

Socio-ecological sustainability and resilience of the urban valleys of the Fez agglomeration (Morocco) (Oral)

Rassam Noura *, Houari Abdelghani

*Department of Geography, Faculty of Letters and Human Sciences Saïs–Fez, Sidi Mohamed Ben Abdellah
University (Morocco)*
[*nourassam2@gmail.com*](mailto:nourassam2@gmail.com)

ABSTRACT

The urban valleys of the Fez agglomeration represent key hydrological and landscape components, yet they are also areas of high vulnerability due to recurrent flooding and rapid urban transformation. Traditionally perceived as risk corridors, these spaces are now being reconsidered within a more sustainable and socio-ecological urban framework. This study aims to assess the sustainability and resilience of urban hydrological systems by analyzing the natural, territorial, and social dynamics that shape the valleys of the Oued Fez basin.

The methodological approach combines hydrogeomorphological analysis, hydraulic modeling using HEC-RAS, and spatial mapping with GIS. These tools were used to identify flow paths, water accumulation zones, and areas most exposed to flood hazards. In parallel, a socio-spatial vulnerability assessment was conducted, integrating land use, patterns of urban expansion, population density, and proximity to critical infrastructures. The integration of these physical and social indicators provides a systemic understanding of the interactions between hydrological processes, urban dynamics, and risk management mechanisms.

The results reveal a progressive fragmentation of the valley systems caused by uncontrolled urban sprawl, surface sealing, and the degradation of natural drainage networks. Nevertheless, several sectors retain significant ecological and hydrological potential, offering valuable opportunities for ecological restoration and integrated revitalization. The study proposes a conceptual framework that emphasizes valley renaturation, creation of multifunctional green-blue corridors, and revalorization of flood zones as functional spaces that contribute simultaneously to risk mitigation, ecological balance, and social well-being.

Beyond its technical dimension, this approach aims to reposition water and valley systems as structuring elements of the urban fabric, fostering coevolution between natural and human processes. It highlights the transition toward a resilient urban model in which water management becomes a driver of environmental quality, landscape enhancement, and sustainable territorial development. This perspective underscores the importance of integrating hydrological, ecological, and socio-spatial dimensions in the planning of North African cities facing climate variability and growing flood hazards.

Keywords: Urban Valleys; Socio-Ecological Resilience; Flood Risk; Sustainability.