



## **Civil protection non-structural measures in risk management on debris fan: a case study in Villarpellice (Italy)**

A. Lazzari (1), R. Conte (1), L. Franzi (2), M. Arattano (3), and D. Giordan (3)

(1) Regione Piemonte, Civil protection department, Torino, Italy (andrea.lazzari@regione.piemonte.it; riccardo.conte@regione.piemonte.it), (2) Regione Piemonte, Public works, soil defence department, Torino, Italy (luca.franzi@regione.piemonte.it), (3) Research national council, Torino, Italy (massimo.arattano@irpi.cnr.it / Fax:+39-011-343574)

In the Piemonte region (Italy) the ideal sequence of steps that are pursued to manage, reduce or mitigate debris flow risk is followed by the regional Authorities in land planning activities. Generally practitioners, engineers, geologists and land planners are involved in this process because they have necessarily to interact among each other. In this frame, the collection of field data, the execution of field surveys and the application of hazard and risk mapping techniques to identify the debris flow prone areas on the debris fan allow decision makers to find the most profitable countermeasures to reduce the hazards and the risk, as well as to monitor the processes on the debris fan. The availability of time allows the government officers to elaborate also complex procedures and methods, and to widely discuss solutions with politicians, the general public and economists.

In emergency situations, right after debris flow occurrence, similar procedures are generally followed to allow the authorities to take the most urgent decisions for risk and hazard management. However the lack of time often forces officers and decision makers to choose solutions to problems and to hazard mitigation much more quickly. Moreover, due to the complexity of the situations that have to be faced (assessment of the residual risk, project of countermeasures), the coordination of engineers, geologists and practitioners plays one of the most important roles in residual risk management. Land planning efficiency is less when the complexity of situation is high. Therefore, in emergency situations, simple and flexible criteria are generally to be preferred to complex ones. The paper discuss the procedures that need to be followed in emergency situations for a good documentation and an effective monitoring of debris flows and for the design of mitigation measures. In particular the paper shows the way the civil protection works in Piemonte region, on the base of the so-called AUGUSTUS approach. The method, based on the separation of competencies and skills, aims at obtaining the highest efficiency in hazard and risk management, taking into account the factors that are jointly considered for risk reduction purposes. In the paper the activity of the civil protection agency during a 2008 debris flow event is described and discussed. The efficiency of the AUGUSTUS method is discussed in the frame of the coordination of the steps taken for the hazard and risk management and is compared to normal land planning procedures as far as time and efficiency are concerned.