

# Contribution of Climate and Anthropogenic Activities to the Transformation of the Fluvial Landscape of the Oued Sahla

I. El Ghalmi<sup>1</sup>; I. Samma<sup>1</sup>; H. Beragrag<sup>1</sup>; A. Taous<sup>1</sup>

<sup>1</sup>Laboratory of Geo-Environmental Analysis, Spatial Planning, and Sustainable Development, FLSH-Saïs

**Corresponding Author:** elghalmi2014imad@gmail.com

**Abstract:** The Oued Sahla basin, covering approximately 1,150 km<sup>2</sup> in the central Rif region, has undergone significant transformations in its fluvial landscape over the past several decades, driven by the combined effects of climate variability and anthropogenic pressures. Analysis of climatic data from the Taounate and Ketama stations reveals an 18% decrease in annual precipitation between 1980 and 2020, dropping from 750 mm/year to about 615 mm/year, along with an increase in the frequency and intensity of extreme events, with floods exceeding 80 mm/24 h recorded in 2010 and 2016. This variability has altered the hydrological regime, leading to flash floods, prolonged low-flow periods, and increased riverbed incision. Anthropogenic pressures have amplified these transformations. Since 1990, the utilized agricultural area has increased by 30%, largely at the expense of forests, whose coverage declined from 45% to 28% between 1985 and 2020. The construction of rural roads and the expansion of slope farming have intensified runoff and erosion, increasing sediment loads. Diachronic analysis of satellite imagery (Landsat, 1985–2020) highlights lateral channel migration of up to 120 m in some areas, along with a 40% reduction in alluvial wetland zones. This study adopts an integrated approach combining remote sensing, GIS, and climatic analysis to reconstruct morpho-sedimentary changes and quantify the respective contributions of climatic and anthropogenic factors. The expected results will help identify vulnerable areas and formulate recommendations for sustainable management to mitigate hydrological risks and preserve water resources in the context of global changes.

**Keywords:** Oued Sahla, fluvial morphology, climate variability, anthropogenic pressure, remote sensing, watershed.