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FENOMENI DI DISSESTO E PRECIPITAZIONI IN RAPPORTO ALLA PIANIFICAZIONE TERRITORIALE: L'EVENTO ALLUVIONALE DEL NOVEMBRE 2002 NELLA BASSA VAL LAVAGNA (LIGURIA ORIENTALE)

ABSTRACT: FACCINI F., BRANDOLINI P., ROBBIANO A., PERASSO L. & SOLA A., *Instability, precipitation phenomena and land planning: the flood of 2002 in lower Lavagna valley (Eastern Liguria, Italy).* (IT ISSN 1724-4757, 2005).

A critical pluviometric event took place in the eastern sector of the Province of Genoa on November 24th, 2002. The event led to a series of landslides and hydraulical problems in that sector, which lies in the coastal area between Zoagli and Chiavari and the inland area of lower Lavagna valley (Fontanabuona).

An analysis of the extreme rainfall was conducted utilizing data recorded at several stations located within the Entella river drainage basin and the sub-basins of the Lavagna and Sturla streams. The analysis showed that the November 2002 levels were twice as high as the corresponding recorded historical means.

Hourly precipitation data revealed an initial major event on November 23rd between 4:00 PM and 9:00 PM, and a second episode the next day. The latter was more intense and concentrated between 10:00 AM and 1:00 PM. Members of the local community have indicated the time interval between 2:00 and 2:30 PM as the start of the main instability phenomena on November 24th, thus 1-4 hours after the maximum peak rainfall.

On the basis of the lines signaling possible pluviometric events, it can be stated that the intensity registered for critical precipitation does not reveal any exceptional characteristics, as the return times lie within a range of 10-20 years, and up to 50 years locally.

The gravitational movements are attributable to debris flow, mainly detached from the lateral valleys of the main segment of the Lavagna stream valley, from wooded slopes that were well maintained and also characterized by cultivated terraces.

As regards the triggering mechanisms, the phenomena noted are attributable to maximum shear stress (peak conditions) and are only secondarily attributable to stress in the residual state. The highest concentration of landslides was noted in the bedrock made up of the Val Lavagna Formation, and to the same degree in the clayey-schistose and marley- schistose components (slate).

It was observed that numerous slide planes correspond with the interface between the surface cover and the underlying bedrock, which tilts down towards the bottom of the valley and thus revealing a marked unfavoreable slope position. In most cases, the displaced material set into motion on the occasion of the pluviometric event revealed a reduced thickness, amounting to less than 2.0 m. The debris was rapidly channeled along the rivulets or sectors with sunken or low morphology. This determined critical hydraulical situations in the secondary drainage network with reductions in the downflow section that also reached significant levels.

The manmade drainage works were partially or totally blocked up in a very short time. This gave rise to very thick and extensive alluvial deposits in relation to the original expansion of the watercourses involved in the event.

Most of the instability phenomena came about in areas considered at medium or low risk in terms of land basin planning, thus lying in sectors defined as stable or lacking elements considered to be indicative of potential landslide risks. The above considerations point to a disregard of or inattentiveness regarding forecasts for the Lavagna Stream Basin Plan. Therefore, as part of the updating of this land planning tool, a more indepth investigation of the geomorphological aspects is held to be a necessary requirement, including the adoption of a different calibration of the weights assigned for the preparation of the map of instability susceptibility.

It is hoped that in the future, data on the positions of the planes of discontinuity of the rock masses and the presence of thin covers of debris reported on the geomorphological map, but not considered in the preparation of the map of instability susceptibility, because they were held to have no influence on the local stability of the slope, will be taken into account in a more incisive manner. In this regard, we wish to stress that to the contrary, the flood event demonstrated that loose and thin-layered debris cover, even more so on terraced slopes, becomes vulnerable in terms of slope dynamics during extreme hydrological peaks, especially in combination with the clayey nature and unfavorable structural characteristics of the substratum.

KEY WORDS: Instability, Flood, Basin land plan, Critical precipitation, Lavagna valley (Liguria, Italy).

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