



Digital Cartographic Models as Analysis Support in Multicriterial Assessment of Vulnerable Flood Risk Elements

Iulian Nichersu, Marian Mierla, Cristian Trifanov, Iuliana Nichersu, Eugenia Marin, and Florentina Sela
Danube Delta National Institute for Research and Development, GIS and Spatial Planning, Tulcea, Romania
(iuli@indd.tim.ro)

In the last 20 years there has been an increase of frequency in extreme weather and hydrological events. This frequency increase arise the need to research the risk to the events that are extreme and has big impact to the environment. This paper presents a method to analysis the vulnerable elements to the risk at extreme hydrological event, to be more precisely to flood. The method is using also the LiDAR point cloud. The risk concept has two main components: the first one hazard (represented by frequency of the occurrence and intensity of the flood) and the second one vulnerability (represented by the vulnerable elements to the flood). The studied area in the present paper is situated in the South-East of Europe (Romania, Danube Delta). The Digital Cartographic Models were accomplished by using the LiDAR data obtained within the CARTODD project. The digital cartographic models, with high resolution, consist of 3 components: digital terrain model (DTM), digital elevation model (DEM) and elevation classes (EC). Completing the information of the three models there were used also the orthophotos in visible (VIS) and infrared (IR) spectrum slices. Digital Terrain Model gives information on the altitude of the terrain and indirect of the flood hazard, taking into account the high resolution that the final product has. Digital Elevation Model supplies information related to the surfaces of the terrain plus the altitude of each object on the surface. This model helps to reach to the third model the Elevation Classes Model. We present here three categories of applications of clouds points analyses in floodrisk assessment: buildings assessment, endangered species mentioned in Annex 1 of the European Habitats Directive and morphologic/habitats damages. Pilot case studies of these applications are: Sulina town; endangering species like *Osmoderma eremita*, *Vipera ursini* and *Spermophilus citellus*; Sireasa Polder. For Sulina town was assessed the manmade vulnerable elements to floods (in special buildings) which are needed for MCDA (multi-criterial dynamic analyze) in risk mapping, afterwards in spatial planning. For the mentioned species was visualized their probable location/habitat of their spread and how these places could be affected by flood. And for the Sireasa polder application there was accomplished the assessment changes of habitat morphology and other characteristics due to the flood. All these analyses conduct to a complex assessment of the vulnerability in a specific studied area.