



**DEPARTMENT OF INTERNATIONAL AND  
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**ATHENS UNIVERSITY OF ECONOMICS AND BUSINESS**

**A MULTI-MODEL ASSESSMENT OF GREECE'S  
AGRICULTURAL WATER-ENERGY-FOOD-  
ECOSYSTEMS NEXUS UNDER FUTURE  
SCENARIOS**

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# A multi-model assessment of Greece's agricultural Water-Energy-Food-Ecosystems Nexus under future scenarios

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## Abstract

Agricultural systems are becoming increasingly complex, requiring data-driven, science-supported models to address their multifaceted challenges and ensure sustainable management. In Greece, agriculture is a critical sector, contributing significantly to the economy and rural livelihoods, but it faces pressing challenges such as competing water uses, energy demands, lack of cluster productivity, and environmental pressures. This study presents a comprehensive multi-model assessment of Greece's Water-Energy-Food-Ecosystems Nexus, evaluating agricultural production alongside its energy and water requirements and quantifying the associated air pollution impacts at the national level. For the first time to our knowledge, we connect the FABLE Calculator (the software of the FABLE Consortium), with LEAP (Low Emissions Analysis Platform, from the Stockholm Environmental Institute), and the WaterReqGCH (a model developed by the Global Climate Hub). The FABLE Calculator provides detailed estimates of the agricultural and livestock production, which are then used by LEAP to calculate the respective energy demand and the associated greenhouse gases emissions, per fuel type used. The WaterReqGCH model uses the activity levels used in FABLE and LEAP in order to estimate the water requirements of the agricultural and livestock sector. The models run under a combination of mild-medium-extreme future scenarios until 2050 considering the Representative Concentration Pathways (RCPs) and the Shared Socioeconomic Pathways (SSPs) scenarios. The combination of the insights provided by this multi-model approach are useful and holistic evidence for policymaking.

## Keywords

Agricultural Systems; Energy-Emissions; Production; FABLE; LEAP; WaterReqGCH; Global Climate Hub; Water-Energy-Food Nexus.

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