



Sinkhole hazard assessment in Lesina Marina area (Apulia, Italy)

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In "Lesina Marina" area, located in the north-western part of the Apulia region (Italy), near the Adriatic coast, sinkhole phenomena are particularly widespread and constitute a risk for the built-up area. These phenomena are due to the structure of the evaporitic rocks located in the study area and to the groundwater regime, influenced by the presence of a channel that connects the sea to the lagoon. The complex sea-channel-lagoon system produces an inland flow towards the channel modulated by the tide with a variable width according to the rules of the coastal aquifers.

Further studies have been carried out in order to clarify the context and the causes of this instability phenomenon. A procedure for the sinkhole susceptibility and hazard assessment has been performed, in order to evaluate the spatial distribution of the most unstable areas and the potential spatio-temporal evolution of the phenomenon.

The sinkhole susceptibility model has been created in GIS by assessing the spatial relationship between the sinkhole inventory map and a series of thematic maps relative to instability factors. The thematic layers selected for the study are nine and cover geometrical features of the surface, of the gypsum rockhead and of the incoherent soil cover, groundwater and daily and seasonal groundwater level variations. Daily groundwater variation in a semiconfined coastal aquifer can be related to the permeability and to the void structures of the evaporitic mass.

In the years subsequent to 1980, when the first reports of the presence of sinkholes are dated, the evolution of these instabilities in terms of their number and of their increase of extension has been monitored with repeated surveys. These data were used for susceptibility model validation and to define the hazard model.

The selected layers revealed to be very useful in describing and mapping the hazard coming from suffusion sinkholes in the study area.

The sinkhole hazard assessment is carried out, according to previous methodologies, by spatio-temporal probability (frequency) of new sinkholes in each susceptibility class.

The sinkhole hazard mapping in this area will provide a useful tool for planning, development, management and recovery of areas affected by the instability and constitutes a useful basis to plan sustainable risk mitigation measures.