MEDIOEVAL HISTORICAL HILLTOP TOWNS IN CENTRAL ITALY: THE CASE OF CIVITA DI BAGNOREGI

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AbstractMany Italian historical sites are usually located on the top of hills, due to the favourable conditions in terms of security. These areas, developed in time becoming important villages and towns, are now suffering from mass movement, often triggered by earthquakes, involving the cliff-slope system.A significant Italian case study is represented by Civita di Bagnoregio, which appears as a typical medieval town, built on the top of a volcanic cliff, evolved today in an exaggerated morphological peak, as consequences of extreme erosional phenomena. The town is connected to the municipality of Bagnoregio through a modern bridge, founded on a narrow morphological clayey crest, that is the last of four different bridges built in this century, progressively ruined by mass movements. Landslides involving the cliff-slope system have caused also the disruption or endangering of many buildings founded close to the border, so that Civita is commonly known as “the dying town”. Since last decade Civita became a sort of geomorphological field laboratory where Italian scientists and engineers developed new approaches for the restoration of unstable historical towns through low environmental impact reinforcement works. The present paper discusses the importance of a correct understanding of geomorphological processes, the importance of monitoring systems, the importance of mitigation measures that are respectful both of environmental dynamics and historical context. An application of the above mentioned concepts is represented by the remedial works recently realized in part of the northern border of the cliff, which has been heavily affected in the last decade (1992, 1993, 1996, 1998, and 1999) by rock falls and debris flows. Restoration works have been designed to stabilise the upper volcanic formation of massive tuffs through the realisation of wells located on the back with respect to the potential rock fall scarp; the wells, hand-excavated in order to minimise vibrations, represent the link between a system of active anchorages and passive nailing of the external cliff border and a system of active anchorages oriented toward the internal side of the tuff masses. The anchorages provide a lateral reinforcement to the cliff walls, preventing, as well, toppling, detachment or fall of rock masses; moreover their function is to reduce the vertical load component in the contact between massive and stratified tuffs, characterised by poor mechanical properties. The injections provide a better stability of medium-small rock masses, prone to sliding, toppling or fall as well as an increase of mechanical properties of rock masses exposed to weathering. A system of micropiles have been realised in the bottom of wells to link the structure with the bedrock, increasing the shear strength of