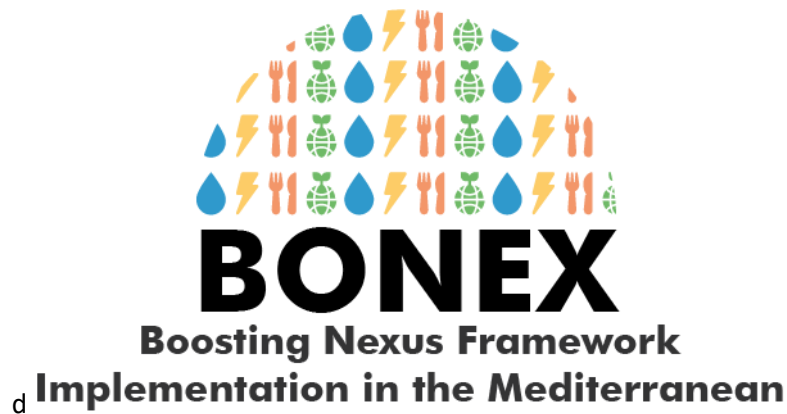




## 2<sup>nd</sup> BONEX Workshop in Tunisia

### Advanced Evaluation of the WEFE Nexus Interventions Under Reclaimed Water Reuse in Ouardanine

Thursday 25 January 2024

The workshop aimed at identifying local context-specific technological innovations in line with the WEFE Nexus approach. More specifically, the aims were:

- To analyze the impacts of the identified interventions on the WEFE Nexus components in a way that balances trade-offs and synergies between ecosystem services and their related implications.
- To identify the main leverage points (barriers and opportunities) to guarantee the implementation and the success of the project intervention.

## 1 Methods

The workshop included 3 main sessions based on a detailed script:

- **1<sup>st</sup> session:** it was dedicated to the introduction of the results of the 1st workshop (Ecosystem analysis and institutional aspects), the methodology of the second workshop, the intervention of BONEX and the presentation and validation of the final CLD results.
- **2<sup>nd</sup> session:** Split into 2 working groups, participants identified the impacts of the interventions on ecosystem services, compared the project intervention and the alternative solution, and presented the outcomes of the 2 working groups. Members of the two subgroups were identified beforehand based on the number of representatives from each organization, gender balance, WEFE coverage with pre-assigned moderators and rapporteurs from the Steering Committee. Facilitators were members of the BONEX research team.
- **3<sup>rd</sup> session:** reporting of the working groups and plenary discussion.

## 2 Results

### 2.1 Validation of the CLD and identification of the solutions

For the CLD, the postproduction process has integrated the 3 CLDs produced during the 1<sup>st</sup> workshop. The process consisted in a refinement of the variables, the identification of new feedback loops, and a general harmonization leading to a unique CLD (Figure 1) including the 3 main problems defined by the stakeholders:



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This project is part of the  
PRIMA programme supported  
by the European Union.

Energy Cost, Energy Availability, and Water Availability. Two main solutions were identified in the CLD as i) the project intervention and ii) the co-produced alternative solution.

During the plenary session of the workshop, the main variables were highlighted especially those including the main problems and possible solutions (the BONEX intervention and the alternative solution). Examples of loops were presented to facilitate the understanding of the causality and the link between the variables i.e. problems and possible solutions to establish a link between the CLD and the following session where the 2 working group are expected to discuss BONEX intervention (Smart reuse) and the alternative solution (Solar pumping). The main reaction was related to the alternative solution (solar pumping = PV investment) that was emphasized by the majority of the farmers who were expecting to go a step further toward the implementation since they were expecting a solution with a short term impact on water availability; one of the crucial problems.

## 2.2 The project intervention, barriers and opportunities

The intervention consisted of using IoT for a better management of reclaimed water quantity and quality. It aims at installing smart sensors to monitor selected parameters of the reclaimed water quality to allow recovering nutrients and reducing the use of fertilizers. Besides, it is meant to improve water use efficiency by installing an agrometeorological station and low-cost soil sensors to better define water requirement and irrigation scheduling.

During the reporting session, the main obstacles that may hamper the implementation of BONEX project intervention, as defined by the experts, were identified and discussed. They are classified as follows:

- **Technical:** Poor timeliness TWW supply for irrigation and limited capacity of the irrigation network.
- **Financial:** Possible high cost of the instruments and current lack of funding/subsidies to use IoT-driven tools in the agricultural sector.
- **Social and institutional:** Lack of incentives to invest in technology, poor water governance at local level, lack of training-for-purpose, and lack of communication among stakeholders and conflicting relations within the local community.

Several **opportunities** were also highlighted as follows:

- **Technical:** Training of the new generation of young farmers on innovative technologies, integration of capacity building as a package within the solution, existence of public training structures and extension services to carry out outreach activities, and availability of research institutions to support the implementation of the solutions and follow up on outcomes.
- **Financial:** Estimated low cost and affordability of the developed tool and its rapid availability on the market, presence of local companies that could provide an integrated solution, involvement of Agricultural Services Companies to promote the intervention among farmers, involvement of NGOs funding, and availability of funding by training centres or research projects.
- **Social, administrative, and political:** Coordination between stakeholders, incentives and support from the government for the reuse of reclaimed water are highly relevant, high acceptance and interest of the farmers in innovative solutions, and potential availability of reclaimed water through improved governance.

## 2.3 The alternative solution (co-constructed), barriers and opportunities

Installing solar panels to overcome energy cut during pick hours and allow timely irrigation had mainly opportunities, and less obstacles:

- **Obstacles:** Limited financial capacity of the water users' association (GDA), lack of commitment to finance from farmers, possible issues with security/safety for the equipment.
- **Opportunities:** availability of the location for the PV installation, existence of ANME (national agency for energy management) to support investment, technical study free of charge with 25% of incentive on the investment cost, subsidies for farmers' associations, supportive regulations, possible coordination between GDA, the society and the electricity company (STEG).

Some of the impacts on the WEFE were identified as cost reduction of the energy, increase of TWW availability, improvement of agricultural production, crops diversity and income, improvement of the ecosystem.

Taking into consideration of prevailing context related to the availability of the resources, the workshop was concluded by a summary of the two discussed technologies and a strong recommendation to consider the BONEX technological innovation and the alternative solution as complementary interventions, part of the same picture, to implement the WEFE Nexus and to improve the resources management under water reuse.

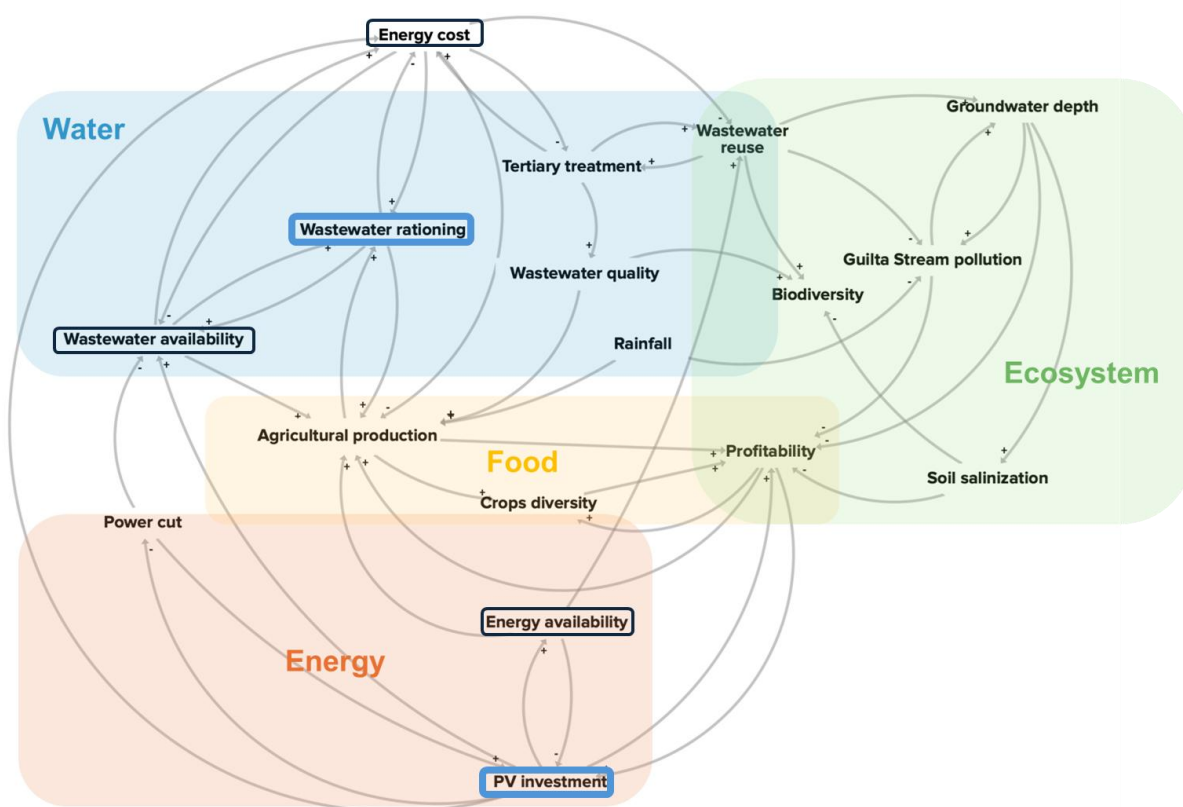


Figure 1. Finalized CLD showing the WEFE Nexus components, the problems (black) and the validated solutions (blue)



