

Shrinking Phenomena in Italian Inner Mountainous Areas. Resilience Strategies

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Abstract. Several factors have been identified by literature as the cause of shrinkage. These factors are often closely linked to spatial features. There are some contexts in which various causes overlap and amplify as in the case of the mountain or foothill areas of Central Italy, which is the case study of this work. The areas of the Marche region in Central Italy, affected by the severe earthquake of 2016, actually feature multiple shrinking causes. In this region, small and medium-sized towns play a determinant role in structuring urban systems with their influence over local communities and organizations.

This research work intends to describe the main characteristics of the territory under study, as well as the shrinking causes detected by the analyses. It then tries to identify the strategies in place and to compare them with those already covered by literature, assessing both weaknesses and strengths.

Keywords: Small and medium-sized towns · Urban strategies · Shrinking cities

1 Shrinking Phenomena in Mountain and Foothill Areas: First Elements of Analysis

Growth and degrowth cycles have characterized all cities throughout history. Even the cities that industrial civilization has accustomed us to think characterized by ever-growing demographic trends such as the capitals of the western states have experienced moments of decline throughout their long history, as the case of Rome teaches.

Similarly there are cities, which due to calamitous events or significant economic changes, have been abandoned (this is the case, in Italy, of some municipalities in the inner areas of the Southern Apennines such as Craco or the Central Apennines, such as for example, Santo Stefano di Sessanio) and today they present themselves as real ghost towns.

In contemporary cities, many have investigated the possible causes [1, 2], which in a nutshell can be summarized in four main ones:

The work is an integrated fruit of authors collaboration, also if the paragraph 1 have to attributed to Francesco Rotondo, the paragraph 2 to Luca Domenella, the paragraph paragraph 3 to Giovanni Marinelli.

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- economic decline, loss of employment, de-industrialization;
- suburbanization and changes in the settlement system;
- aging and decline of the natural balance;
- pollution, and particularly unfavorable environmental context.

To these main causes, we can add natural disasters that suddenly determine the impossibility of living in the affected places and, finally, as in the case of small and medium-sized municipalities in the inner areas, the distance from services and places of significant economic production, which they cause isolation and abandonment. Often these causes occur concurrently, in some cases one of them becomes prevalent.

This work deals with medium and small cities in demographic decline in the inner areas of the central Apennines of the Marche Region, which, already characterized by abandonment phenomena, were hit in 2016 by a severe earthquake that accelerated and aggravated the phenomena already in place.

Therefore, after a brief illustration of how the inner areas have been defined in the related strategy developed by the Italian state and the relationships between the problems of the inner areas and the more general ones of the shrinking cities, the case study of the central Italian areas, affected by the 2016 earthquake, will be illustrated, drawing possible general indications on the investigated phenomena.

In line with the place based approach proposed by Fabrizio Barca (Statistician and economist, as President of the OECD Committee for territorial policies and advisor of the European Commission, he coordinated public administrators and scholars in the design of a new method of intervention for territories that are lagging behind: the "place-based approach") to the European Commission [3, 4] Italy has developed a National Strategy for the Inner Areas which in most cases consist of small and medium municipalities of the Apennines from North to South Italy.

The "National Strategy for Inner Areas" interprets the territory of the Italian inner areas as a set of project areas, treated as local inter-municipal systems each with its own territorial identity defined by social, economic, geographical, demographic and environmental characters. Each project area, selected through an open preliminary investigation between the Region and the State, is asked to develop a Project area development strategy or "Area strategy" Fig. (2).

The selection process of the inner areas - which affect more than 60% of the national territory and 23% of the Italian population - took place through a public investigation procedure, carried out by all the central Administrations collected in the National Inner Areas Committee and by the Region (or autonomous province) concerned.

In order to define the concept of inner areas, the national territory was divided at municipal level not according to a minimum population criterion, nor according to altimetric parameters, but according to a criterion of capacity to offer some essential ser- vices, which have been identified in the presence in the territory of an institution of upper secondary school, a first level hospital structure and a railway station classified not less than the "Silver" category. Based on the coexistence of these three requirements, the "urban poles" and the "inter-municipal poles" have been identified, made up of those neighboring municipalities in which the three essential services were "jointly" present Fig. 1.



Fig. 1. Entrance to the abandoned city of Craco in the Basilicata region in the southern Apennines (photo by the author).

Consequently, the municipalities not included in the poles have been classified according to an "accessibility" indicator, calculated in terms of minutes of travel to reach the nearest pole: the limits have been set in less than 20 min (peri-urban areas or belt), between 20 and 40 min (intermediate areas), between 40 and 75 min (peripheral areas) and over 75 min (outermost areas).

Municipalities with access times over 20 min from the nearest pole have been classified as "inner areas".

The strategy aims to create new income possibilities and to ensure the inhabitants greater accessibility to essential services, as well as to improve the maintenance of the territory itself. It is aimed at financing "pilot interventions" for the rebalancing of the offer of basic services in the inner areas of the country, with priority reference to local public transport, education and socio-health services.

The identification of the inner areas of the country starts from a polycentric reading of the Italian territory, that is, a territory characterized by a network of municipalities or aggregations of municipalities (service offer centers) around which gravitate areas characterized by different levels of spatial periphery. Inner areas are defined as those that are significantly distant from the centers offering essential services (education, health and mobility), rich in important environmental and cultural resources and highly diversified by nature and following secular anthropization processes.

In the case of the Marche region, the inner areas on the border with the Umbria and Lazio regions were affected in 2016 by a strong earthquake that destroyed many homes and public buildings, which will be discussed below, which aggravated and accelerated the shrinkage phenomena already in place. A few years after the earthquake, the Municipalities are still facing the transition from the emergency phase, characterized by a mainly sectoral-operational approach, linked to the temporary nature of solutions,

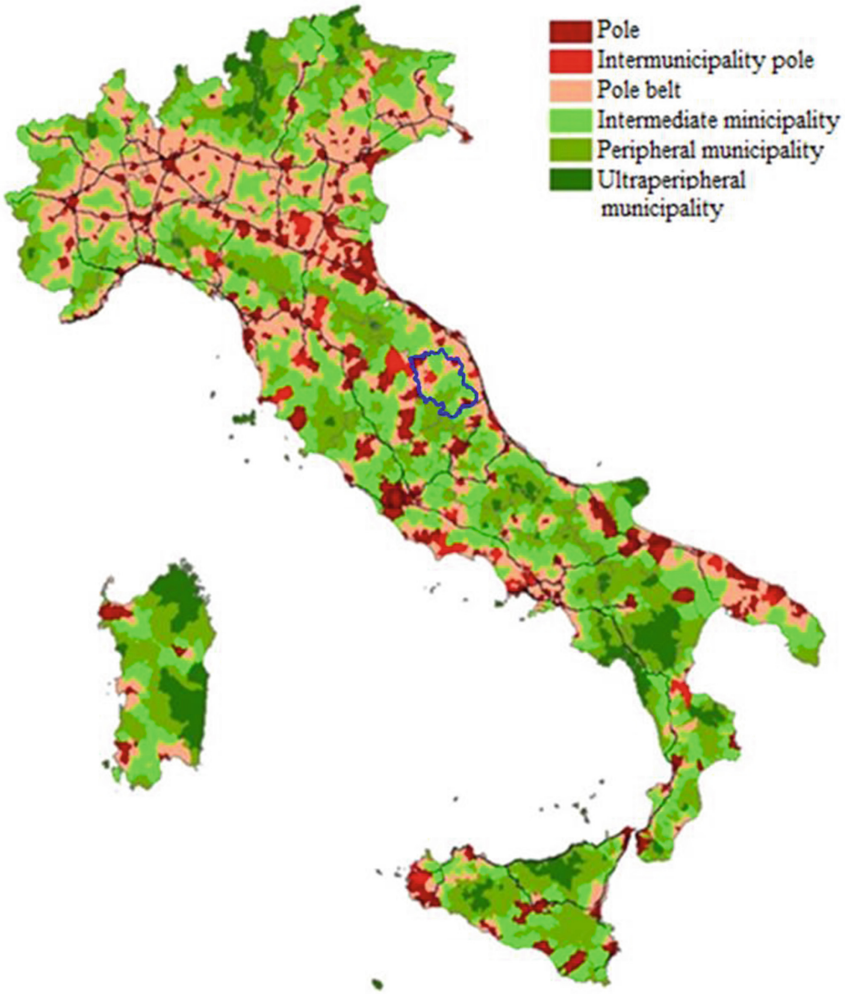

Fig. 2. The inner areas in Italy. UVAL-UVER processing of data from the ministry of health, ministry of education and FS. The blue area indicates the study area of this work: the inner areas of the Marche region affected by the 2016 earthquake.

to the phase in which implementation urban planning schemes are developed[1]. These plans may envisage public and private building refurbishment interventions, related to

[1] Reference regulatory framework: Special Commissioner's Order no. 25: Criteria for the delimitation of urban centers and special interest centers that were most severely affected by the earthquake that occurred on August 24, 2016; Special Commissioner's Order no. 39: implementation planning guidelines related to reconstruction of historic town centers and urban centers that were most severely affected by the earthquake that occurred on August 24, 2016.

building aggregates or individual structural units[2]. This choice was motivated by the desire to avoid losing the local community, in most contexts mainly made up of over 65 elderly people [12], and to fight against depopulation.

2 2016 Earthquake, Urban and Territorial Crisis, Policy and Governance

A severe earthquake struck Central Italy in 2016, affecting four regions, 10 provinces and 139[3] Municipalities, up to a total of approximately 8,000 km2, reaching 6.5 Mw magnitude with the shock recorded on October 30th, which caused the destruction of highly valuable historic centers. The earthquake of 2016 reached a far greater intensity than the previous earthquake that occurred in L'Aquila in 2009, which was regarded as the "fifth most severe disaster in the modern history of Italy", not in terms of the number of victims, but because of the intensity of the earthquake (with the highest peak reaching a 6.3 Mw magnitude) in the affected area.

The Marche Region was the most severely affected region out of the four regions within the area struck by the earthquake, with extensive damage in 86 out of a total of 139 municipalities (3,978 km2 of affected regional surface). The toll was very high: with more than 104,000 damaged buildings, 54,000 evacuated buildings and 32,000 displaced people, of whom 28,500 benefited from Autonomous Accommodation contributions (CAS) since the very beginning and about 3,400 people hosted in accommodation facilities along the Adriatic coast[4].

To avoid the depopulation of the areas affected by the earthquake, and to reconnect people to their places of origin, so- called Emergency Housing Facilities (SAE) have progressively been built since August 2017 (in 28 municipalities located within the area struck by the earthquake), temporarily accommodating over 4,400 people Fig. (3).

The earthquake impact analysis on the housing system (source: Marche Region, June 2018) shows that among the 86 municipalities within the Marche seismic area, 16 municipalities feature more than 30% of the population accommodated in temporary housing solutions (CAS, accommodation facilities and SAE), including 9 municipalities with more than 50% of displaced people due to the earthquake.

The town of Camerino is among the most heavily damaged municipalities, with over 3,500 displaced inhabitants out of a resident population of about 6,850 inhabitants (census dated July 31, 2016), in addition to the non-permanently resident university population Table 1.

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[2] Reference regulatory framework: Special Commissioner's Order no. 19: Measures designed to restore and rebuild buildings severely damaged or destroyed by the earthquake that occurred on August 24, 2016, for residential use, according to anti-seismic rules.

[3] On January 1st, 2017 the Municipality of Valfornace was established from the merger of the municipalities of Fiordimonte and Pievebovigliana. The number of municipalities located within the seismic area fell to 139, compared to 140 municipalities set out by decrees Dl 186/2016 and 8/2017.

[4] Variable data surveyed on a monthly basis, source: Osservatorio Sisma (Earthquake Observatory), Marche Region. https://sisma2016.gov.it/.

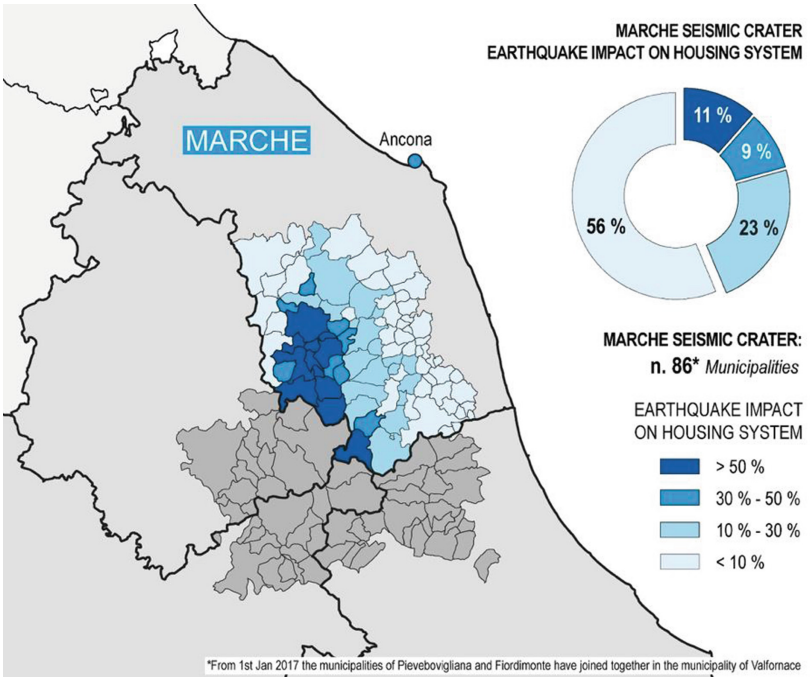

Fig. 3. Marche Region, impact of the earthquake on the housing system; data source: statistics office - Marche Region, http://statistica.regione.marche.it/

Table 1. Table captions should be placed above the tables. data source: statistics office - Marche Region, http://statistica.regione.marche.it/

EARTHQUAKE IMPACT ON HOUSING SYSTEM: Municipalities with population in emergency housing solutions	N. Municipalities	Territorial surface (km²)	Resident population (on 31/07/2016)	POPULATION IN EMERGENCY HOUSING SOLUTIONS (June 2018)						POPULATION IN EMERGENCY HOUSING SOLUTIONS
				People with contribution for renting accommodation (CAS)		N. people in hotel	N. people in other accommodation facilities	N. people in emergency housing (SAE)	TOTAL population	
				N people	N. households					
MORE THAN 50 % of the population	9	655,5	13.965	5.445	3.005	482	341	2.331	8.599	27,79%
BETWEEN 30% e 50% of the population	7	213,1	4.874	1.380	642	78	7	428	1.893	6,12%
BETWEEN 10% e 30% of the population	21	1.114,9	62.881	10.689	4.706	247	22	458	11.416	36,89%
LESS THAN 10% of the population	49	1.994,7	266.753	8.983	3.843	20	15	20	9.038	29,21%
TOTAL MARCHE SEISMIC CRATER	86	3.978,3	348.473	26.497	12.196	827	385	3.237	30.946	100,00%

Finally, 7 municipalities were heavily affected with more than one third of uninhabitable buildings, including the Town of Caldarola with 749 inhabitants out of 1,806 residents (census dated July 31, 2016), while 21 municipalities feature a total loss of housing functionality of city centers higher than 10%, with 11,416 inhabitants being provided with emergency housing solutions out of 62,881 residents in the area at the time of the earthquake.

A significant earthquake impact, in terms of distribution, has been recorded in the remaining 49 municipalities located in the area affected by the earthquake in the Marche region (about 50% of the territory within the area struck by the earthquake in the Marche region), with an overall incidence of displaced people below 10% of the resident population, and with more than 9,000 people accommodated in temporary emergency solutions Table 2.

Table 2. Marche Region, the earthquake impact on the housing system. Details of the most severely affected municipalities. data source: statistics office - Marche Region, http://statistica.regione.marche.it/

MUNICIPALITY	Territorial surface (km^2)	Resident population (on 31/07/2015)	POPULATION IN EMERGENCY HOUSING SOLUTIONS (June 2018)						POPULATION IN EMERGENCY HOUSING SOLUTIONS	EARTHQUAKE IMPACT ON HOUSING SYSTEM: Municipalities with population in emergency housing solutions
			People with contribution for renting accommodation (CAS)		N. people in hotel	N. people in other accommodation facilities	N. people in emergency housing (SAE)	TOTAL population		
			N people	N households						
Arquata del Tronto (AP)	92,2	1.160	468	245	41		418	927	79,91%	
Camerino (MC)	129,9	7.008	2.965	1.791	239	305	18	3.527	50,33%	
Castelsantangelo sul Nera (MC)	70,7	274	69	42	11		108	188	68,61%	
Fiastra (MC)	57,7	552	208	94	7		130	345	62,50%	MORE THAN 50 % of the population
Muccia (MC)	25,9	915	331	155	16	10	396	753	82,30%	
Pieve Torina (MC)	74,8	1445	578	274	37	3	516	1134	78,48%	
Ussita (MC)	55,3	447	101	51	11		177	289	64,65%	
Valfornace (MC)	48,6	1058	375	182	46		225	646	61,06%	
Visso (MC)	100,4	1106	350	171	74	23	343	790	71,43%	
total	655,5	13965	5445	3005	482	341	2331	8599		
Bolognola (MC)	25,9	138	49	23	5		12	66	47,83%	
Caldarola (MC)	29,2	1806	464	214	32		253	749	41,47%	
Cessapalombo (MC)	27,6	508	163	80	11	7	20	201	39,57%	BETWEEN 30% e 50% of the population
Gagliole (MC)	24,1	632	215	88	3		4	222	35,13%	
Monte Cavallo (MC)	38,5	132	21	9			20	41	31,06%	
Montegallo (AP)	48,5	529	198	101	3		44	245	46,31%	
Pioraco (MC)	19,5	1129	270	127	24		75	369	32,68%	
total	213,1	4874	1380	642	78	7	428	1893		
Acquacanina (MC)	26,8	122	37	23				37	30,33%	
Acquasanta Terme (AP)	138,4	2885	753	356	19		6	778	26,97%	
Amandola (FM)	69,5	3623	487	225	3	13	2	505	13,94%	
Camporotondo di Fiastrone (MC)	8,8	557	122	43	2		17	141	25,31%	
Castelraimondo (MC)	44,8	4578	638	280	18		25	681	14,88%	
Colmurano (MC)	11,2	1260	181	78				181	14,37%	
Cossignano (AP)	15,0	976	94	41				94	9,63%	
Force (AP)	34,3	1321	203	83			14	217	16,43%	
Gualdo (MC)	22,2	812	189	76	1		20	210	25,86%	
Monte San Martino (MC)	18,5	757	91	33				91	12,02%	BETWEEN 10% e 30% of the population
Montefortino (FM)	78,6	1162	294	123				294	25,30%	
Montemonaco (AP)	67,8	586	145	72				145	24,74%	
Palmiano (AP)	12,7	189	22	12				22	11,64%	
Roccafluvione (AP)	60,6	1994	231	111				231	11,58%	
San Ginesio (MC)	78,0	3479	810	371	33	9	92	944	27,13%	
San Severino Marche (MC)	194,3	12716	2053	897	108		214	2375	18,68%	
Santa Vittoria in Matenano (FM)	26,2	1325	231	94				231	17,43%	
Sarnano (MC)	63,2	3280	576	245	52		43	671	20,46%	
Serrapetrona (MC)	37,6	954	168	70	11		25	204	21,38%	
Smerillo (FM)	11,3	366	60	24				60	16,39%	
Tolentino (MC)	95,1	19939	3304	1449				3304	16,57%	
total	1.114,9	62881	10689	4706	247	22	458	11416		

The vast majority of the population residing in areas affected by the earthquake in 2016, despite the serious inconvenience experienced so far, decided not to leave their respective towns, although a gradual demographic decline and depopulation process had al- ready been in place even before the earthquake.

The earthquake has further aggravated and accelerated the depopulation process taking place in these areas, reducing even further the minimum habitability standards, in terms of accessibility and provision of basic services, as already broadly pointed out by the National Strategy for Inner Areas [5].

While the decision to provide temporary settlements (Emergency Housing Solutions) to the people affected by the earthquake proved to be, on the one hand, a complex and

potentially uneconomic operation especially in these foothill and mountain areas, on the other hand it was motivated by the will not to weaken the local community, predominantly consisting of elderly people aged over 65 [6] and to try to prevent the affected areas from becoming more and more desolate.

The goal would instead be to set up temporary housing areas according to new criteria and guidelines leading to a greater integration with the community and with the landscape. In the event of the occurrence of a future earthquake, it would therefore be necessary to assess in advance the identification and setting up of emergency preparedness areas (waiting, sheltering-admission, gathering), in addition to those guidelines already envisaged by the Civil Protection provisions set out by CLE (Limit Emergency Condition: accessibility and access to the areas, number of aggregate objects interfering with the area in question, first aid facilities, formal and dimensional information, accessibility, service infrastructure, morphology and location of the area, type of soil, type of instability, possible landslides, groundwater, surface water, hazards and danger of flood areas. It is therefore necessary to design a stable prevention and early warning system throughout the territory and to identify equipped areas that may play a dual role: both during the ordinary daily-phase and in the emergency phase during a seismic crisis. Ultimately, the new criteria should be able to ensure integration with the context and the landscape, in order to ensure a better level of connectivity with the existing environment, protect and enhance natural and historical heritage and check the compatibility between temporary functions and pre-earthquake daily functions Fig. (4) and Fig. (5)

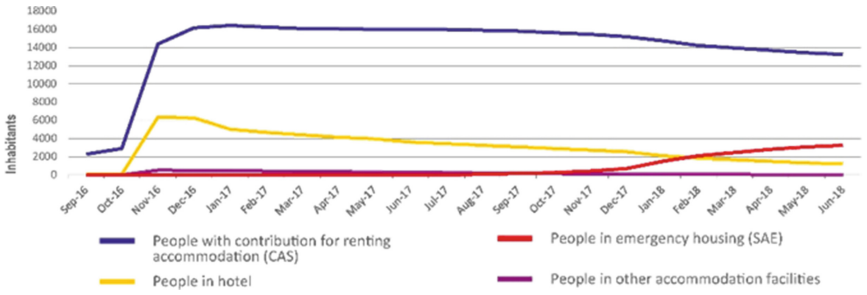

Fig. 4. Region Marche, emergency stage: dynamic housing response. data source: statistics office - Marche Region, http://statistica.regione.marche.it/

3 Resilience Strategies: Programs for Building Back Better, Safety and Disaster Preparedness

The increasing awareness of the high vulnerability of Italian urban systems is triggering off a growing demand for safety, bringing environmental risk prevention and managemen tissues in the public spotlight.

The weakly effective predominantly building-centered approach on safety is highlighting the inherent limitations of a sectoral approach, which neglects the relationships between settlement contexts and urban functional systems.



Fig. 5. Marche Region, temporary housing solutions, examples of settlements

The building risk mitigation interventions (not always consciously) involve an urban impact and for this reason they should be evaluated and readjusted taking into account the spatial, hierarchical and functional organization of the urban context in which they are implemented.

Ensuring the effectiveness and efficiency of risk mitigation actions undoubtedly is the key objective in terms of safety. Therefore it becomes necessary to identify suitable methodologies to relate the urban environment not only to environmental aspects, but also to cultural and economic issues, engaging local communities and individual citizens in the decision-making process, since the promotion of safety to face natural hazards means not just preventing or limiting the damage caused by natural disasters, but also investing on competitiveness and quality of life in our country [7]. Ultimately, the post-earthquake phase should lead to a paradigm shift in the lifestyle of this wide territory based on: a permanent protection of the urban-territorial risk; a networked technological service system providing better services to the local community and businesses; a new functional relationship system between small towns in areas affected by the earthquake and urban centers outside of the earthquake-stricken areas (through transport incentives, cooperative firms, itinerant services for manufacturing activities, etc.) strengthening of cooperation relations and economic and social exchange between communities living in the mountain, hillside and coastal areas.

In conclusion, marginal territorial systems that are not easily accessible, such as inland areas, regional and urban planning should focus on mitigation of risks, seismic vulnerability and the consequent need for changing lifestyles. Therefore, the new strategic land use objectives should include future visions shared by many small towns, circular economic processes associated with new forms of governance based on advanced technological networks providing regional and supra-regional remote protection and assistance.

Despite a few legislative innovations developed within regional contexts (Umbria Regional Law no. 11/05, Marche Regional Law no. 61/08, Emilia-Romagna Regional Law no. 20/2000 and no. 6/2009, Calabria Regional Law no. 19/2002), a clear-cut separation between urban planning and risk planning still remains in Italy [7].

The current legislation envisages only partially the need for prevention within ordinary spatial governance planning, except for the Umbria Regional planning law, which has introduced the so-called Minimum Urban Structure to serve as an essential tool

to reduce seismic vulnerability at an urban scale, through goals and actions to be implemented by means of the General Master Plans.

According to the Sendai Framework for Disaster Risk Reduction (2015–30) [12], an interdisciplinary and holistic approach for an appropriate disaster risk management is necessary, based on the awareness that the severity of a natural disaster is closely related to the choices that are made and that concern specific questions pertaining to each individual or having a relevant wide spatial scope, such as life lifestyles; the approach underlying the preservation and enhancement of natural and cultural resources; agroforestry and pastoral activities management; handicraft and industrial manufacturing systems; urban and infrastructural growth planning and design [8].

It is therefore necessary that the Disaster Risk Reduction approach becomes an integral part of the regulations that are immediately enforceable by the Regions and municipalities located within the area affected by the earthquake, to manage and monitor all the lengthy reconstruction process stages, being the only regulatory tool available to supplement the risk "component" in the urban and regional planning project.

This awareness is increasing more integrated in European territorial governance policies. Hence, urban planning cannot relinquish its responsibility in giving its contribution in achieving the above mentioned objectives.

The United Nations Office for Disaster Risk Reduction [12] underlines the following key factors to focus on:

1. Ensure the preparedness of individuals, communities and economic and social organizations to deal with and cope up with natural disasters and related risks by means of appropriate measures to increase the response capacity, and therefore the resilience of local communities;
2. Post-disaster interventions meant to build better, conceiving reconstruction as an opportunity to be seized to mitigate the impact of future disasters. All this is summed up in the slogan Building Back Better [9], i.e. a principle that applies not only to buildings or physical infrastructure but to a much broader attitude.

In this context, the "action plan" launched by the Italian Government, which was established under the coordination of the Extraordinary Emergency Commissioners and centered on Commissioners' Ordinances, was fully implemented only with reference to temporary intervention objectives intended to cope up with the emergency situation; more specifically in accordance with the Law 229/2016 (Civil Protection Law) and the various ordinances, it was designed to meet emergency housing needs, to be swiftly implemented through "unitary and homogeneous" procedural models throughout the area affected by the earthquake, regardless of the varied settlement articulation and different (historical, cultural and natural) landscape features that characterize the Central Apennines spatial contexts [10] Fig. (6).

Even before the 2016 earthquake, the Italian State had paid a special attention to the Apennine area, i.e. a large portion of the national territory, which although rich in environmental resources and landscapes, as well as cultural and local know-how, has undergone a marginalization process that has resulted into a decline in population and employment, along with an inadequate land use and protection.

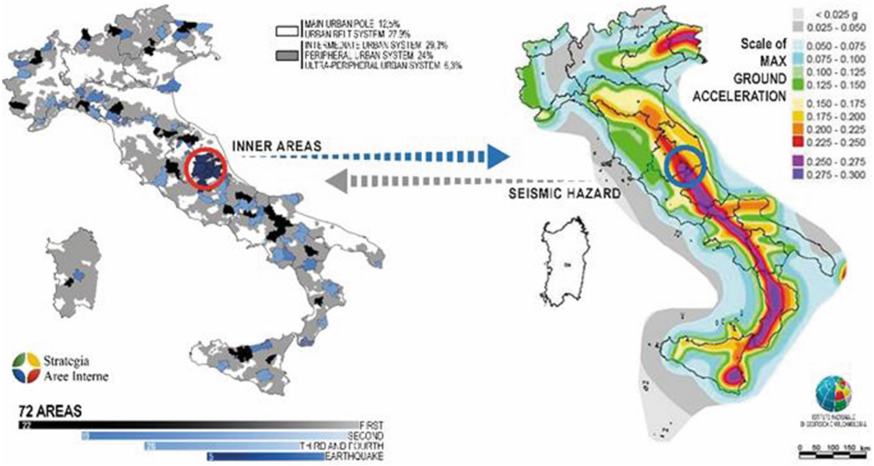

Fig. 6. Case study localization in inner areas and in seismic hazard Italian map

Based on the National Strategy for Inner Areas classification already discussed (see paragraph 1), it has been assessed that Italian inner areas account for 52% of municipalities, 23% of the population and about 60% of the Country's entire territory [11].

At the end of the evaluation process, 72 areas were initially selected, characterized by particularly low-density population levels (2001–2011 census period), and by a 4.4% population decrease compared to an average 4.3% population increase in Italy. The depopulation trend was confirmed in the 2011–2017 period, with a further loss of residents by 3.2% in only six years (as against an average Italian population growth by 1.9%). This trend makes it even more urgent to strengthen the commitment and actions to ensure a prompt implementation and enforcement of planned actions within the area-wide strategies.

In outlining this geographical mapping, National Authorities have carried out a major spatial consultation operation and building of a new multi-level governance system, in which Regional and Provincial Authorities have demonstrated their ability to listen to the local communities' needs and to choose socio-economic policy priorities in agreement with the Central Government.

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