THE CONTRIBUTION OF REMOTE SENSING IN HYDRAULICS AND HYDROLOGY, 
ANALYSIS AND EVALUATION OF DIGITAL TERRAIN MODEL 
FOR FLOOD RISK MAPPING

Abstract

The study of flood risk involves the knowledge of the spatial variability in the characteristics of 
the vegetation cover, terrain, climate and changes induced by the intervention of humans in waters- 
sheds. The increased needs of the actors in land management mean that static maps no longer meet the 
requirements of scientists and decision-makers. Access is needed to the data, methods and tools to 
produce complex maps in response to the different stages of risk evaluation and response. The availa-
bility of very high spatial resolution remote sensing data (VHSR) and digital terrain model (DTM) 
make it possible to detect objects close to human size and, therefore, is of interest for studying anthropo-
genic activities. The development of new methods and knowledge using detailed spatial data, cou-
pled with the use of GIS, naturally becomes beneficial to the risks analysis. Indeed, the extraction of 
information from specific processes, such as vegetation indices, can be used as variables such as water 
heights, flow velocities, flow rates and submersion to predict the potential consequences of a flood. 
The functionalities of GIS for cartographic overlay and multi-criteria spatial analysis make it possible 
to identify the flood zones according to the level of risk from the flood, thus making it a useful deci-
sion-making tool.

This study was carried out on the territory of watersheds in the Annaba region, East of Algeria. 
The choice was guided by the availability of data (satellites images, maps, hydrology, etc.) and hydro-
logical specificities (proximity to an urban area). The adopted model is divided into two parts. The 
first part is to establish a methodology for the preservation of wetland biodiversity and the protection 
of urban areas against floods. Thanks to the multi-criteria spatial analysis and the functionalities of the 
GIS, we established a flood risk map for the watershed defined above. The result was satisfactory 
compared with the field reality. The second part of the model consisted of the integration of cadastral 
information with the flood risk map obtained in the first part of our research.

The primary objective of this mapping is to contribute to the development of flood risk manage-
ment plans (in the sense of risk reduction). The mapping stage also provides quantitative elements to 
more accurately assess the vulnerability of a territory.

Key words: Annaba, cadastral information, digital terrain model (DTM), flood risk, GIS, multi-
criteria spatial analysis, remote sensing, VHSR

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