



Modified Analytical Hierarchy Process (M-AHP) Based River-Line Flood Hazard Assessment Module Running on GIS: Netcad Architect Environment

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The main purpose of the present study is to introduce an expert based river-line flood hazard assessment approach, and develop a module running this approach on Netcad Architect environment. The spatial variability of river-line flood hazard was evaluated by considering two components of the phenomenon. The first component defines the heuristic infiltration rates of ground while the second one expresses the heuristic potential of water accumulation. In order to model these heuristic concepts geological, geomorphological, and environmental factors were implemented. Soil erosion observed on residual soils of volcanic rocks, slope gradient and slope aspect of natural topography, and normalized difference vegetation index acquired from natural vegetation were considered to be the primary conditioning factors controlling the infiltration rates during possible short-term or long-term rainfall events. Additionally, the slope gradient of topography, drainage channel density, and topographic wetness index of ground being one of the second derivatives of topography were evaluated to be the main conditioning factors controlling water accumulation on ground. The conditioning factors evaluated in the present study were handled in Netcad GIS 6.0 environment. Netcad GIS 6.0 has all of the abilities which expected from a traditional GIS. Additionally, it has a new module namely Netcad Architect which enables to describe processes visually. The majority of the Architect was developed within “.Net”. The main concept of the Architect is “Operator” and it corresponds the complex routines which maps inputs coming from data sources to output. As can be seen from this definition, the M-AHP and other expert based approaches could be easily defined as new operators in the Architect. Some of operators are specifically named as “Geocalculator” which provides templates for different forms of linear formulae. Similarly, operators which present templates of matrix are called as “Geokernel”. The heuristic models describing infiltration rates and water accumulation potentials were constructed by using the M-AHP operator developed in the Netcad Architect. The Akcaabat catchment area locating in the northeastern part of Turkey was selected to be the test area. According to the results of the analyses the areas having very low infiltration potential constitute almost 10 % portion of the region while the areas having very high water accumulation potential constitute about 0.25 % portion of the catchment area. Considering the uncertainties in flood hazard assessment and limitations in sophisticated analytic solutions, the proposed methodology and the module could be evaluated to be an efficient tool representing river-line flood vulnerability and assessing the mitigation applications in terms of changing land-use patterns.