



**Boosting Nexus Framework
Implementation in the Mediterranean**



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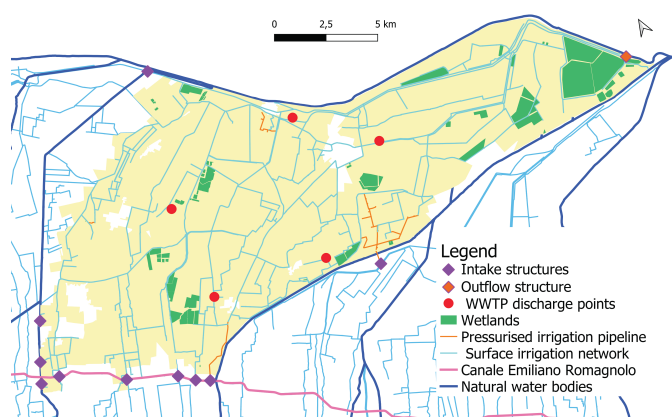
FACTSHEET | DEMONSTRATION PILOT ITALY



Lorgana-Botte irrigation (Italy)

Context of the demonstration project

The Lorgana-Botte irrigation district in Emilia-Romagna (Figure 1) covers the area of around 22,500 ha, and represents an important agricultural production zone. It is characterised by a developed irrigation network and a total of 12 wastewater treatment plants (WWTP) discharging their effluent into irrigation canals, representing a case of indirect water reuse. Moreover, due to water scarcity and increasing energy costs, it is needed to reduce water consumption. Therefore, the Italian DP focused on analysing water and energy conservation strategies based on the district's water balance, also considering irrigation water quality and the impact of Nature-based Solutions (NbS) within this intricate nexus.



The district faces significant challenges stemming from uneven water resource distribution and intensifying climate change, evidenced by recurring droughts (2012, 2015, 2016, 2017, 2022) and recent floods (May 2023, October 2024). This water scarcity impacts the region's substantial agricultural production, also increasing its costs.

Moreover, and the energy use and cost is another problem since it is needed to transport and distribute water. There are also different environmental issues such as water quality, wetland loss and riparian vegetation removal, although conservation efforts are underway. While water quality has been improving, water losses persist, highlighting the need for efficient water management in this vital agricultural area vulnerable to climate extremes.

Description of the technology demonstrated in the DP

The DP primarily aimed to optimise the irrigation network's water balance to minimise losses and reduce water abstraction, thus also lowering energy consumption and costs. This can result in improving agricultural sustainability, by analysing all water fluxes and also implementing NbS for water quality improvement.

The BONEX project interventions also included evaluation of the impact that WWTPs effluents can have on irrigation water quality by considering different sections of the distribution network and variable hydrological conditions.

The application and analysis of the interventions applied showed promising results and possible extent of water savings was estimated.

Moreover, the NbS tested (i.e. wetland, riparian buffer) had a valuable effect on water quality improvement, and WWTP effluent was found to increase nutrient content in irrigation water therefore potentially allowing lower use of artificial fertilisers, while not significantly affecting microbiological parameters.



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WEFE Nexus dimensions

The BONEX DP addressed the WEFe Nexus dimensions through three main interventions.

To close the irrigation network's **water** balance, the project quantified different components (e.g., crop needs, infiltration, evaporation) and related energy consumption, using four years of data and empirical estimations for previously unmeasured variables like infiltration (through canal trials) and evaporation (Figure 2). This quantification aimed to optimise water inlet, reduce pumping, lower energy use, and promote sustainable water practices, also involving stakeholders like farmers' associations and authorities.



Moreover, the water quality was also considered, both through testing the effects on indirect water reuse and application of Nature-based Solutions (NbS). The project implemented wetlands, both existing and restored (Figure 3) and a novel mowing technique for riparian vegetation, that could both improve water quality, therefore contributing to a more sustainable food production. Finally, these NbS and other interventions enhance water quality with minimal energy use, boost biodiversity, and improve overall **ecosystem** state.



These promising results were also positively evaluated by the DP stakeholder that were involved, with dedicated activities, in the intervention design and testing throughout the project lifetime.

Main policy recommendations

In order to apply on a large scale the new approach developed by the Italian DP within the BONEX project, specific actions must be taken.

First of all, it must be ensured that the implementation is properly planned and designed, taking into account all key players and potential regional variables. It is also crucial to assess the possibility of extending the technology to a larger scale. To this end, it is necessary that the quantitative and qualitative criteria are uniform throughout the area and applicable to different territories. The policy makers should therefore implement specific actions that would favour water saving and quality improvement interventions, requiring specific planning for agricultural areas, also taking into consideration the overall ecosystem status.

Gender dimension

The work carried out in the Italian DP took into account the gender dimension mainly in terms of identifying stakeholders to involve and obtain information. The main activities with stakeholders were the project workshops and, in the first instance, invitations to participate in these events were usually sent to organisations or institutions, which decided autonomously who would represent them.

However, it was noted that this approach led to a low participation of female stakeholders and therefore a specific strategy to identify also these stakeholders and invite them individually was implemented.

Moreover, during the project lifetime CBR started an internal process that led to the inclusion of a Gender Equality Plan among the corporate objectives, aligning with the requirements of Horizon Europe. UNIBO already has this kind of policy document and therefore it was applied also on the project activities.

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