TYMPAKI LIVING LAB

Our Living Lab Journey

TRANSCEND

Our Living Lab at a glance

The Tympaki water system is located in the southern part of the Heraklion regional unit, on the island of Crete.



Key facts

265 km2
Basin area

The area includes mountainous terrain in the north and the Messara plain in the south.

Water and land use

Irrigation accounts for approximately 95% of water use.

Agricultural land, including pastureland, covers around 90% of the basin: approx 40% is cropland and 50% is pastureland.

Climate, hydrology and ecology

Seasonal rainfall and dry periods worsen water supply-demand imbalances. Despite the Faneromeni Dam, water deficits persist, increasing pressure on groundwater and risks of over-abstraction and saline intrusion.

A collaborative living lab

10 participating actors
Coordinated by the Region of Crete: Water and environmental authorities, the Hellenic Survey of Geology and Mineral Exploration (EAGME), the Municipality of Phaistos, local land reclamation boards (TOEVs), DEYA Phaistos, the Tympaki Agricultural Cooperative and farmers.

Our journey towards transformational adaptation policies (TAPs)



WORKSHOP 1 - Vulnerability Assessment and Gap Identification (Sept 2023 · Zaros, Greece)
Identification of vulnerabilities, modelling needs, and challenges in communication and the implementation of water management decisions.

WORKSHOP 2 - Scenario Exploration and TAPs Identification (Feb 2025 · Zaros, Greece)
Presentation of the initial hydrological and economic simulations and exploration of scenarios.

WORKSHOP 3 - TAPs and scenario revision (Nov 2025 · Zaros, Greece)
Revision of scenarios through the Serious Game and discussion of interventions in pricing, infrastructure, crops and user awareness.

WORKSHOP 4 - Co-implementation of TAPs (Sept 2026 · Kokkinos Pyrgos, Greece)
Presented WEAP and economic model results, explored scenarios and drought insurance. The Serious Game addressed economic impacts and policy implementation conditions.

What we learned together

Water challenges

- Demand exceeds supply, while reliance on groundwater resources increases vulnerability to drought.
- Addressing water scarcity is closely linked to protecting the aquifer and ensuring the sustainability of agriculture.

Barriers to transformation

- Gap in communication between institutions and water providers on the use of novel solutions and governance that promotes water efficiency.
- Use of innovative solutions (e.g. change crop cultivations) by farmers is limited by market uncertainties.

Knowledge and capacity gaps

- Institutions lack the technical expertise to use models and interpret their results, limiting their ability to make urgent decisions.

From knowledge to action

From knowledge gaps to tools

LIVING LAB CHALLENGE

Understanding the interaction between water demand and supply, taking into account economic factors.

INTERACTION - Serious game (workshop 3 version)

Model results were incorporated into an interactive environment where stakeholders could compare adaptation strategies, explore trade-offs between different objectives, and see how their decisions could affect the area's hydrology and water users' economic outcomes.

TOOLS - Integrated Modeling Suite

- **WEAP - Water system**
  Simulates water availability, flows, users' water demands and the extent to which those demands can be met. It is a water management tool.
- **Microeconomic models**
  A set of positive mathematical programming models uses data on crops, water use, prices and costs to estimate farmers' adaptation responses. Changes in the crop mix, profit, water demand and labour requirements are assessed.

POLICIES TESTED IN THE SERIOUS GAME

- Hydrological scenarios
- Economic scenarios
- Infrastructure scenarios
- Management scenarios
- Insurance scenarios

INDICATORS

Unmet demand | Unmet irrigation demand | Agricultural profit (increase in %) - Average

Final score: Composite indicator of balanced water allocation and profitability; higher scores indicate better outcomes.

Adaptation options explored (TAPs)



Hydrological scenarios
Rainfall reductions of 10% and 20%. Severe drought lasting 5 and 7 consecutive years.



Economic scenarios
A 30% increase or a 30% decrease in olive prices. Increases in the cost of water of €0.50/m^3 and €1/m^3.



Infrastructure scenarios
Diversion of part of the Platy River's flow to the Faneromeni Dam, combined with expansion of the existing irrigation system.



Management scenarios
Fully irrigated or rainfed olive cultivation, and replacement of 5% of irrigated olive trees with avocado trees in central Tympaki.



Insurance scenarios
Applied in cases of a 10% and 20% reduction in rainfall, 5 or 7 years of drought, and irrigation of all olive trees.

From exploration to implementation

Top-ranked TAPs was as follows:

- **Hydrological TAPs:** Implementing deficit irrigation (despite reduction in profits/revenues) during dry years.
- **Infrastructure TAPs:** Reduction of water losses/leakages of pipeline system.
- **Economic TAPs:** Financial support for farmers through subsidies for crop rotation.
- **Management TAPs:** Spatial expansion of the TOEVs in the catchment area for better management vs private wells.

→ **More to come...**

This project has received funding from the EU Horizon Europe Programme under GA 101084110 and from UK Research and Innovation's (UKRI) Horizon Europe Guarantee Scheme [award number 10044695].

Funded by the European Union

UK Research and Innovation