



# **Man-induced land subsidence manifestations in Bulgaria**

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The man-induced land subsidence takes place in populated and unpopulated areas with old or new buildings, monuments, transport networks, industrial sites, barrages, irrigation systems etc. In cities (Sofia, Varna, Plovdiv), towns (Bourgas, Rousse, Sliven) and villages (Koshava) there are local manifestations of man-induced subsidence. Monuments of world (Rila monastery) significance are situated also in partially subsided territories. There are also areas from S Bulgaria (Plovdiv city, towns of Pazardzhik and Plovdiv) with very high potential for the development of man-induced subsidence manifestations. The maximal value of the subsidence is of 10-12 m in the village Koshava, the district of the town of Vidin (NW Bulgaria). The subsidence occurs under 1-20 floors buildings or mines that are created with or without official permission. It takes place in periods before, during or after the installation of the people in the created from the society constructions. Some of the constructions are state or private ones, others represent primary a possession of the state or of persons and secondary - of national or foreign private organizations or persons. The causes for the subsidence are mainly the following: accomplishment of the construction plans with several omissions; execution of irregular corrections in the water supply systems; presence of inefficacious or inoperative drainage systems; unregulated exploration of the water resources in the first groundwater layer; activities in the gypsum or salt mines; presence of underground empty spaces, that are not taken in account; uncontrolled reconstructions in the existing constructions; change in the management of the constructions.

The financial losses from the accomplished subsidence in the constructions or from

the supposed ones are or will be considerable. In a part of the cases they represent losses of the state institutions, but more often - personal or family losses.

The man-induced subsidence provokes more considerable dangers when they are developed in territories with geological dangers – in territories with recent activity, including seismicity, in areas with the distribution of loess or swelling clays, in karst regions etc. In these cases the combination of the natural and the man-induced subsidence could provoke terrible results for the population and the environment, also immense financial losses for the society.