



## **Flooded area cartography and damage assessment from the combined use of Landsat TM and ANNs**

Yosra Alouene (1) and George P Petropoulos (2)

(1) Mediterranean Agronomic Institute of Chania, Alysilio Agrokepiou, Chania, Crete, Greece , (2) Institute of Geography and Earth Sciences, University of Aberystwyth, Wales, United Kingdom

Use of Earth Observation (EO) data has generally shown a very promising potential in performing rapidly and cost-effectively mapping as well as damage assessment in different types of natural hazards, including floods. The recent technological progress in remote sensing has resulted to the development of a vast number of image processing techniques applied to different types of EO data in performing flooded area mapping and damage assessment. When optical EO data is used for this purpose supervised image classification is regarded as one of the most widely exploited approaches employed for this purpose.

In the present study we evaluated the use of different classifiers based on Artificial Neural Network (ANNs) in obtaining flooded area cartography and performing a damage assessment when those combined with optical multispectral data from Landsat TM. In this context, the inclusion of different spectral layers derived from the processing of the original TM bands for improving the estimation of the flooded area was explored. A flooding event occurred in 2010 in Evros river - located north of Greece - was used as a case study. Accuracy of ANN-derived flooded area estimates was based on the error matrix statistics but also statistical comparisons performed against corresponding estimates obtained from the Greek local authorities. Damage assessment was performed on the basis of land use/cover information derived from CORINE2000.

Results generally evidenced the capability of the ANNs in obtaining cartography of the flooded area and in performing a flooding damage assessment when combined with the TM imagery. The inclusion of the additional spectral information showed variable results in terms of improving the accuracy of the flooded area extraction. From all scenarios examined, most accurate results in terms of flooded area mapping were obtained when the original TM spectral bands were combined with the Tasseled Cap additional bands.

**Keywords:** flooded area mapping, flooding damage assessment, remote sensing, Geographical Information Systems, Artificial Neural Network, Landsat TM, Evros, Greece.