

MODELLING AND TECHNOLOGICAL TOOLS TO PREVENT SURFACE AND GROUND-WATER BODIES FROM AGRICULTURAL NON-POINT SOURCE POLLUTION UNDER MEDITERRANEAN CONDITIONS

Pr. Souad El HAJJAJI
s.elhajjaji@um5r.ac.ma

Laboratoire de spectroscopie, Modélisation Moléculaire, Matériaux, Nanomatériaux, Eau et Environnement (LS3MN2E).



Type de Projet	International	Eau - environnement	Domaine de Recherche
Appel d'offre	PRIMA	Horticultural crops, nitrate pollution, biological inhibitors of nitrification,	Mots Clés

2023 >>> 2026

Résumé

Fertilization is an essential practice to obtain the Several countries in the Mediterranean are affected by agricultural Non-Point Source (NPS) nitrate and phosphorus pollution of aquifers and surface waters (estuaries, lakes, wetlands, etc.), widespread in areas of intensive agriculture and livestock activity. The complexity of NPS pollution requires adopting specialized, interdisciplinary and multi actors approaches and different solutions from farmers and Water Resources Managers, Water Users Associations and regional and national Environmental Agencies. Therefore, there is a need for a paradigm change, looking for more site-specific approaches that support farmers rather than sanctioning and limiting their entrepreneurship. It might be the way for maintaining the trade-off between the needs of sustaining farmers' income and detrimental environmental impacts of NPS pollutants, which is a cornerstone of sustainable agriculture. NPP-SOL overall objective is to prevent diffuse pollution of water resources due to NPS agricultural pollutants under the Mediterranean soil and environmental conditions, according to the goals of the new Green Deal and Farm-to-Fork strategies. NPP-SOL will integrate site-specific best management practices to improve soil, water, fertilizers, and crop management with site-tailored and affordable-cost technologies to prevent natural bodies pollution. Common to all the adopted methodologies-technologies will be their sustainability, economic efficiency, and adherence to circular economy approach. NPP-SOL co-designs and tests Site-Specific Best Management Practices and Pollution-Preventing Technologies enhancing a multistakeholder participatory approach considering context-related needs and challenges, whether the proposed innovations are appropriate or not, and whether they can sustainably adopt the knowledge generated by NPPSOL. The aim is to intercept and remove NPS pollutants before reaching the groundwater and surface water bodies. Technologies such as Bioreactors and Constructed Wetlands will be set up to remove nutrients and pesticides from surface runoff and/or drainage water coming from agricultural fields. Anaerobic Digestors will treat livestock slurries before spreading them to the soil. Modelling Tools such as the agro-hydrological model FLOWSHAGES (FLOws of Water and Solute Transport in Heterogeneous Agricultural and Environmental

Systems) and the bio-economic model DAHBSIM (Dynamic Agricultural Household Bio-economic Simulation Model) are provided. FLOWS-HAGES produces information on the time evolution of water and solutes balance and all the functional processes involved (evapotranspiration, root uptake of water and solutes, irrigation volumes, groundwater recharge, drainage, runoff, nutrient transport). As for solute transport, the model allows for salts, pesticides, phosphorus and nitrogen transport simulations. DAHBSIM maximizes household objectives subject to constraints and resources allocation patterns by linking several sub-modules related to economic, production (including livestock), and consumption decisions. Technical Capacity Building assets of technicians from key stakeholders guarantee the application and spreading of the NPP-SOL outputs, the monitoring of the effectiveness of applied technologies, and the maintenance and fine-tuning over time. Farmer Awareness is monitored and strengthened throughout the project. NPP-SOL is implemented in four Case Studies (Israel, Italy, Morocco and Spain). The multi-disciplinary consortium provides expertise in surface and subsurface hydrology, soil science, agronomy, chemistry, microbiology, economics, and social sciences. NPP-SOL aims to overturn the traditional top-down approach, seeking more site-specific models and techniques focused on supporting farmers. It privileges small-to-medium scale actions spread throughout the agricultural basin and avoids large-scale interventions, thus making farmers involved and directly responsible for the management practices applied on their farms.

Partenaires

- University of Basilicata (UNIBAS) Italy,
- University of Cagliari (UNICA) Italy,
- Universitat de Barcelona (UB) Spain,
- Mediterranean Agronomic Institute of Montpellier (CIHEAM-IAM) France,
- Agricultural Research Organization – Volcani Institute (ARO) Israel,
- Ministry of Agriculture and Rural Development (MOAG) Israel,
- National Institute of Agricultural Research (INRA)

