

Project pilot Areas: Koiliaris CZO, Chania (Greece)

OPTIMIZING THE *Water-Ecosystem-Food-Climate* (WEFC) NEXUS IN AVOCADO PLANTATIONS

The Koiliaris river basin is currently affected by various pressures, ranging from soil degradation, torrential events that exceed infiltration rates leading to runoff and flooding, and loss of forests and natural vegetation. Within the overarching objective to build resilient systems, LENSES aims to find solutions that contribute to sustainable growth, thus contributing to food security. For this purpose, LENSES is applying innovative methodologies and strategies, such as nature-based solutions (NbS), to improve ecosystem management. The Water-Ecosystem-Food-Climate nexus (WEFC) is being evaluated, with a special focus on avocado cultivation.

GENERAL CHARACTERIZATION

Koiliaris River Basin →

- ✓ **Location:** Island of Crete.
- ✓ **Koiliaris River:** 36 km, Origin in the White Mountains (altitude exceeds 2,000 m).
- ✓ **Climate:** Mediterranean with hot/dry summer and cold/humid winter.
- ✓ **Precipitation:** 705 mm Average year (447-1032 mm).
- ✓ **Water resources:** Excellent water quality supplied by the White Mountains. In the regions where the Karst system communicates with the sea, the water quality shows higher chloride concentrations.
- ✓ **Land use:** Grasslands 58%, cultivated areas cover 29.4 %, urban 2.8 %, forests 8.5 % and aquatic areas 0.6 %.
- ✓ Most of the population is **engaged in agriculture**. The Main crops cultivated are *olives, oranges, and grapes*.



Koiliaris River Basin
130 km²

Extended Karst
80 km²



LENSES GOALS

The main goals are to improve understanding of the Nexus, improve water management and increase adaptive capacity to climate change. The objectives by domain are highlighted below:

Key domain goals →

- ✓ **Water:** Increase irrigation water efficiency by irrigating the tree, not the field, and local stakeholder engagement with government authorities for water management.
- ✓ **Ecosystems:** Increase NbS application, restore/increase biodiversity and reduce environmental pressures on ecosystems.
- ✓ **Food:** Increase food production and drought resilience and improve agricultural infrastructure.

HOW WILL LENSES WORK?

Modelling will be used to run **Nature-based Solutions (Nbs)** scenarios and quantify the impact on the Nexus using hydrological and geochemical data from the **Koiliaris-Critical Zone Observatory**. **LENSES** will combine **state-of-the-art technology**, such as Participatory Systems Dynamic Modeling (PSDM), water accounting, climate risk assessment and NbS bundles, and stakeholder expertise and knowledge.

Priority set of actions →

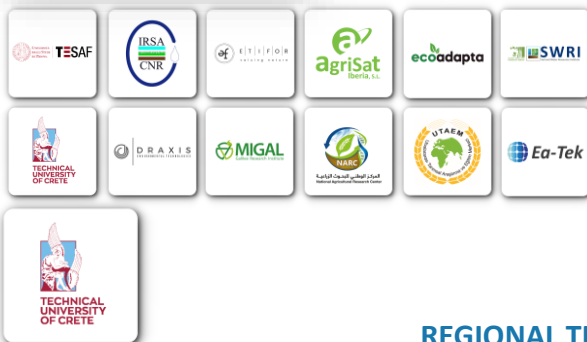
- ✓ Optimize irrigation systems and increase productivity
- ✓ Learning Alliances and Action (LAA): Focus group (avocado producers) + Participatory workshops
- ✓ Installation of soil moisture probes
- ✓ Running models to simulate plant growth and ecosystem processes
- ✓ Development of innovative business models



FUTURE PERSPECTIVE “CALL TO ACTION”

“It is necessary to have a scientific basis and data to present to institutions that can generate positive change in the agricultural systems of the Basin to address the challenges. We support studies that provide better water and land management, evaluations of soil degradation and soil formation and analyse institutional frameworks and possible barriers. Through monitoring and research, it is expected to assess the Nexus in the Koiliaris Watershed and the Extended Karst. Systematically, it is expected to minimize the environmental footprint and impact of the operation while maximizing the benefits to the farmer and the environment. Finally, Nature-based Solutions (NBS) are crucial in moving toward sustainable development while preserving ecosystems.”

Technical University of Crete (TUC)



REGIONAL TEAM



The Technical University of Crete (TUC) is one of Greece’s Higher Education Institutions, whose mission is to develop modern engineering specialties, to place emphasis on research in fields of advanced technology as well as to establish close cooperation with industry. The research is conducted at the Hydrogeochemical Engineering and Remediation of Soils (HersLab) laboratory (www.herslab.tuc.gr). The main contribution of TUC is in providing the tools for the modelling of the Nexus and the impacts of climate change and the use of the case study - Koiliaris CZO (<http://www.koiliaris-czo.tuc.gr/>).