



Integration between hazard scenario and local civil protection workflow with GIS techniques

S. Frigerio (1,2), S. Sterlacchini (1), M. De Amicis (2), M. Canziani (1), S. Sironi (2), S. Poli (1,2), F. Villa (2)

(1) Institute for the Dynamic of Environmental Processes, National Research Council (CNR-IDPA), Milan, Italy, (2) Department of Environmental Sciences, University of Milano-Bicocca, Milan, Italy (simone.frigerio@unimib.it / Phone: +39-0264482854)

Methodologies able to get over critical hydrogeological situations exploiting GIS tools and Decision Support Systems are developed to define a Civil Protection plan. The aim tasks the management of emergency situations, setting intervention for people safeguard, basing on available resources and exploiting the best technology. Every critical event is characterized by the same goals: safety of people, care of the wounded, first aid activities, recovery of primary public services, management of personnel and resources and communication with public and private institutions, government agency, authority and citizens. Human behaviour changes in relation to the critical state; standardization of people attitude in an emergency situation could not be defined in a rigorous way. As a consequence different spatial and temporal scenarios have to be integrated in an emergency plan. The application was settled and tested in a local mountain consortium of 12 Municipalities in Valtellina (Sondrio, Italy), an area characterized by a high level of hydrogeological hazard.

The requirement useful to protect people and resources derives from capability to understand the potential impact of a natural occurrence, in a spatially and quantitatively point of view. For a Civil Protection approach a local hazard classification was done to understand and define specific scenarios; resources involved are often limited and the time required for interventions must be short; as a consequence, actions, operations, communications and aid support of Civil Protection was settled, organized and continuously uploaded. The definition and the assessment of the hazard level in the territory followed the conventions and set of law in force, both from a cartographic point of view and from the classification method of the natural phenomena.

The organization of assets, resources, volunteers, instruments, means and equipment was assessed and managed. Information about volunteers (quantity, spatial distribution, phone numbers), technical staff (quantity, skill, ability), means (location, technical characteristics, relative users) and useful infrastructure (hospitals, first aid stations, fire brigade stock, Civil Protection storehouse) were acquired. Detailed geographical dataset of vulnerable elements (exposed “sensible” people, age classification and location) were obtained and specific field surveys to integrate the information were completed. Every “entity” was clearly defined with attributes and georeferenced in a cartographic view. Only in this way the spatial component of natural hazards, their location and magnitude could be compared and analyzed with infrastructures, vulnerable elements and Civil Protection resources.

A cartographic view of the total “exposed” scenario needs a careful, simple and complete management of the procedures, made by short and clear action steps. A workflow management, which settles and fixes rules of every intervention, is the most logic and comprehensible way to approach a critical situation. Rules and steps were defined from available resources (human and material); local, regional and national laws were implemented as a necessary tie and “skeleton” of every practical action, from the management of the steps until the choice of responsibilities.

A GIS integrated technique was developed as a supervisor of the emergency management system, to have a see-through point of view of every entity involved, both as a spatial distribution in the territory and as complete and organized archive of the available elements. The Decision Support System was dynamically defined. Integrated steps define every action: technical staff, volunteers, resources and legislative bond were organized in a concrete methodological approach.

Communication is a primary need in emergency situations; this need meant the creation of a specific communication tool (sms, fax and e-mail manager) in the integrated system, to avoid lack of time and improve the information flow between personnel, citizens and public administrators in critical situations