



## **The last huge rainfall in the Murge area (Apulia, southern Italy): the reasons of announced disaster**

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The occurrence of calamitous meteoric events is unusual in the Murge area (Apulia, southern Italy) since the dry climate, but very intense rainfalls cause emergency states and flood damages, involving people as well as socio-economic property.

The Murge plateau is the central part of the thick carbonate Mesozoic sequence of the Apulia platform. Cretaceous carbonate platform deposits are known as “Calcari delle Murge” Group. The carbonate rocks are overlaid by thin transgressive calcareous and marly-calcareous deposits of Tertiary and Lower Pleistocene known as the “Calcareniti di Gravina” Formation. In the Holocene, “terra rossa” deposits derived from limestone solution, and alluvial deposits accumulated in depressed areas such as dolines and river valleys. The whole area is characterised by developed karst landforms. Karst formed in response to several morphogenetic phases which took place in different climatic and structural contexts. The area is interested by a system of drainage channel of low order developed mainly along N and NE directions.

The climate is defined as “Mediterranean” and the value of the annual mean rainfall is about 600 mm and events of large intensity occur mainly in autumn season. Usually rainwater rapidly infiltrates, feeding a wide, deep karst aquifer; however, it can flow at the surface towards endoreic basins or in drainage channels when the epikarst is saturated.

In the whole study area the agriculture is developed and the well-paid growing is mainly cultivated where the soil is thick, such as the bottom of both dolines and drainage channels. Moreover, the socio-economic development of the last 50 years caused the enlargement of towns, and the building of industrial district without respect of the physical environment. So, houses, commercial and industrial buildings, roads, railroads and service infrastructures as well as vineyards and cultivated fields

are located in areas of high flood risk.

Historical records report that floods occurred in the city of Bari every 10-20 years until 1926 when several measures to avoid or mitigate damages were taken. These measures worked well until the night between the 22<sup>nd</sup> and 23<sup>rd</sup> of October 2005 when more than 150 mm of rain fell in six hours in the upstream zone of the city of Bari. The catchment headwater, where this intense meteoric event occurred, is located about 30 km of the city in the central part of Murge hills. The maximum elevation in this area is about 450 m a.s.l. and slope degree is low (about 6%), the great amount of rain fell during few hours caused a huge water flows which carried away growing, road embankments, bridges, walls and other infrastructures, flooding into private houses and industrial buildings. The event also caused the loss of six human lives which were travelling along roads carried away by water. The assessment of flood damages amount to several millions of euros involving public and mainly private property.

Several studies were carried out during last years before the event in order to map areas of flood risk. These studies should have provided a contribution to a better management of the area. The event described above clearly shows either that the flood areas were underestimated and, in general, a bad territory management has been carried out without taking into account of a sustainable development.