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Data Preparation for Logistic Modeling of Flood Crisis Management

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Abstract

The aim of contribution isthe importance of preparing and verification of input data for logistic modeling of flood crisis management in GIS systems. Appropriate data is essential for crisis management operations. GIS systems offer a wide range of possibilities for further data analysis, the results of which can be used for decision-making process. The purpose of these systems offer wide range of possibilities, starting from complex base of digital data available online whenever anytime in the field, through ordinary and also specific spatial analyses, to the composing of specific outputs required by particular units of the Integrated Rescue System [1,2].

Keywords: GIS system; input data; maps; civil security; flood; modelling

1. Introduction

Floods are among the most frequent and costly natural disasters in terms of human and economic loss. Problems related to flooding have greatly increased, and there is a need for an effective modeling to understand the problem and mitigate its disastrous effects. The flood rescue activities are considered to be technical and organizational measures done during the floods in imminent endangered or already flooded areas in order to save human lives and property, particularly to protect and evacuate humans from these areas, to take care of the casualties for the

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necessary period, to save and move property to non-affected areas. A properly constructed database of interest area, maps of flooded area and modeling of floods is necessary for effective conservation planning. Geographic information systems (GIS) are usually used in the evaluation of the geo-environmental hazards but offersas welltools for logistic modeling and solving of floods [2,3,4].

2. GIS system in crises management

Crisis management is a very important part of public safety.Each phase in the crisis management cycle (mitigation and prevention, preparedness, response, recovery) requires specific collection and processing of geographic information [5].

Whereas most of the phases are part of medium-and long-term approaches, it is important to separately-dedicate preparation of data (fig. 1). The Mitigation and Prevention phase consists in the global identification and prioritization of the risks in a specific area, in order to define the proper measures for risk reduction (technical responses, land-use planning, information specifically dedicated to the population). Prevention implies the cross checking of all the data related to hazards, issues and vulnerabilities at various scales. It requires negotiations between the different actors to reach some compromise between protection and development. The preparedness phase is based on the development of different municipal, departmental and national operational plans. Such negotiations are based on maps, and all the actions cover the short, medium and long term. In the risk management cycle, the response phase is the only one requiring immediate access to information and resources to determine and organize a rapid response.The *reconstruction phase*, management cycle, requires a location-based inventory of all material, social, economic and environmental consequences of the disaster. Reconstruction is usually a very slow process, given the scale of the damage; it includes establishing liability, re-evaluating safety standards, redefining technological choices and the organization and functioning of territories[6,7,8].

Fig.1. Risk and need management in terms of geographic information[6].

GIS systems have very important place in processing and analyses of dates. ArcGIS from ESRI is considered efficient tools for editing, analysis and modeling together with generous opportunities of visualization and opportunities of data management. GIS software uses two basic types of data: *Spatial data* - containing the coordinates and identifying information describing the map itself and *Attribute data* - containing information that can be linked to the spatial data. Specific type of spatial data is Geo-Spatial data represents real world objects (roads, land use, elevation) with digital data. Geo-Spatial data can be obtained from Satellite images, field data i.e. survey data and Global Positioning System (GPS) data. GIS. GIS integrates all kinds of data and contains the tools to manage and analyze data [2,3,9].