

REXUS Project Pilot Areas: Pinios River Basin, Greece

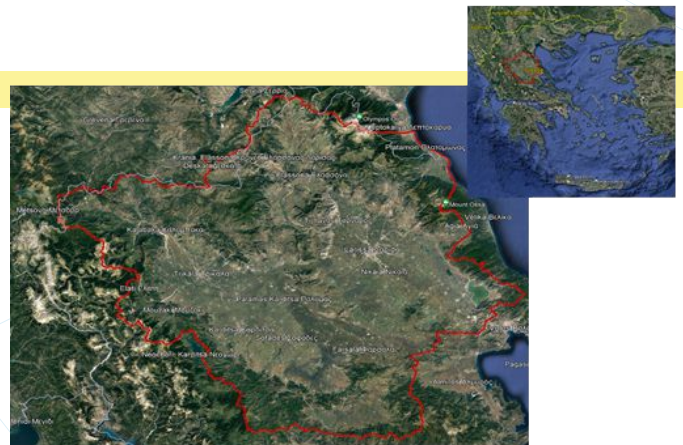
Bringing together a range of stakeholders to tackle the Water-Energy-Food-Climate (WEFC) Nexus issues in the Pinios River Basin

Considering all the complexities of sectoral interdependencies, the REXUS project aims to develop a sustainable framework that integrates the whole Nexus. The Pinios River Basin (PRB) is one of the most productive basins in Greece in terms of agricultural production, with a significant impact at the regional and national levels.

The absence of efficient water resources management manifests in high water consumption and overexploitation of groundwater. In addition, population growth and the expansion of tourism have increased water needs. Energy production is also essential, with two large hydropower plants operating and small hydropower plants expanding. In a further development, photovoltaic plants are also being established, in most cases replacing agricultural land, and large capacity new wind farms are planned. Finally, Climate Change impacts considerably, increasing the likelihood of devastating floods and extreme droughts.

General Characterization

- **Area:** 11,000 km²; Delimited by rugged relief.
- **Agricultural land:** 45%.
- **Arable crops:** Cereals, cotton, and other annual crops cover over 65% of the total arable land of Thessaly Water District (1st designated nitrate vulnerable zone of Greece since the 90's).
- **Water demand for agricultural irrigation:** Approx. 92% (1292 hm³).
- Groundwater constitutes the main source, although surface water is also contributing significantly to water requirements.



Water Framework Directive (WFD): River Basin Management Plan outcomes

- 3 out of the 27 groundwater bodies characterized by bad chemical quality and 10 by bad quantity status.
- 4 of the 69 surface water bodies in bad ecological status, 4 surface water bodies with chemical status below good.
- Intensive groundwater abstraction led to aquifers' over-exploitation in the past, triggering in parts of the basin significant subsidence due to matrix compaction that affected land infrastructures considerably.
- The water budget in large parts of the basin is deficient, leading to exploitation of non-renewable water resources, thus posing significant risk for water availability in the near future.

REXUS Goals



The REXUS project will contribute to all the Nexus domain's challenges.

- **Water:** Restore the status of water bodies, sustaining a sufficient quantity and quality of water to meet the needs of water users; Likewise, environmental flows to ecosystems must be maintained, improving adaptability to Climate Change (floods and droughts).
- **Energy:** Maintain/increase energy production through renewable resources to reduce emissions; Satisfy the energy needs of various uses (agricultural, industrial, domestic, etc.).
- **Food:** Considering the high socio-economic impact on agriculture, maintaining production is one of the most critical challenges. Production costs must be optimized to achieve the viability and improve the competitiveness of agriculture, while promoting the quality elements of products produced in harmony with the environment, to increase their added value in the market.
- **Climate:** Reduce the vulnerability of productive sectors and especially agricultural production to climate impacts. Resilience is also the keyword in this critical sector.



How will REXUS work?



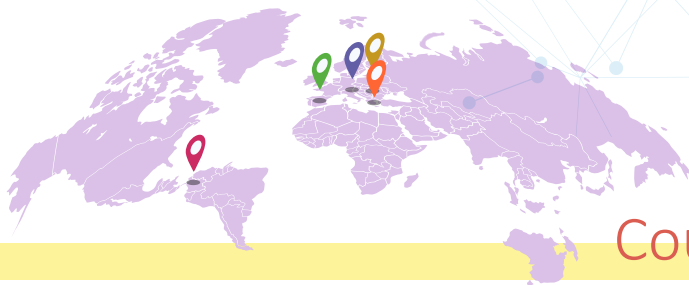
Scientific and Participatory approach

The critical issue to be addressed is to improve the understanding of the NEXUS by providing sustainable and viable solutions with the involvement of stakeholders from all sectors, levels, and functions with the firm conviction that this is the right way to manage “our NEXUS”. In addition, REXUS will show how technologies help shape scientifically justified and reliable pathways to sustainability and demonstrate the need for systematic, high-frequency monitoring as a vital tool to safeguard the correct implementation of solutions. Successful implementation of solutions must go through detailed analysis of the pilot’s needs.

Future perspective: Call to Action

“ Active stakeholder engagement is a one-way road to realize our vision, and a unique opportunity to make viewpoints known, and share experiences, knowledge and different problem-solving approaches to common challenges. Their guidance to the envisaged solutions and critical review of the project's research team proposals is of utmost essence. Smart, pragmatic, and acceptable solutions need to be shaped after hearing all the voices on ideas and the needs to be met, thus holistically understanding the environment the stakeholders want to live in. Stakeholders help us shape the big picture of the NEXUS, and we help stakeholders co-create sound solutions. Our action plan facilitates connectivity and networking with other stakeholders and the scientific community in the pilot area and beyond. In turn, the research team shares knowledge, technical guidance, and scientific support to the day-to-day work and operations, enhancing capacities where needed and requested. In the end, our overall actions aim at promoting real solutions for the sustainability of our living environment. ”

SWRI Team



Country pilots Regional Team

The Soil and Water Resources Institute (SWRI) is one of the 11 research institutes of the Hellenic Agricultural Organization-DEMETER in Greece that specializes on the protection and management of soil and water resources. SWRI is involved in resource management and policy support oriented projects, focusing on environmental modeling, applying state-of-the-art technological solutions and sensors in environmental monitoring, developing and proposing good agricultural practices, performing climate change impact assessment and environmental impact assessment in agriculture, and managing soil resources in agricultural areas. SWRI is one of the founding partners and the operator of the Pinios Hydrological Observatory (PHO), which is included in the International Long-Term Ecological Research (ILTER) sites and the European Network of Hydrological Observatories (ENOHA). SWRI also manages national river discharge monitoring network operating in the framework of the WFD 2000/60/EU .



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