



Urban areas of Carbonia (Sardinia, Italy): anthropogenic and natural sinkhole

A. Mureddu (1) and A.S. Corda (2)

(1) Provincia di Carbonia Iglesias, Carbonia, Italy (alessio.mureddu@provincia.carboniaiglesias.it), (2) ARPA Sardegna, Cagliari, Italy (ascorda@arpasardegna.it)

This work aims to contribute to knowledge on the phenomena of sinkholes in the urban area of Carbonia, primed mostly as a result of mining in underground coal Sulcis, as well as natural causes, in the hills and valleys structured on the bedrock of Cambrian area, in the localities of Cannas and Serbariu.

During the exploitation of the coal deposits, (so called Lignifero), mines of the Sulcis Area, in over a century of mining, have produced large underground excavations, which were extracted more than 50 million tons of coal and large quantities of tailings. On older crops of mineral minings centers of Serbariu, Cortoghiana and Bacu Abis, the mining operations reached the depth of 300 meters from the surface of the country, over 100 meters below sea level.

In the late of 1960, following the closure of the mines, were manifested in the temporal effects of the disruptions caused by the collapse of underground voids, affecting a much wider area of the below mining cultivations. The first signs of instability are occurred with the sudden opening of large potholes and structural damage to buildings up area of Bacu Abis, in neighboring areas to the Mine of Serbariu, intended for production facilities ("Su Landiri Durci"), and along certain streets service.

In the case of mine "Serbariu" located on the outskirts of the urban west Carbonia, exploited in the period between 1940 and 1964, the cultivation of the layers of coal left in place, at short depth from the surface level, consisting of empty mines, with more than 5 km of galleries. So, have been found important effects of instability of the soil in urban areas and in the recently built road infrastructure linking lots of settlements.

The area affected by mining operations has an area of over 4 square kilometers, is covered in part by the built environment and road infrastructure of regional and state level.

In the mining center, now converted to craft and commercial area, have continued various undergrounds mining collapses, with the opening of pits on the surface, circular or elliptical, formed by highly inclined or vertical walls. On the surface have been found sinkholes, large depressions with steep walls and slightly elongated forms, which have caused impacts to homes and roads infrastructure.

Based on recent surveys carried out, was estimated that the risk area covers about 2.7 square kilometers, jutting out from the center of mining "Serbariu mine" and arrives conurbation of Sirai.

To remember besides, in the eastern outskirts of Carbonia, (Cannas locality), and in the district of Serbariu - Perdas Biancas, in any major tectonic lineation Hercynian and Tertiary age, the presence of 9 sinkholes, 6 of which are newly formed, for the which are studying the possible causes due to the exploitation of groundwater.

Referring to the geological and structural models of the study sites, were made firsts geophysical investigation using GPR (Ground Penetrating Radar), in "multi-frequency arrays," in the process of calibration and systematize of the sinkhole phenomenon.