



Hydrological landscape classification based on Digital Elevation Models and orthophotos

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Landscape classification is carried out, which focuses on the identification of areas that are distinct with respect to the predominant runoff generating mechanism. Three criteria are used for classification, which are calculated from ground elevation information in the form of a Digital Elevation Model (DEM). These are: the index known as HAND (Height Above the Nearest Drainage), the ground slope and the distance from the nearest drain or branch of the hydrographic network, considered along the flow direction path. On the basis of these criteria two different classifications are performed. The first one is based on the first two criteria (HAND and slope), whereas the second one includes all three criteria. Artificial Neural Networks (ANNs) are employed as the primary classification method. Since this is a supervised classification method, it required that a subset of points in each test basin be independently classified with the aim to construct data sets for training, testing and validation. Orthophotos are used to assist this manual classification process. These constitute a by-product of the DEM construction process through using photogrammetric methods. They offer the advantage of lower cost and processing time with respect to the collection of field data. The value of this kind of information was assessed through using unsupervised classification via the well-known Fuzzy c-means (FCM) method. Five classes of landscape are considered: riparian areas, plain areas, low slope areas, high slope areas, and plateaus. Two drainage basins are used to illustrate the proposed methodology. The first basin is the Erasinos river basin in Eastern Attica, Greece, while the second basin is that of the Sarantapotamos river in Western Attica. The first basin is predominately semi-mountainous, while, in the second one, differences in elevation are more pronounced. Landscapes of the two basins are typical in the Mediterranean region. Classification results are discussed and compared to findings from other similar studies. Further validation is provided through using data from a limited field data collection campaign in the Erasinos basin..