

## THE EFFECT OF FLOOD PROTECTION WORKS ON THE FLOOD RISK OF THE MANDRA ATTIKI AREA

### ABSTRACT

The city of Mandra is an area of particular interest as it was hit by a devastating flood on November 15, 2017, which proved to be deadly, killing 23 people. The extreme violence and thunderstorms, as well as the fact that the disasters were largely due to inadequate settlements and reckless encroachments on the region's hydrographic network, prove the city of Mandra to be the ideal case study. The flood of November 2017 highlighted many of the pathogens of society, the lack of operational readiness of the responsible public authorities, the chronic negligence shown by local elected officials, and the ignorance of the residents about the imminent danger. At the same time, however, it has highlighted the importance of flood protection works as well as emergency preparedness measures.

After the flood, the process of approving flood protection works was accelerated. The study of flood protection works predicts the divergence of the Agia Aikaterini stream and the arrangement of the Soures stream. The runoff of these two streams, that contribute to the Mandra area, caused the November 2017 disaster.

The purpose of this work is to evaluate the effectiveness of these works in addressing the flooding phenomena that may occur in the Mandra area.

As a first step, the TELEMAC-2D hydrodynamic model is constructed, which simulates the flood for three different discharge scenarios. These scenarios apply in two cases, where no flood protection projects exist and where such works exist.

In the first simulation scenario, a fixed flow at the entry points of the streams into the computational model is set at a value equal to the design discharges of the flood protection works to be constructed. In the second scenario, a constant discharge is applied at the entry limits, with a value so that the culverts work less than 80% full. In the third scenario, the discharges calculated for the November 2017 flood event apply to the model entry points.

The effectiveness of protection works is assessed through flood risk assessment.

Initially, the vulnerability of the flooded area for each simulation scenario is assessed, followed by the flood hazard assessment, and the corresponding maps are compiled. Vulnerability is calculated by estimating the maximum potential impacts for the various uses of the study area. Flood hazard, which expresses the intensity of the flood phenomenon, is calculated according to the results of the hydraulic simulation of the different scenarios. Finally, the flood risk is calculated, which is the product of these two factors, and the flood risk maps are compiled for all simulation scenarios.

It is noted that the calculations of the present study are preliminary, for the purpose of a Master Thesis; thus, the use of the results and the relevant conclusions should be performed with the required reservation.

**Keywords:** *Mathematical Model, TELEMAC-2D, Mandra, Hydrodynamic Analysis, Flood Risk Assessment, Flood Protection Works*