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The hydrological hazard and flooding damages due to anthropogenic activities in the Murgian karstic environment (Southern Italy).

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The Murgia area (Apulia, southern Italy), a morpho-structural high of the Apulian foreland, consists of a powerful succession of Mesozoic calcareous rocks, on which at heights lower than 450 m a.s.l. extended limbs of sedimentary formations formed in subsequent periods up to the recent quaternary period lie.

The Murgia holds a huge karst aquifer, which constitutes the main water resource of the region.

The morphological features of the karstic plateau are defined by the density of surface karstic forms. Karst surface shows natural distribution of modest deposits of “terra rossa” and regolith on the bottom of the morphologic depressions called “lame”, often outlining a primordial hydrographical network occasionally convergent in dolines, polje or endorheic basins. These depressions work as streams during and after heavy rainfall events and, normally, reach the coastal area.

Karst morphology play a dominant role in the surface and subsurface hydrology.

In such context, the surface of recharge area, characterized by high hydraulic conductivity of karstic outcropping rocks, has high capacity of adsorbing rainfall of medium and high intensity, the runoff being basically activated only during highest intensity events, and the low evapotranspiration, consequent to the negligible outcrop of soils, has been preserved in the time until the last two decades. In these conditions the occurrence of runoff is associated to natural flooding of endorheic basins and very low

slope areas.

Recently, the Alta Murgia plateau has undergone a dramatic land use change due to agricultural activities. In particular, the crushing of surface rock layers, which affects mainly soils and epikarst textures of the Alta Murgia, has changed large part of the original karst landscape into sown land.

Land transformation involves also the demolition and crushing of the dry stonewalls, and the flattening of large areas included the “lame”, that become suitable to cultivations of intensive type.

Another growing practice, the generalized coverage of the grape fields with plastic sheets acts with a different mechanism, the concentration of the precipitation avoiding its infiltration in the soil and transforming almost all of it in runoff.

These practices have negative effects as the creation of an instable environment caused by the hydrological balance and groundwater quality alteration and the irreversible loss of soil, the closest precursor of the desertification of the area.

At the same time, other recent anthropogenic activities such as urbanization, quarries, realization of road and buildings in flooding river areas produced degradation and serious consequences in the wholeness of the fragile natural karstic landscape and increased the vulnerability along the drainage network exploiting the natural flooding areas, underestimating hydrological hazard and as consequences the flooding risk of the territory.

This study, from detailed geomorphological surveys, in situ investigations, and aerial photo analysis, highlights the flooding risk evidencing anthropogenic control on the karstic environment and on the damages caused by recent dramatic events.