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Delineation of Flood Inundated Areas using Aerial photo Interpretation and GIS-based Hydrological Modeling - an application in Barcelonnette, France

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Due to an increasing trend of flood events in recent years, the demand on information of potentially flooded areas has been increased in particular for planning and managing purposes. This study is an attempt to develop an integrated methodology for calculating flood inundated area and to delineate the factors which determine the floods by using GIS-based hydrological modeling, aerial photo interpretation and analyzing hydrological and meteorological time series. One result is that the flooded area model is a good method to generate a flood map and distinguish flood inundated area in this study. The study was carried out in the Ubaye River located in the Barcelonnette catchment (200 km2) in France. This area is highly vulnerable to geohydrological hazards and has experienced a number of significant flood events.
The model input data include a digital elevation model (DEM), information on spatially distributed surface roughness and hydrological data. Land cover was digitized from aerial photographs available for different time sequences. These data have been used to re-calculate the severe flood occurred between 28.05.2008 and 31.05.2009. The final flood inundated map has been combined with a land cover map in order to determine the zones with high flood risk in Barcelonnette. The results demonstrated the high vulnerability of Barcelonnette to flooding events. This is due to some characteristics including: 1) Location of the city: It is situated in an elongated form extending below mountain slopes and along a river channel. 2) Seasonal Changes: During spring, the melting of snow result in an increase water level in river channels and this will be amplified whenever a warm rainfall occurs. Results show that the model developed herein is applicable to demonstrate also scenarios of future flood inundation areas, in particular when considering fundamental environmental changes in the catchments. The final maps might support environmental managers to consider inundations areas as in their land use management.

Key words: Flood hazard map, flood inundated area, aerial photo, Geography information system