

From Knowledge to Action: The Paradigm of the Local Resilience Units in the Post-Pandemic Context

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As we approach the 2030 deadline, the pivotal year for achieving the Sustainable Development Goals (SDGs), both the scientific community and policymakers in urban environments are intensifying their focus on understanding and, more crucially, implementing, the concept of resilience with reference to SDG11 *Making cities and human settlements inclusive, safe, resilient and sustainable* ahead of the major challenges related to pollution, life quality and adaptation to the consequences of climate change.

Against this backdrop of global transformation, the sudden arrival of the Covid-19 pandemic added elements of complexity to the overall picture, exposing cities to emergency scenarios that impacted everyone's daily lives. Thinking about the context of European cities, which have largely adopted similar measures to contain the contagion, the months of spring 2020 and to a lesser extent the entire following year were characterized by an alteration of the spaces and times of urban life. Widespread closures of public and economic activities, curfew measures, and ban on gatherings emptied squares, parks, and pedestrian streets. The closures of tertiary activities and schools have emptied the streets of vehicular traffic.

In the tragedy of the events, the pandemic period offered an alternative scenario of cities, and allowed for empirical observation and appreciation of the impact of phenomena such as congestion on urban dynamics: an impact evident in reduced noise, available public space, and reduced pollutant emissions. Conversely, the very pandemic has provided insight into the limitations and shortcomings of cities. In a period of restricted movement, the need to stay in the proximity of one's homes showed the limitations of neighborhoods such as the lack of quality public space and poor building quality, and especially the disparities between different parts of cities. These empirical observations have restored strength in the urban planning debate to the issue of proximity and accessibility: paradigms such as the post-carbon city, which outline resilient, sustainable, zero-carbon but also just and equitable cities must necessarily confront the dimension of the neighborhood, the quality of its public space and the incentive for soft mobility.

Within this framework, the team of researchers from the Responsible Risk Resilience Centre (R3C) at the Politecnico di Torino initiated the Post-UnLock project, with the aim of promoting a "jump forward" in territorial resilience research and seeking to understand a) whether we have the cognitive and planning tools to address complex issues in pursuit of sustainability and resilience goals, b) what the role of planning is in translating goals into action, and c) whether planning can actually lead to an ecological transition. The research, developed within an interdisciplinary team that had already worked on the theoretical background of territorial resilience and the definition of tools for measuring territorial vulnerability, and enriched by the contribution of health experts to take into account the impacts of Covid, resulted in the introduction of the concept of Local Resilience Unit, defined as "an operational frame" at the "neighborhood" level that can develop planning actions together with community empowerment to make cities more responsive, resilient, and able to provide a high level of liveability and urban well-being (Brunetta & Voghera, 2023). The introduction of new concepts-guidance in planning is not a completely new issue, but highly topical in the face of the challenges that cities face.

The Local Resilience Un-Lock paradigm was discussed by the researchers at the theoretical level and through a review of case studies and tools allowing for an initial conceptualization and more general reflection on planning in the post pandemic era. The outputs of the project, which flowed into the book *Post Un-Lock - From Territorial Vulnerabilities to Local Resilience* were also the input for a PhD thesis funded by the Post UnLock project of DIST Department at Politecnico di Torino in the context of the R3C center. The thesis, by delving into the concept of Local Resilience Units in the specific case of the City of Turin, Italy, offers a methodology for identifying and mapping portions of the city where Units can be activated, i.e., that set of transformative actions and active participation of citizenship for resilience and increased livability. Turin was selected as a case study as an important urban center in northern Italy with a past rooted in the automotive industry. For years the city has been undergoing a series of strategic and planning processes that have redefined its physical form and assets, moving toward the promotion of sustainable mobility, the limitation of vehicular traffic, and the widespread implementation of sustainability projects and initiatives.

The methodology of identifying areas suitable for Local Resilience Units in the experimentation carried out in Turin rests on the concept of pedestrian proximity, understood in reference to the possibility of people being able to walk to the main public and private services necessary for the performance of daily activities. This assumption makes it possible to hold together the theme of the neighborhood as the place of the Local Resilience Unit and to focus on the actual reading of the territory - based on the services present - as opposed to the use of administrative conventions such as neighborhoods or - in the specific case of Turin - districts. Thus declined, the theme of pedestrian accessibility pushes the Local Resilience Unit to compare itself with city models such as the 15-minute city and the Supermanzana, with which it shares a focus on the dimension of proximity and soft mobility but from which it differs in its resilience-oriented approach. Pedestrian accessibility to services is, in the case of this experimentation, the way to identify the areas most conducive to the activation of the resilience-building processes of the Unit.

At the technical level, the mapping of suitable areas was characterized by the calculation of accessibility basin overlays, obtained through isochronous curves generated from a set of Points of Interest (POIs) representative of the dimensions of daily life, including neighborhood and market businesses, green areas and recreational facilities, schools and health services. The isochron overlay technique was mediated from the literature on planning for commerce, particularly in its applications with respect to large-scale retail planning. Operations were carried out according to an open-source approach, favoring the use of free data and software: a relevant role was played by public data from the City of Turin and those provided by the Openstreetmap collaborative mapping project. At the software level, calculations were made possible by the opensource tool *Openrouteservice*, implemented as a local server and used through QGIS. The methodology thus defined was tested and optimized in the Turin case study by trying different combinations of POIs, different time thresholds of 5, 10, and 15 minutes, and developing techniques for automating and speeding up software procedures, in particular by modeling the workflows necessary for calculation with the QGIS Graphic Modeler.

The results of the trial in Turin allowed for a deeper understanding of the concept of Local Resilience Units in the urban context. The mapping results, in particular, found that with respect to all the parameters used of 5, 10 and 15 minutes, the City of Turin turns out to be predisposed to the implementation of Units. Adopting the 10-minute parameter in particular, suitable areas are identified roughly in the neighborhoods of Borgo San Paolo and Santa Rita, to the west and southwest of the city, and Valentino, along the Po river shaft. From the results of this experimentation, it is possible to outline for the identified target areas a series of planning and design initiatives that by involving the citizenry can "activate" the identified portions of the city and transform them into Local Resilience Units.