

RiskCity and WebRiskCity

Educating responders and the public about risk management

—by S. Frigerio and C.J. van Westen

More and better training is needed to identify and prevent or mitigate risk presented by natural hazards. Too often, the concept of risk is misunderstood, and neither responders nor the public may fully understand what is at issue here.

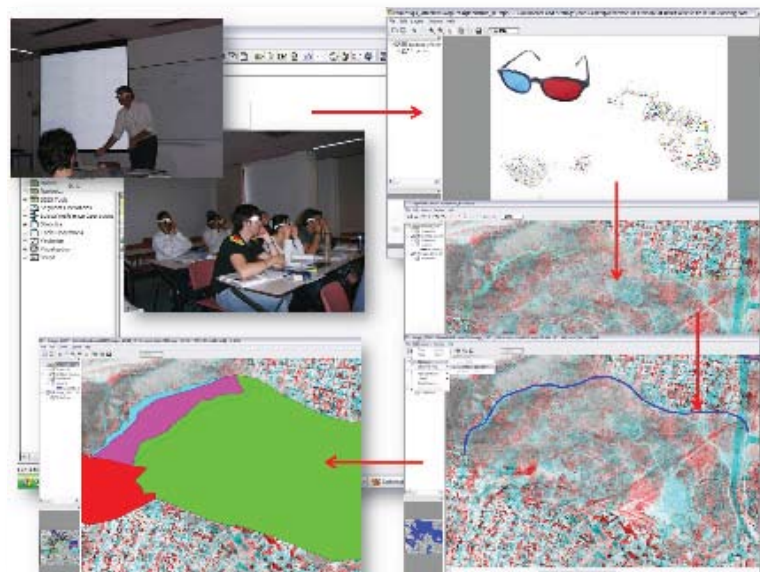
Clear terminology is the first line of defence. But, in order to facilitate widespread sharing of information and knowledge necessary for the development of reliable and extensible solutions for dealing with risk, one also needs to employ the web and its graphic communication capabilities.

Worldwide, many organizations provide short training courses on multi-hazard risk (e.g. BE-SAFE-NET, DEBRIS, NAHRIS). However, few of the training materials they use are complete, as textbooks are usually restricted to specific case studies. Furthermore low-cost software solutions for identifying and responding to risk continue to be scarce. Open source approaches such as the multi-platform RiskCity and WebRiskCity are being developed to support education and training for risk detection, risk prevention, and risk amelioration. Availability of free licences will go a long way to harness the the training capacity necessary for efficient risk management.

To demonstrate how such an open source software solution may work, we have selected a hypothetical urban risk case study populated with data from the Tegucigalpa area in Honduras. After the Mitch Hurricane in October of 1998, which dumped 281 mm of rain in three days, an old landslide was reactivated and an entire neighbourhood was destroyed. The landslide dammed the river and caused a serious flooding for several weeks. The database available to us did not provide sufficient information about the effects of the hurricane on the entire area and so, “virtual” layers were used to complete the training reality.

The open source software we tested was the dual-platform RiskCity and WebRiskCity.

RiskCity is a distance education course based on a GIS environment for training in multi-hazard risk response. It is designed for several types of “students”—faculty, planners, NGO professionals, or students learning about risk posed by natural hazards. RiskCity teaches students about the collection, analysis, and spatial evaluation of risk from natural and human-induced hazard. In RiskCity’s virtual classroom, students proceed step-by-step from receiving instructions and support by tutors to submitting home



Students at ITC (Enschede, the Netherlands) were the first to test RiskCity. They learned how to create a 3D view of the study area and buildings exposed to potential hazard, using anaglyph glasses (top). Below are boundary lines and areas extracted for spatial analysis.

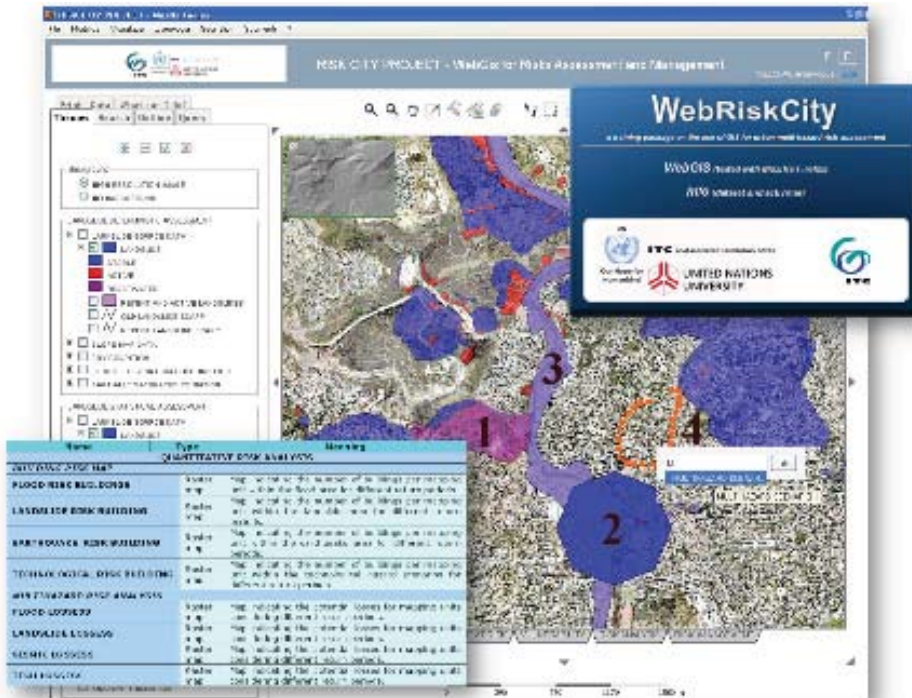
exercises and test results. The course offers a sample of data requirements, hazard assessment procedures, generation of elements-at-risk databases, vulnerability assessment, qualitative and quantitative risk assessment, risk evaluation and hypotheses on risk reduction.

WebRiskCity is a WebGIS interface which can share every output built in RiskCity. Student can interact with the data created in RiskCity, compare the output, and plan decisions just like multi-hazard risk managers do. The advantage of WebRiskCity is that queries and commands are easy to use and expressed in unambiguous terminology (standard vocabulary is provided).

The primary goal of the training is to gain thorough understanding of the multi-risk concept. Through RiskCity and WebRiskCity, students are presented with different feasible scenarios for coping with different types of hazard risk based on spatial analysis. A series of exercise sessions then enables students to learn how to manage risk using the information available to them for a single or multiple risk scenarios. The purpose of each action, as well as the spatial data used are listed for each action, and users have the option of going through the sessions in a logical progression or go directly to the session of most interest to them. The training consists of the following sessions.

Session 1: Introduction to WebRiskCity

Definition of risk assessment and its constituents (e.g. high resolution image, hazard zones, element at risk).



starting point for planning where a future extension of the city would be most appropriate, for instance, or, evaluate the areas where the need for shelters would be highest in the event of a disaster.

A questionnaire was given at the end of the course to evaluate the usefulness of RiskCity and WebRiskCity as an option for distance learning in risk management. Responders found the platform to be user friendly, praising such features as the customizable browser and online guide to essential theoretical concepts and concrete examples. They also appreciated the level of feedback provided. Some felt that in order to fully benefit from the course, some sessions could be allocated more time. They generally appreciated

the clear, focused topics. The initial testing of RiskCity and WebRiskCity platform has shown this to be a useful option for training future disaster managers and increasing the awareness of risk management among the public.

A view of WebRiskCity [http://geoserver.itc.nl:8181/cartoweb3/WebRiskCity/WebRiskCity.html]. Here, students are calling up specific information from layers published on the web.

Session 2: Spatial data for risk assessment and image interpretation

Analysis of hazards and vulnerability to hazard using time-series of multi-temporal images (stereo image interpretation with 3D view).

Session 3: Hazard assessment

Study of hazard maps for different periods, learning the procedures for landslide and flood hazard assessment, and identification of potential hazard scenarios.

Session 4: Elements at risk

Explanation of an elements-at-risk database, how it is built from high resolution imagery, and census or cadastral data.

Session 5: Vulnerability assessment

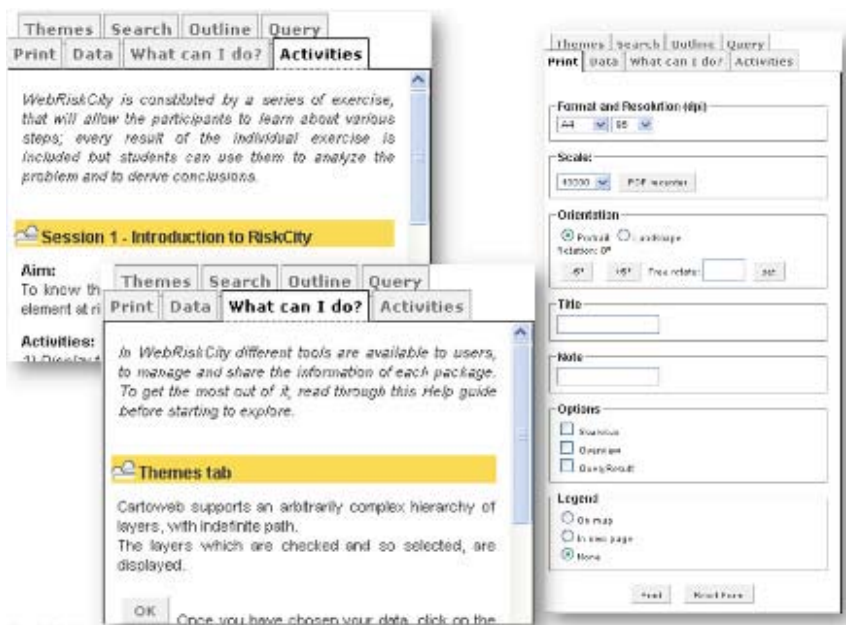
Estimation of physical, social, economic, and environmental vulnerability. Definitions and methods used to characterize vulnerability.

Session 6: Risk analysis

Quantifying risk in terms of losses for all possible scenarios that might occur with different strategies. It includes potential methods for calculating the consequences of vulnerability to a hazardous situation.

Session 7: Risk reduction

Analyse the costs and benefits of different reduction measures. The result of the analysis is the



Examples of WebRiskCity online support functionality: "Activities," often used in exercises, and "What can I do," which provides information on online spatial tools and devices.