Applied Research Partnerships with Developing and Transition Countries
Swiss Universities of Applied Sciences and Universities of Teacher Education

Foto: Daniel Pittet

Project title

Shallow landslide vulnerability assessment

Thematic focus

Landslide, risk, vulnerability

Year

2010

Project location

Hagian Province, Vietnam

Swiss Institution

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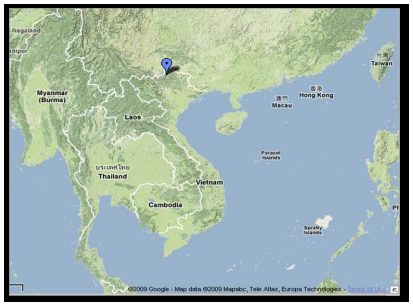
Description

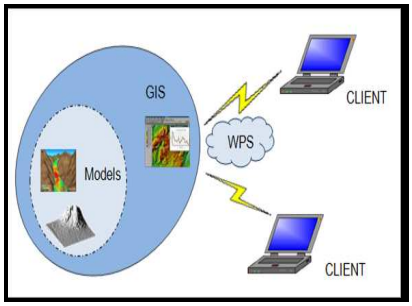
The overall objective of this project is to enhance the capacity of developing communities resilient to shallow landslide disaster. To pursue this objective this project conduct research on the capabilities of mathematical models to estimate where shallow landslides may occur and what area is involved. In particular this project is going to couple TRIGRS and DFWALK, two widely used models respectively capable to estimate instabilities areas and runoff extents, in a geographical framework capable to produce “real time” maps that can be disseminated trough the internet and that represent the areas likely exposed to risk. This result can support the realization of early warning systems, capable to timely inform government, agencies and population about existing landslide risks in order to take appropriate measures and limit the loss of lives and damages.
The expected result of this project is the realization of a Web site capable to provide dynamic information on shallow landslide risk relative to a pilot area, to be replicated in the future on larger extents and different areas.

Development relevance

With reference to the UN Millennium Development Goals, the topic of this project is closely related to the target 7.A: “Integrate the principles of sustainable development into country policies and programmes and reverse the loss of environmental resources”. This project is also in fully agreement with the UN/ISDR (International Strategy for Disaster Reduction) as outlined in the Road map toward the implementation of the United Nations Millennium Declaration (Secretary-General Report to GA A/56/326): developing early warning systems, vulnerability mapping, technological transfer and training; supporting interdisciplinary and intersectoral partnerships, improved scientific research on the causes of natural disaster;encouraging governments to incorporate disaster risk reduction into national planning proc



Hagiang province pilot study area



Schema of the Web system for shallow landslide analysis

KFH
Rektorenkonferenz der Fachhochschulen der Schweiz
Conférence des Recteurs des Hautes Ecoles Spécialisées Suisses
Conferenza dei Rettori delle Scuole Universitarie Professionali Svizzere
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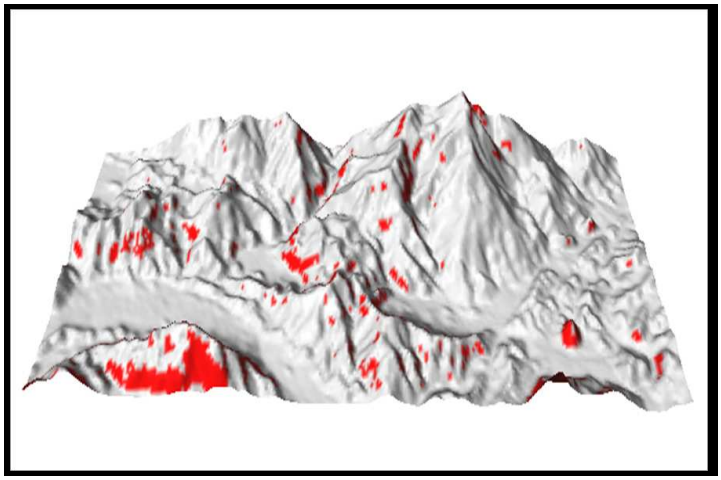
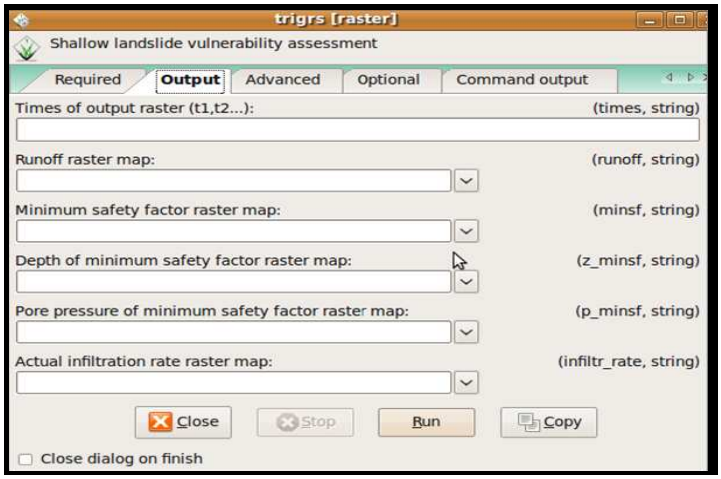
Swiss Agency for Development and Cooperation SDC

Main features of the project

There is mounting evidence that climate-related disaster events are having an impact on developing countries in Southeast Asia, home to more than 570 million people. While researchers and scientists reveal that climate change is set to reverse decades of social and economic progress, the international climate change spotlight has not yet fallen on Southeast Asia as attention is focused more on the industrializing giants China, India and Brazil.
Millions of people in the region tend to suffer most from the catastrophic impacts of global warming coupled with recurring food, oil and financial crisis, and typically, these will be the poorest people and the most vulnerable communities who may have little information about impending hazards and are often the least able to rebuild their lives and livelihoods after having suffered a setback.
The Philippines, Vietnam, Cambodia, Thailand, Laos, Sumatra and Indonesia are among the countries identified as climate change “hotspots”-countries particularly vulnerable to some of the worst manifestations of climate change, such as the increase in extreme drought, flooding, sealevel rise, landslide and cyclones expected in the coming decades. This, according to a new report of Eepsea funded by Canada’s International Development Research Centre (IDRC), an international organization public corporation created in 1970 to support research in developing countries.
In the last years in Vietnam a wide regional variations in rainfall have been recorded, but the annual volume has remained largely stable. However, the localised intensity and unpredictability of the rainfall has increased, causing severe floods and shaollow landslides. Climate changes scenarios for the future years forecast an increasing of intense rainfalls that are the primary triggering cause of shallow landslides activation.
To minimize the consequences of natural disasters, it is necessary to make accurate weather forecasts and release early warnings to help communities to prepare for any bad weather.
Shallow landslides, including debris flow where high density water with mud and big gravel flows at high speed, has a huge destruction power. Because of theirs high density and speed, damages are very severe and sometimes tragic: destroying houses, bridges and infrastructure and claiming people's lives.
In the majority of cases the main trigger of landslides is heavy or prolonged rainfall. Generally this takes the form of either an exceptional short lived event, such as the passage of a tropical cyclone or even the rainfall associated with a particularly intense thunderstorm or of a long duration rainfall event with lower intensity, such as the cumulative effect of monsoon rainfall in South Asia. In the former case it is usually necessary to have very high rainfall intensities, whereas in the latter the intensity of rainfall may be only moderate - it is the duration and existing pore water pressure conditions that are important.
The threat due to natural hazards can be reduced, by integrating them into land use management, urban planning, and population protection plans. Computer simulation is one of a few possibilities to objectively assess the hazard due to a process, by simulating its localization and expansion. The key criteria for the choice of a simulation approach are: validity, applicability and user-friendliness. Since the hazard assessment is part of the risk management procedure, its capacity to be integrated into a spatial modeling environment (GIS) is crucial to provide decision makers quick and easily understandable.
The goals of this research project can be summarized in the following key points: 1. Increase the expertise of the partners in shallow landslides modeling. 2. Strength SUPSI’s and HUMG’s capacity in interdisciplinary participation action research. 3. Knowledge transfer from SUPSI to HUMG in the field of environmental modeling, Geographical Information System, Web Mapping Service, and risk assessment. 4. Knowledge transfer from HUMG to SUPSI in the field of shallow landslides in tropical region. 5. Contribute to the risk reduction in Vietnam; 6. National and international exposure for SUPSI and HUMG trough research findings dissemination. 7. Expand SUPSI and HUMG international collaboration networks.



Likely location of shallow landslide activation in Hagiang Province



User friendly GIS interface for the TRIGRS model