

Assessment of Agricultural Dynamics and Water Requirements in the Oued Guir Watershed (Southeastern Morocco) Using Remote Sensing: Diagnosis and Perspectives under Climate Change.

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The Oued Guir watershed (southeastern Morocco) has undergone rapid transformation of its agricultural systems over the past two decades, marked by the coexistence of traditional oasis palm groves and new, larger-scale agricultural expansions, often irrigated by pumping or modernized irrigation networks. The commissioning of the Kaddoussa dam and its irrigation system, designed to mobilize around 30 million cubic meters per year for nearly 5,000 hectares, aims to support the rehabilitation of palm groves and the development of new irrigated areas. In this context, increasing water demand, growing pressure on the Meski-Boudenib aquifer, and uncertainties related to climate change pose significant challenges for the sustainability of agricultural systems and water resource management, Although this aquifer has an aquifer contract (Law 36-14).

This study aims to spatially characterize agricultural dynamics and water uses in the Oued Guir watershed while assessing the potential impacts of climate change, using remote sensing and agro-hydrological modeling tools. The objectives are: (i) to map and distinguish agricultural systems traditional oasis palm groves and recent agricultural expansions and analyze their evolution between 2000 and 2026; (ii) to identify the water sources mobilized and their interactions within the different agricultural systems; and (iii) to estimate crop water requirements to compare them with available water resources and assess their potential evolution under climate change conditions.

The methodology is based on the analysis of time-series satellite images processed on the Google Earth Engine (GEE) platform to map vegetation changes. Crop water requirements are estimated by combining the NDVI index with the crop coefficient (Kc) to calculate crop evapotranspiration (ETc), supplemented by estimates of actual evapotranspiration (ETa) using energy balance methods. These results are then analyzed in relation to climate scenarios to assess the potential evolution of agricultural dynamics and water requirements under the effects of climate change.

The expected results will identify areas where agricultural intensification or expansion could be considered in a sustainable manner, as well as sectors where water constraints require the implementation of adaptation strategies and enhanced management of water resources and ecosystems at the basin level.

Keywords: Oued Guir watershed, Oasis, Modern expansion, Remote sensing, NDVI, GEE, and Climate Change.