BONEX
Boosting Nexus Framework Implementation in the Mediterranean

PRIMA
PARTNERSHIP FOR RESEARCH AND INNOVATION IN THE MEDITERRANEAN AREA

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

FACTSHEET | DEMOSTRATION PILOT PORTUGAL

Alentejo (Portugal)

Context of the demonstration project

Located in southern Portugal, the Alentejo region is the country's largest by land area but one of the least populated. Known for its traditional cork oak forests (montado) and extensive farming systems, the region has long suffered from water scarcity, limiting agricultural modernization and rural development. The BONEX Demonstration Project focuses on the Alqueva irrigation zone, where the construction of the Alqueva dam has increased water availability and transformed the landscape. Vast cereal steppes have been replaced by irrigated permanent crops like olive trees, vineyards, and almond orchards. While this shift has boosted productivity and economic growth, it has also intensified pressure on natural resources, exacerbated by climate change. Key challenges include water scarcity, soil degradation, biodiversity loss, ecological imbalances, and the decline of traditional ecosystems. The region also faces rural depopulation and socio-economic inequality. Expanding irrigation raises energy demands and environmental stress, while the degradation of ecosystems such as the montado threatens long-term sustainability. These issues call for integrated, nature-based solutions that protect resources, restore biodiversity, and promote a more resilient agricultural model.

Description of the technology demonstrated in the DP

The BONEX Demonstration Pilot in Portugal implemented three Nature-based Solutions (NbS) tailored to Alentejo's landscape: waterline restoration with native hedgerows, restoration of a Mediterranean temporary pond, and use of biodiverse cover crops in olive groves. These solutions improved water retention, biodiversity, and soil health. Monitoring showed benefits like better soil infiltration, more stable crop yields under extreme weather, and increased wildlife presence. Farmers reported added value in landscape aesthetics, reduced labour after waterlogging, and improved farm branding.

The pilot also tested the KER Tool, which helps stakeholders evaluate the environmental, social, and economic trade-offs of NbS. Used at farms like Esporão and Marzalonas, it supported decision-making and natural capital assessments. The technologies demonstrated are scalable across Mediterranean areas, offering multifunctional, low-cost solutions to climate, biodiversity, and water management challenges in agriculture.

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WEFE Nexus dimensions

The BONEX pilot in Alentejo applied NbS to address all WEFE Nexus dimensions.

- **Water:** hedgerows, ponds, and cover crops improved retention, infiltration, and reduced runoff.
- **Energy:** healthier soils and moisture reduced irrigation and agrochemical use, lowering energy demand.
- **Food:** farmers reported more stable yields and enhanced soil fertility.
- **Ecosystems:** restored habitats increased biodiversity and ecosystem services.

The KER Tool supported evaluation of trade-offs across WEFE, linking ecological integrity to economic value and enabling integrated planning for sustainable, multifunctional landscapes.

Main policy recommendations

To scale Nature-based Solutions (NbS), an integrated policy approach is needed, combining training, incentives, and planning. Farmers and advisors must be trained in NbS benefits such as erosion control, water retention, and biodiversity.

Financial tools like Payments for Ecosystem Services (PES) and water pricing incentives should reward sustainable practices.

Cooperatives and advisory services can integrate decision-support tools for nutrient and water management aligned with NbS. Local platforms should foster dialogue and joint planning.

Demonstration farms promote peer learning and showcase results. Consumer awareness campaigns and product labelling can build demand for NbS-based farming.

Policies must reflect regional needs, mainstream NbS in eco-schemes and rural plans, and be supported by monitoring frameworks that measure both ecological and socio-economic outcomes.

Gender dimension

Although not addressed as a separate focus, gender considerations have been thoughtfully incorporated into the DP work. One example is the visibility of women in science, as the scientific team is predominantly female and played a key role in leading stakeholder engagement activities.

Particular attention was given to achieving gender balance in the three participatory workshops held in rural areas of Portugal, reaching near parity between male and female participants. Women were actively involved in co-design workshops, particularly from agricultural cooperatives and civil society organizations (1st workshop: 29 men and 14 women; 2nd workshop: 35 men and 25 women; and 3rd workshop: 19 men and 21 women). These numbers are especially significant given the rural context and the focus on agriculture, where women have historically been underrepresented in formal decision-making spaces. This reflects a commitment to inclusivity and recognition of the value of diverse perspectives within the WEFe nexus framework. The active involvement of women in both scientific and participatory processes provided strong role models and helped foster an equitable environment.

At the Esporão and Marzalonas site, women-led sustainability teams directly applied the KER Tool, highlighting its usability across gender lines. The project also emphasized the role of women in biodiversity conservation, both through leadership roles and decision-making contributions. Gender perspectives were considered in KPI development, ensuring the social impacts of NBS are comprehensively captured. Gender-disaggregated data was collected to monitor participation and support ongoing reflection on how to further strengthen gender sensitivity in future activities.

CONTACT

Coordinator: Rafael Casielles
BIOAZUL S.L. (Málaga, Spain)
+34 951 047 290
rcasielles@bioazul.com
www.bioazul.com