



## **Flood Hazard Assessment of the coastal lowland in the Kujukuri Plain of Chiba Prefecture, Japan, using GIS and multicriteria decision analysis**

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Floods, the most common natural disaster in the world, cause serious loss of life and economic damage. Flood is one of the disasters in the coastal lowland along the Kujukuri Plain, Chiba Prefecture, Japan. Many natural and human activities have changed the surface environment of the Plain. These include agricultural development, urban and industrial development, change of the drainage patterns of the land surface, deposition and/or erosion of the river valleys, and so on. In addition, wide spread occurrence of land subsidence has been caused by the abstraction of natural gas dissolved in groundwater. The locations of the groundwater extraction include nearby the coast, and it may increase the flood risk. Hence, it is very important to evaluate flood hazard by taking into account the temporal change of land elevation caused by land subsidence, and to develop hazard maps for protecting surface environment and land-use planning. Multicriteria decision analysis (MCDA) provides methodology and techniques for analyzing complex decision problems, which often involve incommensurable data or criteria. Also, Geographical Information System (GIS) is the powerful tool since it manages large amount of spatial data involved in MCDA. The purpose of this study is to present a flood hazard model using MCDA techniques with GIS support in a region where primary data are scarce. The model incorporates six parameters: river system, topography, land-use, flood control project, passing flood from coast, and precipitation. Main data sources used are 10 meter resolution topography data, airborne laser scanning data, leveling data, Landsat-TM data, two 1:30,000 scale river watershed map, and precipitation data from precipitation observation stations around the study area. River system map was created by merging the river order, the line density, and the river sink point density layers. Land-use data were derived from Landsat-TM images. A final hazard map for 2004, as an example, was obtained using an algorithm that combines factors in weighted linear combinations. The assignment of the weight/rank values and their analysis were realized by the application of the Analytic Hierarchy Process (AHP) method. This study is the preliminary work to investigate the flood hazard at the Kujukuri Plain. Flood hazard map of the other years will be analyzed to investigate the temporal change of the flood hazard area, and more data will be collected and added to improve the assessment.