



An interactive, integrated education and training information system for natural multihazard-related disaster management

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Natural hazards-related disasters worldwide, but most notably in the developing world, have claimed many lives, injured many more, led to massive population displacement, caused severe damage to the natural and built environment, and seriously undermine efforts for achieving sustainable economic and social development. Over the past decades, there has been an upward trend in the number of natural disasters and related losses as a result of such factors as population growth, concentration of population in and industrialization of exposed, disaster prone areas, and climate change (Munich Re data). Reducing the risk and impact of natural hazards requires a better understanding of the phenomena related with natural hazard processes as well as comprehensive, multihazard-related disaster reduction/management strategies. It has been reported by various sources that information derived from space-based technologies (e.g., remote sensing Earth observation satellites or EOS) has demonstrated that it can be usefully combined with other relevant data (e.g. aircraft and in-situ) within geographic information systems (GIS) to provide solutions for the full disaster management cycle. It has also been noted that keys to the effective use of space and other relevant technologies for disaster management include awareness raising, knowledge transfer, and capacity building. Especially needed are educational and training initiatives, both traditional classroom and web-based e-learning/training with inclusion of case-studies, for the use of such technologies (in particular remote sensing and GIS). In response to these needs, the aim of the present work is to provide support to capacity and awareness building efforts specific to disaster management ac-

tivities, in particular helping end-users learn of the potential benefits of space, geoinformation and other technologies -based solutions to support natural-hazard related disaster management activities as well as learn how to access and use such solutions. We will focus on geohazards and climatic hazards for hazard-prone areas within developing countries. Towards these goals, we introduce the prototype for an interactive, integrated information management system for education and training for natural multihazard-related disaster management. The e-learning/training system is built on and extends our previous work on a dynamic, fully web-enabled mapping interface (<http://discoverourearth.org/webmap/>) that accesses a variety of geosciences data sets relevant to natural hazard-related studies. The rich and robust system has provided reliable services to research, education, and decision making communities. The new educational system discussed here also integrates elements from our recent work on an interactive geohazards and risk information system (Geophysical Research Abstracts, Vol. 9, 10818, 2007). At its core, the new system will consist of the following four main components: (1) a series of geo-databases focusing on selected natural disaster-prone regions, with an emphasis on developing countries, and including geospatial data and associated metadata from a variety of sources (baseline topography and slopes, EOS-based remote sensing imagery, past events distribution, ...), (2) middleware of various GIS-based software tools to effectively use an integrated approach for storing, retrieving, manipulating, analyzing, and visualizing hazards-appropriate geospatial data sets, (3) online study and training guides/curricula providing a brief overview of the topics (hazards) addressed by the data sets, along with information on how these data may be combined and utilized for disaster management purposes, and (4) interactive applications for inquiry-based learning/training, implementing (1) and (2) and designed to support the material and questions in the user guides in the form of both "virtual experiments" or exercises (covering such topics as geohazards, digital mapping, remote sensing and GIS,...) as well as specific regional case studies using real world data and of relevance to the respective end-user needs for the considered at risk area. It is hoped that the open, interactive and internet-based, natural hazards, risk and disaster management education/training system introduced here will usefully complement/support traditional class-based initiatives, especially at the local/community level, and can serve as a possible foundation for more complex e-learning/training environments. As a demonstration of training case studies, we will present a selection of hazard risk information products for Turkey and the Sudan, derived using existing components of the proposed system.