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Resilience of historic built environments: Inherent qualities and potential strategies

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Abstract

The historic built heritage is conceived, in terms of morphology, typology and construction technology, as a responsive and adaptive system to the environmental surroundings. Nevertheless, it is featured by spatial and functional configuration, resulting from a continuous evolution process of social, economic and cultural events for the territory and the community. Thus, it shows inherent characteristics connected with the concept of “resilience”, namely the capability to prevent, adjust and overcome changes, even traumatic and catastrophic ones, through natural protection from calamities, exploitation of available resources, transformation of arrangement layouts, aggregation schemes and uses. However, the historic built heritage is affected by specific vulnerabilities, in terms of functional, normative and technological obsolescence, due to increasing requirements of safety, well-being and accessibility, as well as in terms of historic and architectural values, whose conservation and enhancement might conflict with the performance improvement. The present study aims at investigation and assessment of methods and tools that might support the identification of potentialities and criticalities of historic built environments with regard to the urban resilience. For that, a multi-scale approach, from the urban to the building level, and a multi-disciplinary vision, including environmental, economic, social and cultural aspects, is pursued. Particularly, the paper is going to focus on the development and validation of a methodological framework, as decision-making support to identify and control the factors that mostly influence the resilient behavior of the historic built heritage. The application to the “Sassi di Matera”, UNESCO site and outstanding compound of rock grottoes, anthropic caves and masonry structures, means to validate the proposed criteria and strategies, in view of their dissemination and replicability.

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1. Introduction

The resilience – namely the capability of a system, a community or a society exposed to hazards to mitigate, resist, change and recover from the effects in a timely and efficient manner, by keeping its functions and structures – has gained increasing attention within the international debate, at institutional, scientific and technical levels. The topic, which involves different fields – environmental, social, economic and political – depending on the main character of the “resilient system”, offers interesting research perspectives for the development of innovative planning and management models of towns. In fact, towns might be considered as complex systems, where an intersection takes place at the local scale among weaknesses and strengths of the natural and manmade “environment”, the “society” of citizens and visitors, the “economy” of commerce, labour and tourism and the “politics” of administrators and institutions.

Particularly, there are numerous activities to raise awareness and dissemination on the topic by international organizations such as GFDRR (Global Facility for Disaster Risk Reduction), UNISDR (United Nations Office for Disaster Risk Reduction) and UN-HABITAT (United Nations Human Settlements Programme) [1,2,3], as well as studies of universities and research centres [4,5,6,7,8], aimed at defining principles, criteria and strategies of urban resilience. Among several international experiences, it is worth mentioning the results of the “100 Resilient Cities” programme, which has focused on the assessment of several representative pilot-cases worldwide and it has identified the main features of the ideal resilient city, in terms of pre-crisis “preparation”, crisis “absorption” and post-crisis “recovery” and “adaptation”. In detail, the most relevant features are: “reflective”, namely able to profit by the critical assessment of past experiences to predict possible transformations and to inform future decisions; “robust” through well-conceived, constructed and managed systems to withstand a crisis without significant structural damage and loss of function; “redundant” and “resourceful”, thus showing spare capacity purposively created to accommodate disruption, by multiple pathways to achieve a given need and efficient ways to manage resources under extraordinary pressures; “flexible” in adopting transient and dynamic solutions in response to changing circumstances or sudden crises; “inclusive” and “integrated” in promoting consultation and cooperation among all the social, economic and institutional stakeholders [9].

The above-mentioned aspects are specifically relevant when referring to the historic built environments, which show some inherent qualities of resilience. Particularly, this applies to three dimensions of resilience: environmental, socio-cultural and socio-economic [10]. In detail, the environmental resilience refers to the ability to respond to changing climatic conditions by reducing the physical vulnerability to natural hazards. The socio-cultural resilience concerns the development over time of intangible values, such as behaviour, knowledge, construction practice and social cohesion that help to create a sense of identity for a community and awareness on land exploitation and management. The socio-economic resilience invests the relation between productivity and social well-being, in terms of efficient and autonomous management of material resources and people's involvement in decision-making.

For historic urban settlements, such aspects are reflected in the morphology, typology and construction technology, as responsive and adaptive systems to the environmental surroundings, as well as in the spatial and functional configuration, resulting from a continuous evolution process of social, economic and cultural events for the territory and the community. However, despite some inherent qualities of resilience, the historic built environments are affected by specific vulnerabilities, which might prevent from the implementation of modern mitigation, resistance and adaptation models. The reasons are basically the increasing environmental pressures, mainly related to the climate change, which will result in a fairly unprecedented exposure to natural hazards (floods, earthquakes, temperature elevation, ...); the performance deficiencies, in terms of functional, technological and normative obsolescence, due to increasing requirements of safety, well-being and accessibility; the historic and architectural values, whose conservation and enhancement might conflict with the performance improvement.

Thus, the development of methods and tools are highly desirable that might guide the recognition and enhancement of the actual qualities, as well as in identifying and overcoming the vulnerabilities of historic urban settlements, through a set of integrated strategies to ensure the desirable balance between preservation of the original identity and adaptation to new requirements. Based on the outlined issues, a research group at the Polytechnic of Bari has recently focused on the definition and validation of a methodological framework, as a decision-making support to identify and control the factors that mostly influence the resilient behavior of the historic built heritage,

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