCW) and build local capacities to adopt/upscale them. Cross-border capacity building and roadmaps and plans for improved water management based on project results will be carried out while enhancing public-private cooperation will be fostered together with investments for the adoption/upscale of the proposed solutions.

The project's main expected results are: • 4 national/regional institutions on water management involved and 80 extension agents trained to provide technical support to farmers • 237 pilot farmers (91 ha) equipped with tailored subsets of 9 innovative solutions, increasing water use efficiency (WUE) by 30% and substituting conventional by no conventional water (NCW) up to 100. They will act as change leaders in communities of about 50.000 farmers (100k ha) and beyond, reinforcing commitment to a more sustainable use of irrigation water at Mediterranean basin level

1. Introduction

In the context of climate change, the problem of water scarcity for agriculture has been accentuated during the last years.

The main water management problems in the Mediterranean countries are:

- Technical: important water losses in irrigation, due to non-efficient systems; limited water sources diversification and reliance on NCWs, still an untapped resource;
- Institutional: scarce capacities of institutions to enforce effective water management plans, involving Irrigation Practitioners-IPs (e.g. Extension Agents-EAs, water users' associations-WUAs, farmers) in planning and implementation;
- Social: scarce adoption of modern solutions at farmer's level enabling more efficient water-use and NCWs exploitation, due to the lack of awareness and knowledge and technology transfer initiatives.

The possible solutions are:

- To have available new/enhanced, more sustainable and context-tailored solutions for WUE and higher exploitation of NCWs in irrigation;

- To strengthen capacities of national/regional/local institutions to manage water sources efficiently and sustainably, cooperating with IPs and the private sector;
- To enhance capabilities of IPs to adopt, operate and maintain modern WUE and NCWs solutions.

In this sense, PROSIM answer focuses on both demand and supply side, bringing innovative solutions for improve of Water Use Efficiency (WUE) and NCWs and building local capacities.

2. General and specific objectives of PROSIM.

General objective: To contribute to environmental protection, climate change adaptation and mitigation in irrigation water management through water use efficiency and use of non-conventional waters.

Specific objectives:

| |
|---|
| To demonstrate new/enhanced, sustainable irrigation solutions that ensure an increased water-use efficiency and entail a larger use of NCWs, adapt their technical complexity to local conditions and capacities of target areas and make tailored solutions available to stakeholders at Med basin level |
|---|

| |
|---|
| To strengthen cross-border cooperation, capacity building and engagement in sustainable irrigation water management of relevant local institutions and private stakeholders at Med basin level, by sharing and capitalising know-how; providing mutual support in the implementation of innovative solutions; |
|---|

| |
|--|
| To support farmers' adoption of sustainable irrigation water management solutions combining environmental, technical and economic advantages and foster civil society engagement in environmental sustainability at Med basin level. |
|--|

3. Cross border impact and expected change

Cross-border Cooperation between different partners (from five Mediterranean countries) will allow to answer common water management challenges and specific needs of territories:

- Spain: to further progress in innovation in WUE and NCWs use, building best practices to transfer in the Med.
- Italy: to cope with technology innovation pace to face water scarcity of Southern regions, especially in Sicily.
- Jordan: to increase NCWs use, e.g. unexploited brackish waters.
- Tunisia: to upscale innovative desalination technologies combined with WUE to face increasing water scarcity in a way that is environmentally sustainable and cost-effective.
- Lebanon: to improve treated waste water (TWW) quality and use in irrigation to address environmental and health challenges.

Thanks to this cross border cooperation, the partners can exchange and capitalise knowledge, help and learn from each other in developing new competences on a multitude of irrigation solutions and improved agricultural practises (IAP).

Change at 5 levels in mid-long term are expected:

- Technological: increased adoption/upscale of 9 product innovations for WUE and NCWs, tailored to local context and farmer-oriented.
- Institutional: improved cooperation between institutions to manage water supply, plan and implement WM initiatives, including efficient and sustainable product innovations and involving the private sector.
- Social: more sustainable water demand by 237 pilot farmers; increased civil society engagement.
- Socio-Environmental: CWs savings thanks to +30% efficiency in water use and substitution up to 100% of CWs with NCWs in 51.5 ha in Lebanon, Jordan and Tunisia, increasing overall water availability.
- Economic: +5-10% investments in WUE and NCWs from governments, financial institutions, providers and farmers; improved agrofood production.
- Employment: we expect 20 new jobs created by farms and IS providers thanks to improved agrofood production and wider adoption of IS.

4. Brief description of the cross-cutting issues.

Gender equality: rural women are 70% of agriculture labour force in Jordan, 40% in Lebanon, 30% in Tunisia. Women will be represented at a higher percentage than their presence in comparable roles at national level and will be included equitably, showing that they are key for effective introduction of product innovations.

Democracy & human rights: the project has an inclusive approach linking up local-regional and national level and facilitating participation of groups as local farmer's associations/cooperatives to WM planning process. This reinforces the access to basic rights (e.g. right to higher quality water, to fair socio-economic conditions) and to public decision making process. Inclusion will be regardless of sex, nationality, religion, language.

Environmental sustainability: sustainable product innovations will have some positive environmental effects: -Effects of increased WUE in irrigation: reduced overexploitation and increased protection of groundwater; decreased groundwater salination. -Effects of higher use on NCWs for irrigation: reduced fresh water use; -Effects of improved NCWs quality will reduce soil pollution and salination, increasing crops safety and elimination of polluting irrigation practices.

5. Innovative Approach

The project has an overall approach based on partner's experience. Main lessons learned over time refers to process and organization:

- demonstrate solutions with farmers and let them fully experience their benefits is a must to really reach the goal, i.e. that other farmers overcome risk-aversion and progressively follow their peers in adopting innovations.
- successful initiatives combine introduction of technical solutions at farmers' site with support from research institutions and better coordination with local players as key for innovation adoption.

- long-lasting work with institutions at Med basin level opens the door to new solutions and related opportunities to address local needs, more effective ways of working locally and more supportive water management frameworks

Within this overall approach, partners will be concentrated in 9 product innovations (IS innovation stages are different: 1-development; 2-tuning, 3-field adoption).

- IS1: Sub-surface irrigation with treated waste water (JOR, LEB, ITA) – Stage 2
- IS2: Drip irrigation system with no conventional wastewater (all countries) – Stage 3
- IS3: New evaporation pan (JOR) – Stage 2
- IS4: New sensors for irrigation scheduling (JOR, LEB, TUN, ITA) – Stage 2
- IS5: New filtration systems to improve the wastewater reuse (JOR, LEB, TUN, ITA) – Stage 2
- IS6: Improvement of the reverse osmosis desalination (JOR, TUN) - Stage 2
- IS7: Improvement of the nano-filtration systems for desalination (TUN; JOR) - Stage 2
- IS8: Development of capacitive deionisation (JOR)–Stage 1
- IS9: Decision support system for mixing conventional and non-conventional water resources in compliance with national laws (JOR, LEB, TUN, ITA, SPA) – Stage 1.

Strong innovative results are expected for local territories, given their current situation: surface brackish water in Jordan Valley are unexploited and can significantly contribute to reduce pressure on other water sources; wastewater are used in Lebanon with poor treatment and dangerous consequences for the environment; wells excavation and use of groundwater is not sustainable in Tunisia; diffusion of innovation is low in Sicily; correctly mixing waters is a challenge in Spain; etc.

Acknowledgements

This research project “Promoting Sustainable Irrigation Management and Non-Conventional Water Use in the Mediterranean- PROSIM” has been funded the ENI CBC MED Programme 2014-2020.