SUSTAINABLE MANAGEMENT DECISION SUPPORT SYSTEM DEVELOPMENT FOR BARROW COUNTY, GA THROUGH FLOOD POTENTIAL ANALYSIS

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Since 2002, the National Weather Service uses Flash Flood Monitoring Program (FFMP) and Flash Flood Guidance (FFG) to predict flash flood events. However, these programs contain several deficiencies for several forecast areas in the nation. Developing a GIS based model that incorporates basin physiographic characteristics will allow the hydrologist to better predict flash flood events and the area being affected by such flooding. These flash flood events are very common in recent times. Therefore, a sustainable management decision support to tackle such disaster is a necessity for any county, state, or federal authorities. The goal of this study was to develop a comprehensive sustainable management decision support for county managers of Barrow County, GA, to be able to manage flash flood scenarios in the county in an efficient manner. In this study, we have developed an automated geospatial model to determine the flooding potential (five different scale: very high, high, moderate, low, and very low) in the county. The dynamic GIS model parameters used in the model development are: Year 2011 NLCD land cover map (30 cm resolution) to obtain vegetation spatial dynamics; slope- developed from 10 m DEM for topographic distribution; flow accumulation, derived from the 10 m DEM using the Flow Accumulation tool available with 100-years storm distribution spatial data and annual precipitation spatial distribution data of the state using 1981 – 2010 precipitation record along with mean monthly precipitation spatial data for rainy months (April to October ; and soil texture, hydrologic group, permeability, and drainage attributes, derived from gSSURGO soil data of the state. All these layers were transformed to raster datasets of same resolution (10 m for all) if they were not in raster form using the essential attribute field responsible for flooding potential analysis. The prepared individual raster were reclassified with different assigned weights based on their flood potential ranking, i.e., least flood potential 1 to most flood potential (9). Finally, each individual layers were overlayed with a weighted overlay analysis using 'Weighted Sum' tool of ArcGIS 10.3. For the weighted overlay analysis, each spatial data layer was given certain weights, judged by their influence in flooding potential. Final output obtained was raster cells with value between 1 (least potential) to 9 (most potential) and classified to above mentioned five categories of potential. County parcel data was obtained from the QPublic site. The flood potential map and the parcel map of the county were analyzed using Zonal Statistics feature of ArcGIS. Thus, a flood potential condition for each parcel were obtained. The parcels with high value (buildings, roads, and other costly features) were selected to provide decision support on a proactive sustainable management, in case of a flash flood occur in the county. Other soil, topographic, hydrologic, and landuse management scenarios were developed for county managers so that they would efficiently manage the county in case of such geohazards.

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