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Lessons learned from the snow emergency management of winter season 2008-2009 in Piemonte

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The winter season 2008-2009 has been characterized by heavy snowfalls over the whole Piemonte, in the Western Alps region. The snowfalls have been exceptional because of their earliness, persistence and intensity. The impact on the regional environment and territory has been relevant, also from the economical point of view, as well as the effort of the people involved in the forecasting, prevention and fighting actions. The environmental induced effects have been shown until late spring.
The main critical situations have been arisen from the snowfalls earliness in season, the several snow precipitation events over the plains, the big amount of snow accumulation on the ground, as well as the anomaly with respect to the last 30 years climatic trend of snow conditions in Piemonte.
The damage costs to the public property caused by the snowfalls have been estimated by the Regione Piemonte to be 470 million euros, giving evidence of the real emergency dimension of the event, never occurred during the last 20 years.
The technical support from the Regional Agency for Environmental Protection of Regione Piemonte (Arpa Piemonte) to the emergency management allowed to analyse and highlight the direct and induced effects of the heavy snowfalls, outlining risk scenarios characterized by different space and time scales. The risk scenarios deployment provided a prompt recommendation list, both for the emergency management and for the natural phenomena evolution surveillance planning to assure the people and property safety.
The risk scenarios related to the snow emergency are different according to the geographical and anthropic territory aspects.
In the mountains, several natural avalanche releases, characterized frequently by a large size, may affect villages, but they may also interrupt the main and secondary roads both down in the valleys and small villages road access, requiring a long time for the complete and safe snow removal and road re-opening. The avalanches often cause the service breakdowns and damage the infrastructures in the built-up areas and the forest heritage. Critical situations due to the snow loading and the snow removal necessity involve all the mountain people directly. Over the plain and the hill country, where the new snow density is generally high giving rise to effects related to its load capacity, to the isolation of little residential and rural settlements, several damages on the secondary road system due to the tree and tree branch falls comes up , together with many public services interruptions (electric power and telephone), warehouse and barn collapses, determining a widespread critical situation. The urban and commuting traffic during the snow emergency enhances the difficulties related to the road management and traffic control over the whole road system in the plains, even with little snow accumulation on the ground. Critical situations may also arise from road frost and intense freezing spells.
The operational implementation of the technical rules for the snow emergency management, tested the first time during the event in a dynamic way, pointed out its drawbacks and potentiality, highlighting the “emergency preparedness” importance at different institutional levels, with the population and stakeholder involvement. Some measures have to be especially underlined: the coordination of the snow monitoring over the territory performed by the local operators (avalanche activity and linked damages reporting) and the steps taken locally; the improvement of the tools for the snow pack evaluation to drive the avalanche artificial triggering off, in case of snow mass hazard assessment, and their regional coordination. Moreover it is important to define the standard, acknowledged and accepted prevention actions suited to minimize the heavy snowfall effects, with particular attention to the viableness,to the school systemopening/closing and to the preventive information care in order to avoid the missing perception of the risk. Special attention must be paid to the hydrogeological risk condition assessment, forecasting

and surveillance. In fact they are enhanced by the winter heavy snowfalls and show their effects during the following season. The improvement in the prediction of the risk evolution scenarios and in the prevention action planning helps the decision making to a considerable degree.