

Climate Change Adaptation: Methodologies and Tools to Define Resilience Scenarios for Existing Buildings in Mediterranean Urban Areas

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Abstract : Climate changes in Mediterranean areas, such as the increase of average seasonal temperatures, the urban heat island phenomenon, the intensification of solar radiation and the extreme weather threats, cause disruption events, so that climate adaptation has become a pressing issue. Due to the strategic role that the built heritage holds in terms of environmental impact and energy waste and its potentiality, it is necessary to assess the vulnerability and the adaptive capacity of the existing building to climate change, in order to define different mitigation scenarios. The aim of this research work is to define an optimized and integrated methodology for the assessment of resilience levels and adaptation scenarios for existing buildings in Mediterranean urban areas. Moreover, the study of resilience indicators allows us to define building environmental and energy performance in order to identify the design and technological solutions for the improvement of the building and its urban area potentialities. The methodology identifies step-by-step different phases, starting from the detailed study of characteristic elements of urban system: climatic, natural, human, typological and functional components are analyzed in their critical factors and their potential. Through the individuation of the main perturbing factors and the vulnerability degree of the system to the risks linked to climate change, it is possible to define mitigation and adaptation scenarios. They can be different, according to the typological, functional and constructive features of the analyzed system, divided into categories of intervention, and characterized by different analysis levels (from the single building to the urban area). The use of software simulations allows obtaining information on the overall behavior of the building and the urban system, to generate predictive models in the medium and long-term environmental and energy retrofit and to make a comparative study of the mitigation scenarios identified. The studied methodology is validated on a case study.

Keywords : climate impact mitigation, energy efficiency, existing building heritage, resilience

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