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A RESILIENCE-BASED APPROACH TO ENHANCE THE CAPACITY OF SMALL VILLAGES TO COPE WITH INTERTWINED THREATS:

A CASE-STUDY IN THE BASILICATA REGION

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Abstract

About 70 percent of Italian municipalities that have fewer than 5,000 inhabitants are located in difficult to access mountain areas which are often prone to multiple hazards. As clearly demonstrated by the seismic events that hit Central Italy in 2016, the socio-economic decline of these municipalities is also increasing their vulnerability. Nowadays, small villages represent an important challenge for Italy, because they require significant resources and effective strategies to both break the cycle of decline and promote their economic and social development, while also reducing their vulnerability to natural and climate related hazards. This contribution provides an overview of the initiatives recently launched in Italy in favour of small villages and outlines a methodological path to assess and enhance the overall resilience of these areas, with a focus on a case study area located in the Basilicata Region of Southern Italy.

Keywords

Inner areas, small villages, vulnerability, socio-economic decline, resilience

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1. Italian Small Villages: Roots and Geographies of Decline

Starting from the 1950s, urban populations have significantly increased worldwide, and exceeded total rural population in the first decade of the 21st century: to date, over 70 percent of the population of Europe lives in urban areas (UN, 2018), with it being estimated that this percentage will reach 80 percent in 2050 (UN, 2014). The concentration of population in large urban areas and the corresponding decline in rural areas have led to significant territorial imbalances, characterised by the gathering of economic activities, equipment, and facilities in urban areas, and the progressive marginalisation of small villages in rural areas, often left to the point of total abandonment.

This phenomenon particularly affects Italy, where about 70 percent of existing municipalities have fewer than 5,000 inhabitants and most of them possess populations ranging from between 1,000 and 2,500 inhabitants (37.5 percent). Small villages in Italy cover a total area that exceeds 50 percent of the national land surface, even though they are home to only 16 percent of the Italian population (ANCI – IFEL, 2015).

Over recent decades, small villages have suffered both from population reductions and an increasingly elderly resident population. During the last three decades, while the overall population has continuously increased in medium and large cities, the Italian Statistical Bureau (ISTAT) estimates that there has been a significant population decline in small villages, with a parallel increase in the percentage of the population aged over sixty-five (ANCE, 2017).

Furthermore, small Italian villages are characterised by both a lack of adequate essential facilities, such as schools and hospitals, and an inability to guarantee an acceptable level of citizenship to local residents. The classification of small villages carried out in 2014 by the Italian Department for Development and Economic Cohesion, which was based on their accessibility to essential facilities, showed that only 36 percent of small villages are located in close proximity to medium-large cities (poles), in which essential facilities are available (Carlucci, Guerrizio and Lucatelli, 2014). In contrast, 64 percent of small villages, mainly concentrated in Southern Italy (Basilicata and Calabria) and on the main islands (Sicily and Sardinia), are located in areas that are far or even very far from such poles. As a consequence, they have limited accessibility to essential services.

Finally, it is worth recalling that most Italian small villages are located in mountain (41.3 percent) and hilly areas (40.7 percent), with a very limited number (17.9 percent) in flat areas. The prevailing location of small villages along the Alpine arc or the Apennine Mountains implies that most of them fall into areas which are characterised by high seismic and hydrogeological hazard levels. In detail, 35 percent of small villages are included in areas classified as seismic zone 1 (where major earthquakes may occur) or 2 (areas which may be affected by quite strong earthquakes): these villages are mostly located in Central and Southern Italy (Marche, Molise, Campania, Basilicata, Puglia, Calabria, Sicily and Sardinia). In respect to landslides, over 36 percent of Italian small villages fall into areas threatened by a very high or high level of landslide hazard, with most of them being located in Molise, Marche, Basilicata, Calabria and Sicily.

The complex geographies of abandonment that increasingly characterise inner areas in Italy (Bassanelli, 2009; Pirlone, 2016) seem to be more and more the result of the dramatic interweaving of socio-economic and environmental factors. In these areas, population decline is due not only to their limited accessibility and the significant lack of facilities and job opportunities, but also a consequence of the occurrence of natural hazards. The latter, by affecting an aged population and a building stock already degraded by a lack of maintenance, can lead to the permanent abandonment of hit villages.

However, despite their continuous decline, almost all Italian small villages possess significant historical-architectural heritage and a wealth of high-quality natural resources, with over 30 percent of these villages being included in protected areas (national and regional parks, natural reserves, and so on). Furthermore, most of them are carriers of diversity both in respect to heterogeneous local cultures and traditions, and in terms of climate and environmental conditions that favour a variety of vegetation, fauna, and agricultural crops.

2. Breaking the Declining Cycle: European and Italian Strategies

Awareness of the need to promote effective strategies, capable of breaking the population decline and ensuring the enhancement of the significant cultural, historical, and naturalistic heritage that characterise small villages in rural and mountain areas, spread throughout Europe in the second half of the 1990s.

The Cork Declaration (EU, 1996) – A Living Countryside – emphasised the urgency of placing sustainable rural development at the top of the European Union Agenda and highlighted the role of small villages as key elements for promoting the development of vibrant rural communities. These issues were resumed, ten years later, by The Cork Declaration 2.0 (EU, 2016) – A Better Life in Rural Areas – that clearly remarks how, despite the decline of both population and traditional economic activities, villages and small towns still represent an important part of European culture. The Cork Declaration 2.0 recognised the key role that rural areas and communities could play in both implementing the United Nations Sustainable Development Goals (SDGs) and counterbalancing rural exodus and youth drain. In particular, the Declaration provides key principles to guide European rural policies and stresses "the need to ensure that rural areas and communities (countryside, farms, villages, and small towns) remain attractive places to live and work by improving access to services and opportunities for rural citizens and fostering entrepreneurship in traditional rural domains as well as new sectors of the economy" (EU, 2016).

Following the same line, in 2014 the Italian Government launched the National Strategy for Inner Areas for the period 2014-2020. The Strategy refers to all inner areas that, although being very heterogeneous, share both a significant marginality in respect to the main supply poles of essential services (education, health and mobility) and the presence of important environmental and cultural resources. The primary objective of the Strategy was to foster economic and social development of inner areas, by improving those already existing practices capable of successfully reversing the marginalisation process (Barca and Calafati, 2014).

The Italian inner areas have been identified with reference to their distance from the closest supply poles which offer basic services related to education, health and transport (railway stations), and have thence been classified into four typologies: belt, intermediate, peripheral, and ultra-peripheral areas. In order to better understand their heterogeneous development paths, they have then been examined according to both their geomorphological features and their demographic and socio-economic structures. The set of indicators that has been used to identify and classify inner areas does not include parameters related to the hazards or vulnerability features of these areas. However, as clearly demonstrated by the seismic events that affected numerous small villages in Central Italy in 2016, the vulnerability of these areas to natural hazards is significantly amplified by population decline and the consequent lack of maintenance practices that had been applied to both territory and building stock. Meanwhile, hazardous events are often responsible for the acceleration of on-going declining/abandonment processes: the few inhabitants who still live in small villages, keeping alive already weak local economies, are often forced to permanently abandon these places following a disaster, because the pre-existing lack of accessibility, services and job opportunities, which have already induced population decline, further increases. This is a process that may also, sometimes, further undermine effective post-event reconstruction.

As emphasised by Vale and Campanella (2005), following a hazardous event cities and territories rise again "not due to a mysterious spontaneous force, but because people believe in them". The authors also stressed that "cities are not only places in which we live, work and play, but also a demonstration of our ultimate faith in the human project, and in each other". In small villages, population decline and ageing, combined with geographical and economic marginality, are progressively undermining the capacity of people to keep their faith in the human project alive, making the development of a vision for their future, which is crucial to achieving a new normalcy after a disaster, more and more difficult.

In Italy, attention on revitalisation of small villages was re-launched in 2017. The latter was declared the Year of the Italian Villages and during this year Law 158/2017, also called the *Save Villages Law*, was issued. This law recognises small villages (referring to those which have fewer than 5,000 inhabitants) as key resources in ensuring a wider territorial safeguarding, since they play a crucial role in counterbalancing hydrogeological

hazards by ensuring the widespread maintenance and protection of common goods. This law aims to counteract depopulation, while increasing the attractiveness of small villages. To this end, a program of public funding was set up in order to support measures addressing the protection of environmental and cultural heritage, the reduction of hydrogeological risks, the regeneration of historical centres, the securing of road infrastructures and school facilities, and economic and social development through the establishment of new productive activities (Law 158/2017, Article 3, paragraph 1). Unfortunately, the National Plan for the Requalification of Small Villages, which should have been carried out within 180 days from the approval of the law and was intended as a preliminary document that would guide project submission and fund assignment, has yet to be issued.

3. A Resilience-Based Approach to the Revitalisation of Small Villages

The two initiatives launched by the Italian Government could undoubtedly disclose new opportunities for the revitalisation of small villages, even though they have not engendered any measurable outcomes so far. It is also worth noting that both these initiatives have provided limited references to the resilience concept: this concept could be very useful both to better understand and cope with the intertwined socio-economic and environmental factors that the overall decline of small villages depends on.

Over the last decade, the resilience concept has gained prominence in several scientific fields, especially spatial planning, and has come to play a key role in all of the most recent international documents focused on Sustainable Development (United Nations, 2012, 2015a) and Disaster Risk Reduction (DRR) (United Nations, 2015b).

Resilience is nowadays widely interpreted as a promising concept for better understanding the interwoven systems of humans and nature, and for better dealing with complexities and uncertainties arising from the numerous challenges due to the interactions among social and environmental factors (e.g. urban population growth; urban development patterns; consumption and degradation of natural resources; climate change and related impacts).

This concept has been pushed forward by numerous international campaigns which have sought to enhance the capacity of cities to deal with current and emerging environmental, social, and economic challenges. Examples include the Making Cities Resilient campaign, launched in 2010 by the United Nations International Strategy for Disaster Reduction (UNISDR), and the 100 Resilient Cities Initiative, launched in 2013 by the Rockefeller Foundation.

The potential of a resilience-based approach to support place-based strategies, capable of framing a participatory and inclusive development of rural and mountain marginalised villages, is nowadays largely agreed (Salvia and Quaranta, 2017). However, despite its largely recognised importance, the resilience concept has so far merely been used as a fashionable umbrella concept or, as remarked by Weichselgartner and Kelman (2015), as "an all-encompassing, multi-interpretable idiom", capable of attracting wide scientific interest and a large amount of funds. The translation of resilience into practice is still limited and generally based on a bounce-back perspective – which clearly informs, for example, the UNISDR's Making Cities Resilient campaign – and leads to strategies that predominantly address increasing the capacity of cities to resist, or quickly recover from natural hazards' impacts.

Nevertheless, the theoretical debate on resilience, which can be traced back to ancient times and is well routed in different disciplinary fields (Galderisi, 2018), could bring out new perspectives for the development of resilience-based strategies which need to be able to:

- strengthen the capacity of living systems to continuously adapt or transform themselves, by "inventing new practices in front of novel problems" (Grøtan, 2014), like those posed by coupled socio-economic and environmental challenges;
- shift from a silo-based (sectoral) approach to a cross-sectoral one that takes into account the complex interactions between social, economic and ecological factors (Galderisi and Limongi, 2017).

Based on the idea of 'evolutionary resilience' introduced by Davoudi et al. (2012), the resilience concept is here interpreted as a set of features that are capable of improving territorial systems' capacities to withstand, absorb, accommodate, adapt to, recover from, and even transform in the face of sudden events and chronic stresses, caused by different and often interconnected pressure factors: from the scarcity of resources to economic crises, from natural hazards to climate-related ones (Galderisi, 2018). According to this definition, a resilience-based approach might support proactive and site-tailored strategies, based on local communities' capacities for active learning, and focused on improving the overall capacity of territorial systems to cope, in the short term, with the impacts of heterogeneous threatening factors, to continuously adapt in the face of changing conditions through incremental adjustments, and innovate themselves in the long term by introducing fundamental changes within and across these systems.

Hence, a resilience-based approach might effectively guide the strengthening of small villages' capacities to withstand and absorb shocks as well as to progressively adapt to emerging threats or to transform themselves, by bouncing forward to better system configurations, in the face of constantly changing system dynamics and complexities over a range of spatial and temporal scales (Yamagata and Sharifi, 2018). In detail, the adoption of a resilience-based approach might allow transforming small villages from problem areas, left on the margins of contemporary societies' development, into fundamental cultural and environmental resources for Italian development (Caravaggi and Imbroglini, 2014; Di Figlia, 2016).

Unfortunately, as mentioned above, the initiatives recently launched in Italy for the revitalisation of small villages have provided limited references to the resilience concept. In detail, the Save Villages Law does not provide any references to this concept while the Italian Strategy for Inner Areas, despite mentioning it, provides a very limited interpretation of the term. The latter includes resilience among the key words that are identified as crucial for triggering a development process based on the 'activation' and engagement of local communities. These key concepts include:

- land maintenance, primarily related to the maintenance of natural resources;
- prevention, related to damage caused by hydrogeological hazards, forest fires and loss of biodiversity;
- resilience, interpreted as a function of the wealth of both the available natural and cultural resources and the artefacts that characterise these areas and their potential for use;
- adaptation, related to the constantly changing and difficult to foresee climate scenarios.

Nevertheless, the concept of resilience, in its broadest meaning, encompasses all the key words mentioned above. Resilience is nowadays widely interpreted as a 'continually changing process' (Davoudi et al., 2012) that results from the dynamic interaction among different features of socio-ecological systems:

- robustness, which refers to the system's ability to withstand the impacts of different threatening factors, by preserving its own characteristics and structure, except for a temporary departure from its normal functioning condition;
- adaptability, which refers to the capacity of a system to continuously adjust its responses to changing external drivers and internal processes, while continuing to develop within the same stability domain (Folke et al., 2010);
- transformability, which refers to the ability of a system to radically innovate in the face of changed conditions, by developing new and creative perspectives for local development;
- learning capacity, which refers to the capacity of a system to learn, by combining experience and knowledge; this capacity supports each of the above-mentioned features and emphasises the key role of social capital and institutions in the construction of resilient territories (Galderisi, 2018).

Having defined our understanding of resilience, what kind of tools can be used to analyse or act on these features in order to enhance the overall resilience of a territorial system? Nowadays, the resilience concept, drives numerous international initiatives: all of them aim at strengthening the capacities of urban and territorial systems to cope with current and emerging environmental, social and economic challenges and, primarily, with the increasing impacts of natural and climate-related hazards. These initiatives, despite sharing common goals, largely differ from each other. They are promoted by different international organisations, such as UNISDR, the Rockefeller Foundation, and the International Council for Local Environmental Initiatives; each involves settlements largely differing in size as well in geographical, cultural, economic and social features; they are based on different principles and guidelines, and adopt different tools to achieve an apparently common goal: the building of a resilient city.

Hence, based on the interpretation of the resilience concept and the most widespread operational tools currently available to analyse and assess resilience, in the following we outline a methodological path which allows us to achieve two objectives. First, a better understanding of the main pressure factors (threats) that might hinder future development and, in some cases, the very survival of small villages. Secondly, a better understanding of the characteristics of these villages that should be strengthened to allow them to better cope with such threats (response capacity) (Figure 1). In detail, the outlined methodological path combines and adapts to the definition of resilience that has been here adopted the operational tools developed by two international initiatives: the Making Cities Resilient Campaign, aimed at increasing the resilience of territorial systems in the face of natural or man-made hazards, and the 100 Resilient Cities initiative, aimed at increasing the resilience of territorial systems in the face of a wide range of shocks and chronic stresses. It is worth noting that while the latter has mostly involved large cities, the former has involved heterogeneous human settlements, ranging from small villages (fewer than 1,000 inhabitants) to big cities.

The Disaster Resilience Scorecard (DRS) is one of the key operational tools introduced by the Making Cities Resilient Campaign. It seeks to guide local governments in evaluating current disaster resilience as a base for outlining, implementing and monitoring Disaster Risk Reduction Action Plans. It includes a set of questions, which have been defined according to the Ten Essentials for making a city resilient outlined by the UNISDR. Moreover, these questions have been designed to allow constant review of local progress in the implementation of the Sendai Framework 2015-2030. The DRS is structured as a two-level process (a preliminary and a detailed assessment), capable of involving multiple stakeholders, such as public bodies, private businesses, community groups, and academic institutions. This tool sets out a clear pathway for: defining a current baseline; outlining future goals; monitoring progresses, and raising the awareness of different stakeholders on the key actions that need to be carried out to increase cities' resilience in the face of natural hazards (United Nations Office for Disaster Risk Reduction, 2017).

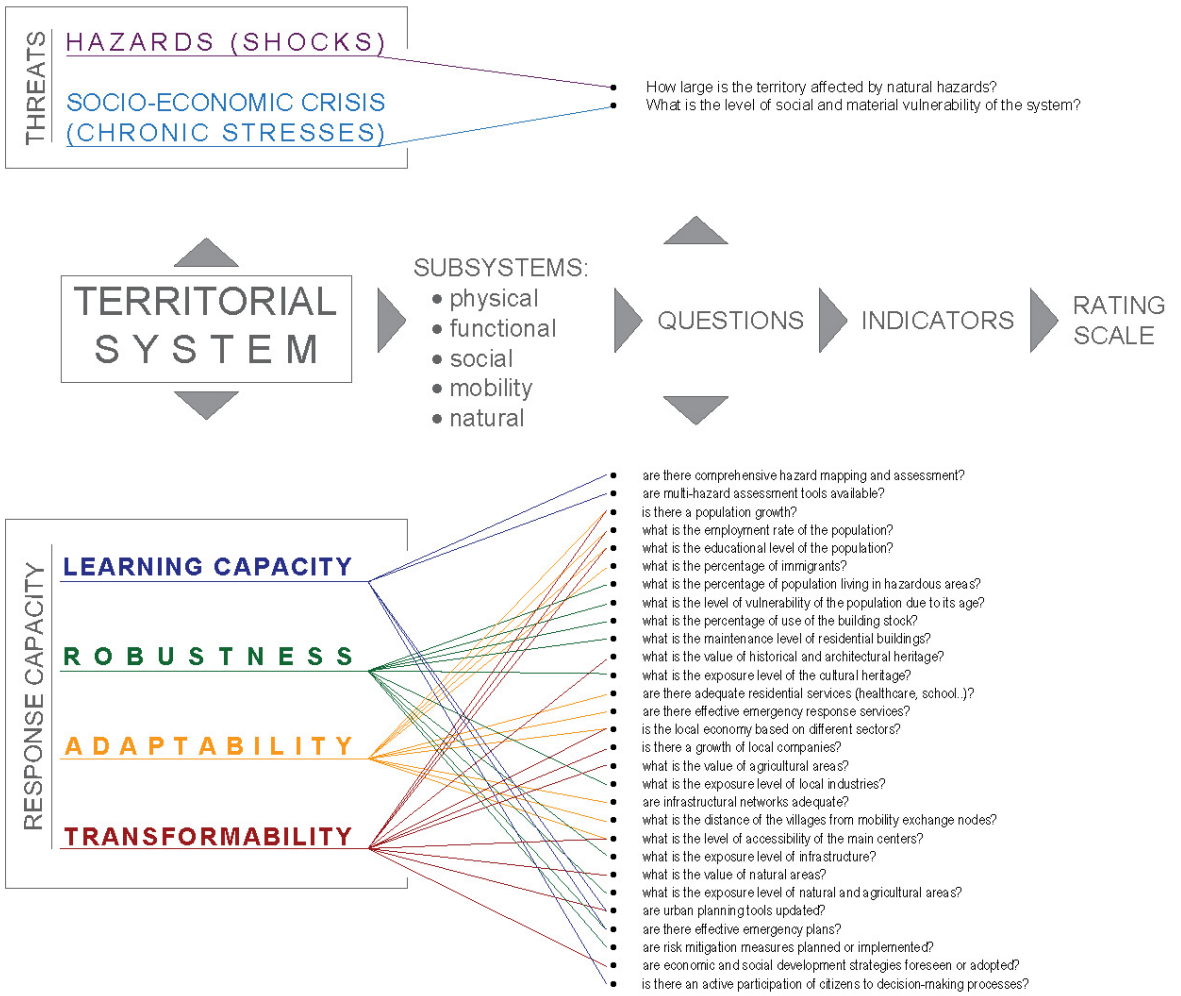

Figure 1 - The methodological path to analyse threats and response capacities of territorial systems

As part of the 100 Resilient Cities initiative, the City Resilience Framework (CRF) was set up with the aim of understanding and measuring cities' resilience in the face of acute shocks and chronic stresses. It is structured as a circular model and characterised by different rings and sectors. It identifies four key sectors (Health and Well-being; Economy and Society; Infrastructure and Environment; and Leadership and Strategy) and 12 key goals (three for each dimension) that cities should achieve in order to improve their resilience. A set of 52 indicators, related to the different sectors and key goals, as well the most adequate qualitative or quantitative metrics for their measurement and assessment, were also provided (The Rockefeller Foundation/ARUP, 2015).

The proposed methodological path combines these tools in order to widen its focus from disaster risk reduction, which is the main aim of the UNISDR initiative, to the broader range of threats considered by the CRF, including socio-economic decline. In detail, the proposed methodology to assess the resilience of small villages is based on a set of questions and related indicators which have been defined with reference to the main subsystems (social, physical, functional, mobility, and natural resources) that constitute a territorial system and to the key features of a resilient system (robustness, adaptability, transformability, and learning capacity). Outlined questions and indicators are taken up and adapted both by the DRS as well as the CRF in order to assess local resilience to both hazard factors and socio-economic decline (Figure 1). The provided set of questions may guide practitioners and decision-makers in evaluating the capacity of each considered subsystem to tackle both acute shocks and chronic stresses. One or more quali-quantitative indicators are associated to every question and their values have been homogenised through a scoring procedure that translates their individual heterogeneous values into a numerical score from 0 (scarce or absent) to 5 (very high). The scoring procedure makes it possible to assign an overall resilience value to each territorial system and evaluate the relevance of each resilience characteristic in relation to each territorial system or subsystem (Tables 1 and 2).

The outlined methodological path is able "to inform decisions about improvement, to evaluate a project or a program development and to learn about incremental changes" (Turner et al., 2014, p.11). Thus, by following this path, local administrations will be guided in: carrying out a preliminary assessment of local resilience in the face of heterogeneous threatening factors; selecting, time to time, strategies and actions that have to be implemented for improving resilience; and, afterwards, evaluating their effectiveness. As a result, this path will ensure a continual learning during the process of resilience building.

4. The Resilience of Italian Small Villages: A Case Study in the Basilicata Region

The Italian Strategy for Inner Areas, in addition to providing suggestions on how to promote local economic and social development, has also identified a pilot area in each Italian Region. For each area, along with specific measures addressed to improve accessibility to basic services, a detailed Program Agreement has been carried out.

With respect to the Basilicata Region, the Strategy identified a pilot area, called Matera Mountain, which includes the municipalities of Accettura, Aliano, Cirigliano, Craco, Gorgoglione, Oliveto Lucano, San Mauro Forte and Stigliano (Figure 2). In this area, the Strategy aims to counterbalance the depopulation process through a set of actions addressing three general goals:

- the strengthening of agricultural activities;
- the promotion of tourism, to be achieved through the enhancement of minor cultural heritage;
- the improvement of basic services (mostly in the fields of health, education and transport infrastructure).

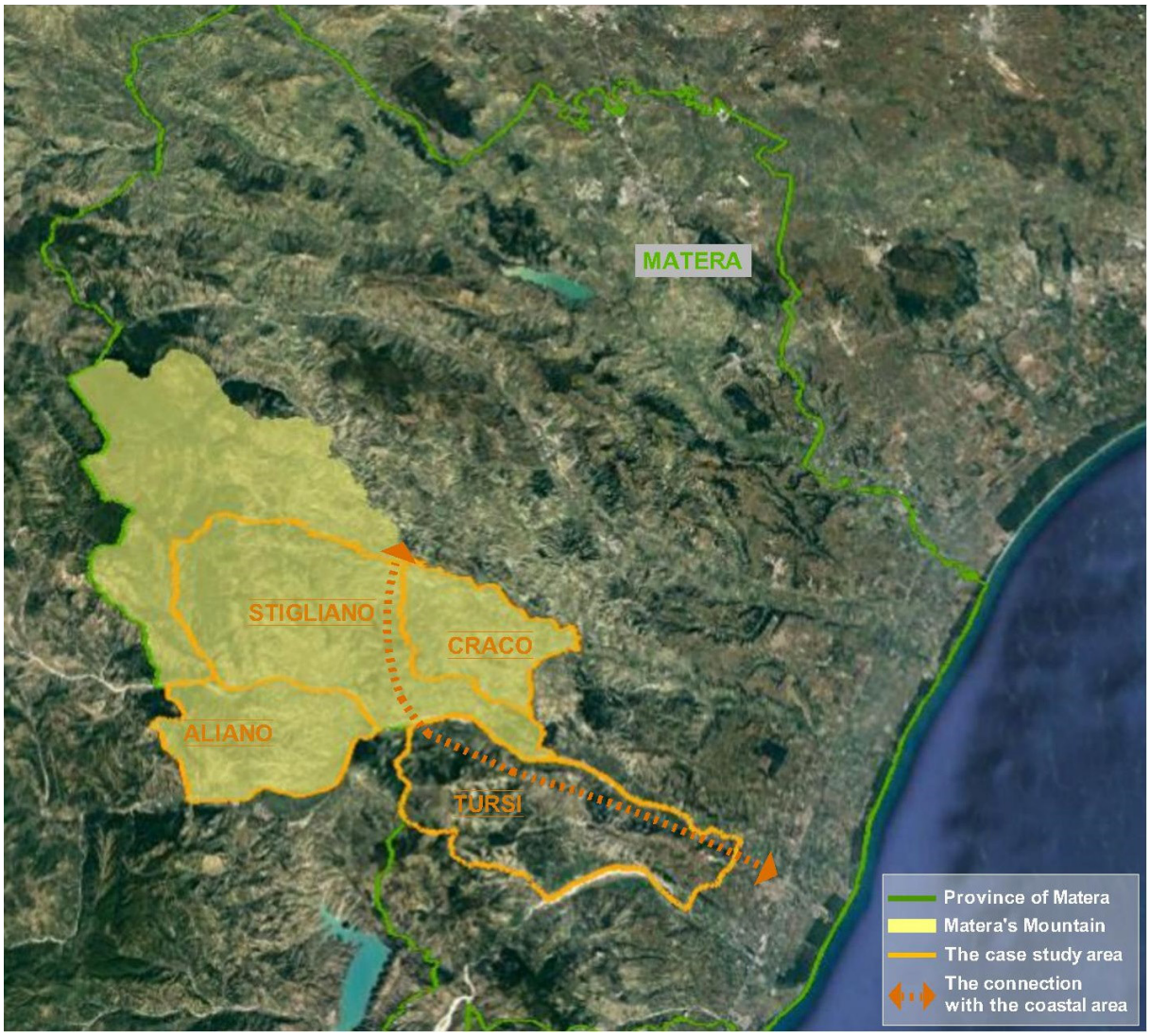

Figure 2 - The pilot area (Matera's Mountain) in the Basilicata Region and the four Municipalities included in the case-study area

It should be noted that, although the occurrence of natural hazards has significantly contributed to the depopulation of the pilot area at stake, the Strategy neither refers to the need for risk prevention and mitigation, nor to the need for master plans based on multidimensional approaches and capable of integrating risk analysis into the wider framework of sustainable local development.

Moreover, the municipalities included in the pilot area from the Basilicata Region, despite all being characterised by significant processes of socio-economic decline, show heterogeneous morphological, landscape and geomorphological features that significantly affect their hazard profiles. According to these characteristics, the pilot area can be distinguished into at least three sub-areas: the predominantly wooded area to the North-West, the plain rural area in the centre, and the area of 'calanchi' to the South-East (Figure 3). In particular, the latter shows a peculiar landscape characterised by steep slopes, along which soft sedimentary rocks, dry terrain and clay-rich soils have been extensively eroded by wind and water.

The area of 'calanchi', including the municipalities of Craco, Aliano and Stigliano, represents an interesting case study for applying our methodological path because it provides an emblematic case of a decline process that has been caused by both environmental and socio-economic factors. This selected case study area has been progressively abandoned from the 1960s onwards due to the lack of residential services and infrastructures, and the numerous hazards threatening it. In the Municipality of Craco, for example, the process of decline started in the 1960s, after a landslide, and accelerated significantly in 1980 when, after an earthquake, all

remaining residents moved to a new village built in the lowland. This is where the few remaining inhabitants (762) still live. The municipality of Tursi has also been included in the case study area. Despite being external to the pilot area identified by the Strategy for the Inner Areas, Tursi shares geomorphological features with the three other municipalities and is also an important hinge among inner and coastal areas; as a result, it might play a key role in any future development of this area (see Figure 2).

According to the outlined methodological path, the threats that the identified case study area is exposed to have to be examined, first. In detail, numerous hazards threatening this area were analysed whilst, with regard to chronic stresses, the main socio-economic factors responsible for the area's decline process were taken into account.

Figure 3 - The area of "calanchi" in the Basilicata Region. Panoramic view from Craco.

Regarding hazards, the case study area is, according to available information, classified as a seismic zone 2 (high to medium) (Dipartimento di Protezione Civile, 2015), possesses a high risk of forest fires (Regione Basilicata, 2015) and significant hydrogeological instability (Autorità di Bacino della Basilicata, 2016, 2017). As for socio-economic decline, this threat has been analysed through the 'social and physical vulnerability index', defined by the Italian Statistical Bureau (ISTAT) at a municipal scale. This index describes, through a single value, the different aspects of a multidimensional phenomenon, by combining seven basic variables: the age of the population, the number of family members, the level of educational attainment, and housing and employment status (ISTAT, 2011). The values of this index are higher than the regional average (99.94) for the municipalities of Aliano and Craco (respectively 100.93 and 104.20), and slightly lower for the municipalities of Stigliano and Tursi, whose values are respectively 98.63 and 99.91.

Secondly, the proposed methodological path was tailored to the peculiarities of the case study area, in order to allow a preliminary resilience assessment. In detail, a matrix for analysing the resilience features of each subsystem to the different threatening factors that this area is exposed to has been outlined. Each matrix provides a set of questions, the related indicators and the rating scale. The matrixes (one for each subsystem

as shown in Tables 1 and 2) allowed us to provide a final value for each resilience feature in every municipality included in the case study area (Figure 4).

It is worth outlining that the test of the methodological path on the pilot area revealed some minor difficulties, which could represent a disincentive to its widespread use by local decision-makers. The first one is the high fragmentation of data and information required for measuring the selected indicators (36) and to the fact that not all the required information was already available. Hence, in order to measure all the selected indicators, heterogeneous data and information had to be collected from both direct (e.g. the ISTAT database, the Basin Plan, the seismic classification, the regional Fire Prevention Plan) and indirect sources (e.g. interviews with citizens and local government officials). Moreover, the measurement of some indicators, such as the percentage of urban areas and the number of historical buildings exposed to the different hazard factors, required the combination and processing of basic variables into the GIS environment, through the overlapping of different thematic layers.

A second difficulty can be traced back to the procedure for standardising the values of the 36 selected indicators, according to a scale of values ranging from 0 to 5. The standardisation process required a comparison of the value assumed by each indicator with an average value. In some cases (such as population trends, unemployment rate, and so on) local indicators had to be compared to the regional average value provided by the ISTAT database. In other cases (such as accessibility levels, calculated through indicators measuring the distance between each municipality and the closest highway exit and railway station as well as the distance between each municipality and the closest supply poles), it was necessary to extend the analysis from the four considered municipalities to a wider territorial area in order to obtain an average reference value for the geographical area against which the obtained indicators for each of the municipalities could be weighed.

With respect to the outcomes of the preliminary resilience assessment, which are shown in different colours in Figure 4, it is worth noting that all the case study municipalities exhibit low values with respect to learning capacity (in blue). This feature was assessed through five indicators (approval and periodic updating of urban master plans; availability of environmental assessments; availability of adequate monitoring system of environmental resources; integration of risk mitigation measures in urban development strategies; and citizens' engagement in the setting up of urban development strategies).

Robustness (in green) was assessed through a set of ten indicators, which referred both to the exposure and vulnerability of the components of each subsystem to the considered threatening factors and to the type and number of risk mitigation measures planned or implemented. The values of robustness, which are below 3 in all considered municipalities, are slightly higher than those assumed by the other resilience characteristics. These positive values, however, largely depend on the really low amount of exposed population and assets, whilst the vulnerability of exposed assets is very high, and few or no risk mitigation measures have been planned or implemented.

Adaptability was assessed through a set of ten indicators taking primarily into account the consistency and diversity of both the resident population and basic services and productive sectors, the accessibility of the case study area, and the redundancy of the mobility network. Due to demographic decline and the limited availability of infrastructures and basic services, adaptability (in yellow) shows very low values in all the considered municipalities and in respect to all the subsystems, with the exception of the Municipality of Tursi, which shows a slightly higher value, as it is the closest one to the more equipped and best connected coastal area.

Transformability (in red) was assessed through a set of eleven indicators which mainly referred to the value of natural and cultural resources. Those resources are crucial, in fact, for triggering a revitalisation process in the case study area. Moreover, some indicators referred to the availability of approved or on-going strategies/ initiatives aimed at promoting local development. Finally, it is worth noting that some indicators (e.g. diversity of productive sectors, redundancy of mobility infrastructures, etc.) refer both to adaptability and to transformability. They are relevant, indeed, to an incremental adjustment of territorial systems to changing contexts, but represent also key factors for the emergence of new perspectives for local development. Again, with the exception of Tursi, transformability shows very low values, even though the existing cultural and natural heritage represents a significant strength for the triggering of a local development process.

Table 1: Example of Matrix to carry out a Preliminary Resilience Assessment: Mobility Subsystem

RESPONSE CAPACITY – SOCIAL SUB-SYSTEM				
Resilience characteristics	**Questions**	**Indicators**	**Rating scale**	
ADAPTABILITY	Are mobility networks adequate?	Length of road and railway network in respect to territorial surface (kms/km^2)	5	Kms/km^2 ratio is less than 1 for the road network and less than 0.6 for the railway network
			4	Kms/km^2 ratio is less than 0.8 for the road network and less than 0.4 for the railway network
			3	Kms/km^2 ratio is less than 0.6 for the road network and less than 0.4 for the railway network
			2	Kms/km^2 ratio is less than 0.4 for the road network and less than 0.2 for the railway network
			1	Kms/km^2 ratio is less than 0.2 for the road network and less than 0.1 for the railway network
			0	Kms/km^2 ratio is less than 0.1 for the road network and less than 0.1 for the railway network
	What is the distance of the villages from mobility exchange nodes?	Distance of the villages from the closest highway exit and railway station (km)	5	Distance from the first highway exit less than 20 km, distance from the first railway station less than 20 km
			4	Distance from the first highway exit is more than 20 km and less than 30 km, distance from the first railway station is more than 20 km and less than 50 km
			3	Distance from the first highway exit is more than 30 km and less than 70 km, distance from the first railway station is more than 20 km and less than 50 km
			2	Distance from the first highway exit is more than 70 km, distance from the first railway station is more than 20 km and less than 50 km
			1	Distance from the first highway exit is more than 70 km, distance from the first railway station is more than 50 km and less than 70 km
			0	Distance from the first highway exit is more than 70 km, distance from the first railway station is more than 70 km
TRANSFORMABILITY ADAPTABILITY	What is the level of accessibility from the main cities?	Distance of the inner areas from the main city (ratio between the radius r of the circle with the centre in the central pole and the road distance d to be covered) and redundancy of the mobility network	5	The main city can be reached by two or more transport options and the r/d ratio is higher than (or equal to) 0.9
			4	The main city can be reached by two or more transport options and the r/d ratio is higher than (or equal to) 0.8
			3	The main city can be reached by two or more transport options and the r/d ratio is higher than (or equal to) 0.5
			2	The main city can be reached by two or more transport options and the r/d ratio is higher than (or equal to) 0.8
			1	The main city can be reached by two or more transport options and the r/d ratio is higher than (or equal to) 0.5
			0	The main city can be reached by two or more transport options and the r/d ratio is higher than (or equal to) 0.3
ROBUSTNESS	What is the exposure level of road and rail networks?	Percentage of road and rail networks located in hazardous areas	5	Less than 10% of the surface devoted to infrastructures located in hazardous areas
			4	Less than 30% and more than 10% of the surface devoted to infrastructures located in hazardous areas
			3	Less than 50% and more than 30% of the surface devoted to infrastructures located in hazardous areas
			2	Less than 70% and more than 50% of the surface devoted to infrastructures located in hazardous areas
			1	Less than 90% and more than 70% of the surface devoted to infrastructures located in hazardous areas
			0	More than 90% of the surface devoted to infrastructures located in hazardous areas

Table 2: Example of Matrix to carry out a Preliminary Resilience Assessment: Social Subsystem

RESPONSE CAPACITY – MOBILITY SUB-SYSTEM				
Resilience characteristics	**Questions**	**Indicators**	**Rating scale**	
TRANSFORMABILITY	Is there a population growth?	Population growth trend over the last 40 years (1971-2011)	5	The population growth trend is higher than 35%
			4	The population growth trend is higher than 20%
			3	The population growth trend is higher than 9%
			2	The decline trend of the population is about 4% (regional average trend)
			1	The decline trend of the population is about 15% (lower than the regional trend)
			0	The decline trend of the population is about 40% (significantly lower than the regional average)
ROBUSTNESS	What is the percentage of population living in hazardous areas?	Percentage of population living in hazardous areas	5	Less than 5% of the population living in hazardous areas
			4	Less than 10% of the population living in hazardous areas
			3	Less than 15% of the population living in hazardous areas
			2	Less than 20% of the population living in hazardous areas (regional average)
			1	Less than 25% of the population living in hazardous areas
			0	More than 25% of the population living in hazardous areas
ADAPTABILITY	What is the percentage of immigrants?	% of immigrants and their age composition (ratio between immigrants aged 0-29 years and total number of immigrants)	5	Number of immigrants between 10% and 20%; more than 50% of them are under 30 years old
			4	Number of immigrants are between 5% and 10%; more than 50% of them are under 30 years old
			3	Number of immigrants are between 10% and 20%; more than 30% of them are under 30 years old
			2	Number of immigrants are between 5% and 10%; more than 30% of them are under 30 years old
			1	Number of immigrants are between 5% and 10% but less than 30% of them are under 30 years old
			0	Number of immigrants are less than 5% and less than 30% of them are under 30 years old
LEARNING CAPACITY	Is there an active participation of citizens?	Citizens' associations, events organized by citizens and partnerships with the local government	5	There are numerous citizens' associations and events organised by citizenship or by local government with a significant engagement of local population
			4	There are some citizens' associations and events organised by citizenship or by local government with a good engagement of local population
			3	There are some citizens' associations recently established and some events organised by citizens and institutions are planned for the future
			2	There are few citizens' associations born recently and some events organised by citizens and institutions are planned for the future
			1	There are few citizens' associations recently established and some events organised by the local government are planned, without a significant engagement of local population
			0	There are no citizens' associations and events organised by local government or citizens

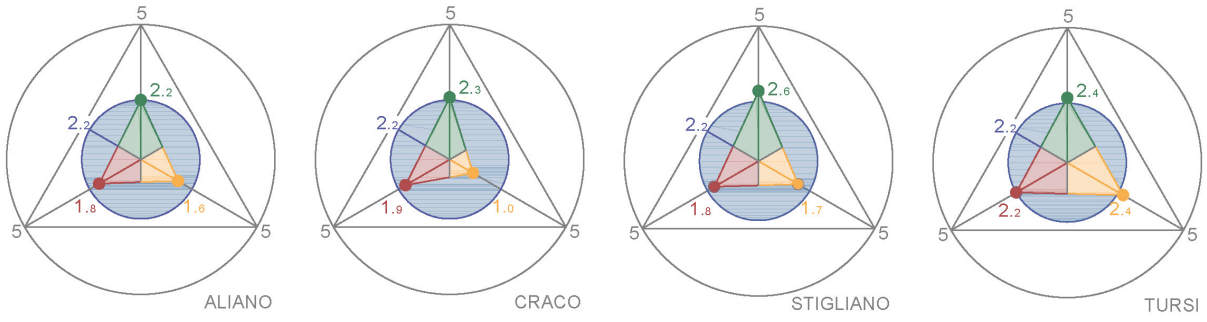

Figure 4 - The outcomes of the Preliminary Resilience Assessment for the selected Municipalities. In detail, the blue circle shows the value of the learning capacity, whilst green, yellow and red respectively refer to robustness, adaptability, and transformability.

5. Conclusion

Based on a brief overview of the initiatives recently launched in Italy in favour of small villages, which represent about 70 percent of Italian municipalities, this paper has outlined the potential of a resilience-based approach to their revitalisation. Furthermore, by combining some of the available operational tools for resilience assessment, a methodological path to evaluate the resilience features of Italian small villages has been outlined. This path, which has been tested on a case study area in the Southern Italy (Basilicata Region), might represent a useful tool capable of supporting decision makers in the development of effective strategies for revitalising small villages. It allows us to measure current resilience features and to build up a baseline against which progresses towards local resilience increase can be monitored. Moreover, monitoring activities also ensures continuous learning alongside the process of resilience building.

Although the research work has been specifically focused on Italian small villages, the outlined methodological path could be adapted to different contexts, providing an effective tool to better steer on-going strategies to counterbalance the depopulation of European rural and mountainous villages and assess their effectiveness. As clearly noted by the Cork Declaration (EU, 2016), this issue represents a priority in Europe as small villages are a key part of European culture; and the need for place-based policies, capable of increasing their resilience to hazard factors while enabling participatory and inclusive development strategies, is nowadays largely agreed (Salvia and Quaranta, 2017).

The outcomes of the preliminary resilience assessment of the pilot case allowed us to identify the main weaknesses that should be addressed in order to enhance the resilience of the pilot area and facilitate the revitalisation process. It also allowed us to highlight some of the main weaknesses of the Preliminary Strategy for the Matera Mountain. In particular, this Strategy lacks any specific references to risk prevention and mitigation, even though the outcomes of the preliminary resilience assessment clearly highlight that, in case foreseen measures would be implemented, they could negatively affect the already limited robustness of the case study area by increasing current exposure levels to the numerous hazards that exist therein.

The features which, though peculiar to the case study area, are nevertheless common to many Italian small villages threatened by multiple hazards and characterised by increasing vulnerabilities, require an integrated vision capable of combining strategies and measures aimed at counterbalancing socio-economic decline with measures and funds specifically addressed to disaster risk reduction.

Finally, the limited impact of the Preliminary Strategy for the Matera Mountain with regard to enhancing learning capacity has to be emphasised. The Strategy clearly remarks the need to engage all local stakeholders, including citizens, in the implementation of the envisaged measures, but it does not refer to the need to 'root' these measures into ordinary planning tools. However, the integration of 'extraordinary initiatives' into ordinary planning tools would allow for better framing of the measures foreseen by each initiative into a comprehensive and shared vision, outlined through a participatory decision-making process, and capable of both ensuring the continuity of the development process far beyond the lifetime of the extraordinary initiatives, and a strengthening of potential synergies among different measures.

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