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Application of a web-based Decision Support System in risk management

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Increasingly, risk information is widely available with the help of advanced technologies such as earth observation satellites, global positioning technologies, coupled with hazard modeling and analysis, and geographical information systems (GIS). Even though it exists, no effort will be put into action if it is not properly presented to the decision makers. These information need to be communicated clearly and show its usefulness so that people can make better informed decision. Therefore, communicating available risk information has become an important challenge and decision support systems have been one of the significant approaches which can help not only in presenting risk information to the decision makers but also in making efficient decisions while reducing human resources and time needed.

In this study, the conceptual framework of an internet-based decision support system is presented to highlight its importance role in risk management framework and how it can be applied in case study areas chosen. The main purpose of the proposed system is to facilitate the available risk information in risk reduction by taking into account of the changes in climate, land use and socio-economic along with the risk scenarios. It allows the users to formulate, compare and select risk reduction scenarios (mainly for floods and landslides) through an enhanced participatory platform with diverse stakeholders' involvement in the decision making process. It is based on the three-tier (client-server) architecture which integrates web-GIS plus DSS functionalities together with cost benefit analysis and other supporting tools. Embedding web-GIS provides its end users to make better planning and informed decisions referenced to a geographical location, which is the one of the essential factors in disaster risk reduction programs. Different risk reduction measures of a specific area (local scale) will be evaluated using this web-GIS tool, available risk scenarios obtained from Probabilistic Risk Assessment (PRA) model and the knowledge collected from experts. The visualization of the risk reduction scenarios can also be shared among the users on the web to support the on-line participatory process. In addition, cost-benefit ratios of the different risk reduction scenarios can be prepared in order to serve as inputs for high-level decision makers. The most appropriate risk reduction scenarios will be chosen using Multi-Criteria Evaluation (MCE) method by weighting different parameters according to the preferences and criteria defined by the users.

The role of public participation has been changing from one-way communication between authorities, experts, stakeholders and citizens towards more intensive two-way interaction. Involving the affected public and interest groups can enhance the level of legitimacy, transparency, and confidence in the decision making process. Due to its important part in decision making, online participatory tool is included in the DSS in order to allow the involved stakeholders interactively in risk reduction and be aware of the existing vulnerability conditions of the community. Moreover, it aims to achieve a more transparent and better informed decision-making process. The system is under in progress and the first tools implemented will be presented showing the wide possibilities of new web technologies which can have a great impact on the decision making process. It will be applied in four pilot areas in Europe: French Alps, North Eastern Italy, Romania and Poland. Nevertheless, the framework will be designed and implemented in a way to be applicable in any other regions.