

# Hydromorphic Impact of Matera's Urban Area-Commentary

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## Commentary

### ABOUT THE STUDY

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The proposed Hydromorphic approach emphasizes the importance of basing territorial and urban planning processes on a careful analysis of the morphological balances described by the catchments, to preserve or improve the ability of transformed areas to cope with the ongoing effects of climate change (resilience). The term 'hydromorphic' is deliberately used to evoke the natural process that is compromised by urbanization works, thus emphasizing the need to assess the impact of morphological transformations even in urban areas. This term is the combination of 'hydro' and 'morphology' to make the reader understand that through the water flow patterns it is possible to understand the morphology. Understanding the phenomena that occurred in important historical contexts like the Sassi of Matera, allows to spread greater sensitivity towards a much debated topic not yet widely applied. In fact, the analyzed situation, although referring to a specific urban area, is highly representative of many situations in Italy where urban development has undergone evolutions and expansions over time, inevitably impacting the morphology of catchments and, consequently, the dynamics of surface runoff that measure their effects. In urban contexts, situations of extreme vulnerability (recurring floods or uncontrolled runoff) often occur when urban development (including road and rail infrastructure) took place not paying due attention to the morphological structure of the locations (catchment, sub-catchment). While observing the catchment's structure allows the recognition of the reciprocal effects of different portions (upstream, slope, valley) that are otherwise overlooked. Areas undergoing changes can affect different downstream portions of the basin, even if these portions undergo no direct transformation. These effects can be easily expressed by the peak flow at the downstream extreme of the watershed (closing section). For this purpose, urban planners could adopt the proposed hydromorphic methodology, which applies an agile tool (RM-formula) to synthetically assess the hydrological response resulting from various planned or already developed transformation activities.

The peak flow evaluated at any section of a watershed is a synthetic indicator correlated with the morphology of the watershed itself and is sensitive to any alterations made. The case study of Matera is introduced to explain how the methodology can provide useful awareness into understanding the effects of morphological changes introduced through urbanization projects and highlights, in particular, the natural connection between the upstream areas of a basin and those downstream, showing the effects in case of improper transformations develop from the bottom of the basin, upwards: The historic district of Sassi occupied the lower part of the watershed which was otherwise in natural conditions, subsequently new districts were created in the upper part and this has reduced the permeability of the mountain areas, altering the balance of the basin and increasing the exposure of the historical areas. Situations of this type are quite widespread and not always well considered. Many cities have adopted water management plans focusing on preventing flash flood risks but urban planning has not yet widely adopted climate change adaptation approaches or water sensitive urban planning. This contribution aims to spread a methodology that can be useful for understanding a natural phenomenon that controls the adaptive equilibrium of any territory. Otherwise transformations that do not take advantage of the equilibrium natural conditions, have to cope with problems they have produced relying on complex water and sewerage infrastructure, resulting in vulnerable situations where urbanization became the cause and the victim of its choices.