



**Boosting Nexus Framework
Implementation in the Mediterranean**



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

FACTSHEET | DEMONSTRATION PILOT MOROCCO



Souss-Massa basin (Morocco)

Context of the demonstration project



The region of Chtouka, located in the heart of the Souss-Massa plain in southwestern Morocco, is a major agricultural production region that faces a major water crisis compromising the sustainability of agricultural production. This critical situation results from a combination of structural and climatic factors. On the one hand, climate change is causing a significant decrease in rainfall, rising temperatures, and greater seasonal variability, all of which are intensifying pressure on already scarce water resources. On the other hand, human activities particularly the intensive exploitation of groundwater are contributing to the depletion of underground reserves. Added to this is the growing salinization of soils, a direct consequence of excessive groundwater use and seawater intrusion into coastal aquifers, which is degrading the quality of agricultural land and undermining its productivity.

These multiple pressures threaten not only the viability of the agricultural sector but also food security and the livelihoods of rural communities. In light of this situation, several measures have been considered to preserve natural resources. Among the key responses implemented is the construction of a seawater desalination plant as an ambitious and strategic project based on reverse osmosis technology. This innovative solution makes it possible to significantly reduce pressure on aquifers while ensuring a stable and reliable water supply for crops. Furthermore, desalinated water contains low levels of dissolved salts, which contributes to improved long-term soil management.

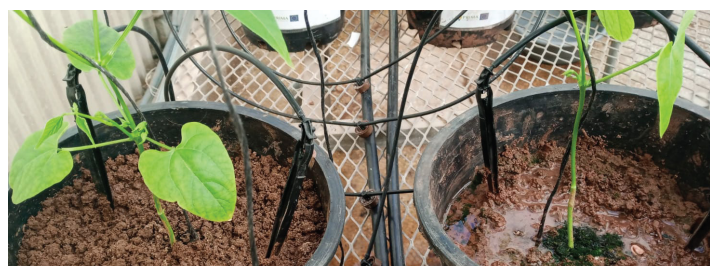
In this context, in the framework of BONEX project, DP Souss Massa focuses, under the Water-Energy-Food-Ecosystems (WEFE) Nexus approach, on the environmental and economic sustainability of the use of desalinated water for irrigation, especially since it is, at the country level, the first use of desalinated water for irrigation.

Description of the technology demonstrated in the DP



Three experimental studies were conducted as part of this initiative. The first focused on evaluating different proportions of desalinated water and well water applied to two zucchini varieties (Radia and Kayssar). The results showed that a mixture containing 25% desalinated water provided a good balance between plant growth, water consumption, and CO₂ emissions. Then, in order to better valorise the use of desalinated water and promote the nexus approach, the second and third studies conducted on green beans and zucchini, and carried out under controlled conditions, implemented an integrated and sustainable approach combining desalinated water, magnetic water treatment, the use of biofertilizers, and solar-powered irrigation. This strategy led to improvements in crop yields, nutrient availability in the soil, and plant resilience to environmental stress.

In addition, a practical irrigation guide was developed for farmers in the region, on the basis of the experimental work and through several surveys targeting key export crops such as tomatoes, peppers, raspberries, cucumbers, and zucchinis. This guide offers concrete recommendations for adjusting both the quality and quantity of desalinated irrigation water according to the specific needs and development stages of each crop. The aim is to promote agricultural practices that are sustainable, efficient, and well adapted to the increasing scarcity of water resources.





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WEFE Nexus dimensions

The intervention carried out in the Chtouka region integrated the Water–Energy–Soil–Food (WEFE) dimensions.

On the water front, the installation of a reverse osmosis desalination plant helped secure the water supply for irrigation while reducing pressure on groundwater resources, with optimized blends of desalinated water and well water ensuring efficient use.

The energy dimension was addressed through the integration of solar energy to power irrigation systems, thus reducing both costs and CO₂ emissions. To preserve soil health, the project introduced the use of biofertilizers and magnetic water treatment to enhance nutrient absorption, prevent salinization, and maintain soil fertility.

Finally, the food dimension was tackled by improving agricultural practices for key crops in the region, with the development of a practical guide offering recommendations that contribute to sustainable and climate-resilient agricultural production.



Gender dimension

The gender dimension was integrated throughout all project activities to ensure an equitable distribution of benefits and opportunities between women and men. Acknowledging that women play a fundamental yet often underestimated role in agricultural systems and water resource management, the project adopted an approach aimed at recognizing, valuing, and strengthening their active participation at all stages of the initiative.

From the beginning of the project, special attention was given to the effective involvement of women. Specific efforts were made to promote women's participation in participatory workshops, field demonstration sessions, and community consultations.

The objective was not only to ensure their presence but also to guarantee their active inclusion in reflection processes, co-creation of solutions, and decision-making.

Main policy recommendations

To support the implementation and scaling up of desalination technology and sustainable agricultural practices, it is recommended at the local level to train and support farmers in the use of desalinated water and associated technologies, while fostering the creation of cooperatives to pool costs and facilitate collective adoption. It is also essential to establish agronomic monitoring units to assist farming operations.

- **At the regional level**, desalinated water should be integrated into integrated water resources management plans, coordination among local institutions should be strengthened, and financial incentives should be provided to encourage the adoption of optimized irrigation systems.

- **At the national level**, it is necessary to incorporate desalination into food security policies, support agricultural innovation, strengthen applied research on the impacts of desalinated water, and promote a national strategy for the use and valorization of non-conventional water resources.

These measures, combined with appropriate taxation policies and targeted subsidies, will help ensure the sustainability of water resources and the effectiveness of agricultural practices in a context of water stress and climate change.

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