

Report on the 4th International Conference on monitoring, simulation, prevention and remediation of dense and debris flows

Debris Flow 2012

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Debris and hyper-concentrated flows are amongst the most destructive of all water-related disasters. These hazards are likely to become more frequent and more important in the future due to the effects of the increase in population, urbanization, land subsidence and the impact of climate change. They affect both rural and urban environments, particularly in river basins and in mountain areas. In recent years, they have attracted more and more attention from the scientific and professional communities due to the number of lives lost, and there is growing public concern for the future. New methods and measures are required to cope with debris flow changes and to achieve a harmonious balance between the environment and economic forces.

An International Conference on these themes took place in Dubrovnik from 29th to 31st May 2012. The meeting was co-chaired by Prof. D. De Wrachien, Past President of EurAgEng and member of the Executive Board of the International Commission of Agricultural Engineering (CIGR), Prof. C. Brebbia, Director of the Wessex Institute of Technology (WIT), UK, and Prof. S. Mambretti of the Politecnico di Milan, Italy, and co-sponsored by EurAgEng and the CIGR.

This successful series of conferences first started in Rhodes in 2006, and continued in the New Forest, UK (2008), and in Milan, Italy (2010).

Participants from 12 countries attended the conference which consisted of an Opening Session and six Topic Sessions: debris flow modeling, monitoring and measurement, risk assessment, sediment transport and debris flow, protective barriers, and landslide phenomena.

Prof. Brebbia opened the conference referring to the importance of these meetings as part of a framework of the Wessex Institute of Technology that aims to disseminate knowledge on an international level. Following Prof. Brebbia's remarks, Prof. D. De Wrachien welcomed the participants on behalf of EurAgEng, the CIGR and, representing the Rector, the State University of Milan that runs a series of joint ventures with the WIT. Prof. S. Mambretti closed the Opening Session stressing that greater research needs to be directed towards understanding the nature of regional disasters, hydrological systems, geological processes and, ideally, the variability and potential for change.

A number of lectures were then held, among which it is worth mentioning:

- *Two methods for measuring internal velocity of debris flow in laboratory* presented by Prof. F. Wei of the Chinese Academic of Sciences;
- *Modeling soil erosion and sediment transport under different land management options in a southern Italy watershed* delivered by Prof. F. Gentile of the University of Bari, Italy;
- *Risk assessment method of debris flow occurrence utilizing a digital terrain model* presented by Prof. O. Nunokawa of the Disaster

Prevention Technology Division of Japan;

- *Empirical methods for the estimation of debris flow deposition areas* introduced by Prof. D. De Wrachien of the University of Milan.

The conference also included an interesting video on the Rio Cordon event in northern Italy presented by Prof. F. Bettella of the University of Padua, Italy.

The main conclusions of the conference were that developments in modeling, satellite communication and information technology are essential for improving mitigation measures and mathematical models for forecasting and early warning systems of impending hazards. The challenge for the international community is to support these activities, particularly in developing countries, where resources are limited. Field studies are the most difficult to carry out within this approach.

The ideal sequence that should be pursued in response to the challenge presented by the management and mitigation of hyper-concentrated and debris flows can be outlined as follows:

- A systematic collection of field data should be made to provide a large reliable database;
- Effective mathematical models should be constantly developed, updated, tested and applied;
- Hydrological mapping techniques and identification of possible scenarios should then be set up;
- The best mitigation solutions should be designed and implemented on the basis of the knowledge gained in the planning phase;
- A program of systematic observations at the sites where risk has been mitigated should be planned and carried out to detect any shortcomings and to test the efficiency of the investigation.

This concept ought to lead to an integrated risk management approach made up of the systematic process, administrative decisions, organization, operational skill and ability to implement policies and strategies. A management approach should also be adopted to develop the ability of society and the local community to cope with and lessen the impact of natural hazards and related environmental disasters.

The conference brought together engineers, scientists and managers from across the world to discuss the latest scientific advances in the field of debris and hyper-concentrated flow, as well as to improve models, assess risks, develop hydrological maps based on model results, and to design preventative and mitigation measures.

The success of the meeting will ensure that the conference can be reconvened in 2014 at a location and on a date to be shortly announced. The Proceedings of Debris Flow IV, 264 pp (Print ISBN: 978-1-84564-586-1; eISBN: 978-1-84564-587-8) are available from WIT Press.

More information is available at:

www.wessex.ac.uk/12-conferences/debris-flow-2012.html