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New scenarios for safe mobility in urban areas

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NEW SCENARIOS FOR SAFE MOBILITY IN URBAN AREAS

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Special Issue 1.2022

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Planning seismic inner areas in central Italy

Applications for the infrastructural project, lifeline and resilient public space in the shrinking territory

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Abstract

Natural calamities that repeatedly hit the Country, ranging from earthquake to climate change induced events – like landslides and floods – resulted in huge damages, worsened by the infrastructural degrade and by the abandonment of some territories, especially in the inner areas of the Country. There is therefore a pressing need to improve the infrastructural resiliency, focusing on extraordinary manutention, on the technological development of the monitoring activities and of the supporting infrastructure, on the prevention, the civil protection and the public aid. Peripheral urban contexts of the Inner Areas are exposed to "isolation Risks" in case of catastrophic events, as witnessed after the 2016 seismic events, where secondary infrastructure network was heavily affected, bringing great problems for those living in the areas. The paper explores experimental methodologies to bring substantial modifications to the villages and minor urban areas structure (for the damaged buildings as for the infrastructural network) that the reconstruction makes possible, making of it a unique occasion to renew and reorganize the territory.

Keywords

Inner areas; Building back better; Disaster risk reduction.

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1. 2016 Earthquake. Urban and territorial crisis in Central Italy Inner Areas

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 violent earthquake that accelerated and aggravated the phenomena already in place.

A severe earthquake struck Central Italy in 2016, affecting four regions, 10 provinces and 139 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 (Oliva, 2014).

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 km^2 out of the 9.344 km^2 of the regional surface). The toll was very high: with more than 104,000 damaged buildings, 54,000 evacuated buildings and 32,000 displaced persons, (Nomisma, 2019).

Already before the 2016 earthquake, with the establishment of the SNAI[1], the Italian state put particular attention on the Apennine area (that occupy a vast part of the peninsula), an area that during last decades witnessed a marginalization process and consequent population shrinkage, resulting in a largely inadequate use and management of the territory.

"Inner Areas" cover a vast part of the Italian territory hosting a population of more than 13.540 million. Around one quarter of Italy's population lives in these areas, divided among more than four thousand municipalities, which cover sixty percent of the entire national territory [Agency for Social Cohesion, 2017]. SNAI emphasized that those marginal areas constitute 53% of Italian municipalities, 23% of the population and 60% of the territory of the nation.

This area possesses a "territorial capital" of exceptional value and diversity, which is largely unexploited as a consequence of the long-term demographic decline that began in the 1950s when Italy started its industrial take-off. The strategy adopted by Italy – now in its experimental phase – has the overall objective of promoting local development by activating unused territorial capital through carefully selected development projects. Improving the quality and quantity of key welfare services (education, health, transport) in the inner areas is a central pillar of that strategy (Barca, 2009; Barca & McCann, 2011).

After the SNAI evaluation process, 72 pilot areas were selected, identified by a low level of population density, (2001-2011 Census data) and by a population shrinkage of -4,4% compared to the Italian average of +4,3%.

The shrinkage tendency was confirmed by the data of the period 2011-2017, with a further reduction of -3,2% in just 6 years, compared to a +1,9% increase of the national average. This tendency makes it even more urgent to increase the actions to achieve a fast application of the planned strategies.

SNAI approached the transportation topic for the inner areas under 3 big families of needs, that are highlighted in the Guidelines for Inner areas Mobility, namely: "Planning and programming", "Improvement and requalification of infrastructural network" and "Development of transport services (internal and external accessibility)".

[1] Inner Areas National Strategy. The greater part of Italian territory is characterized by small towns and villages which often have restricted access to essential services: "Inner areas" are those areas far away from large and medium-sized urban centres, and from their associated infrastructure. Since September 2012 - Italy is developing a National Strategy in favour of Inner Areas with the aim of improving the quality of life and economic well-being of people living in its relatively isolated and sparsely populated areas and in the long term, "reverting" demographic trends.

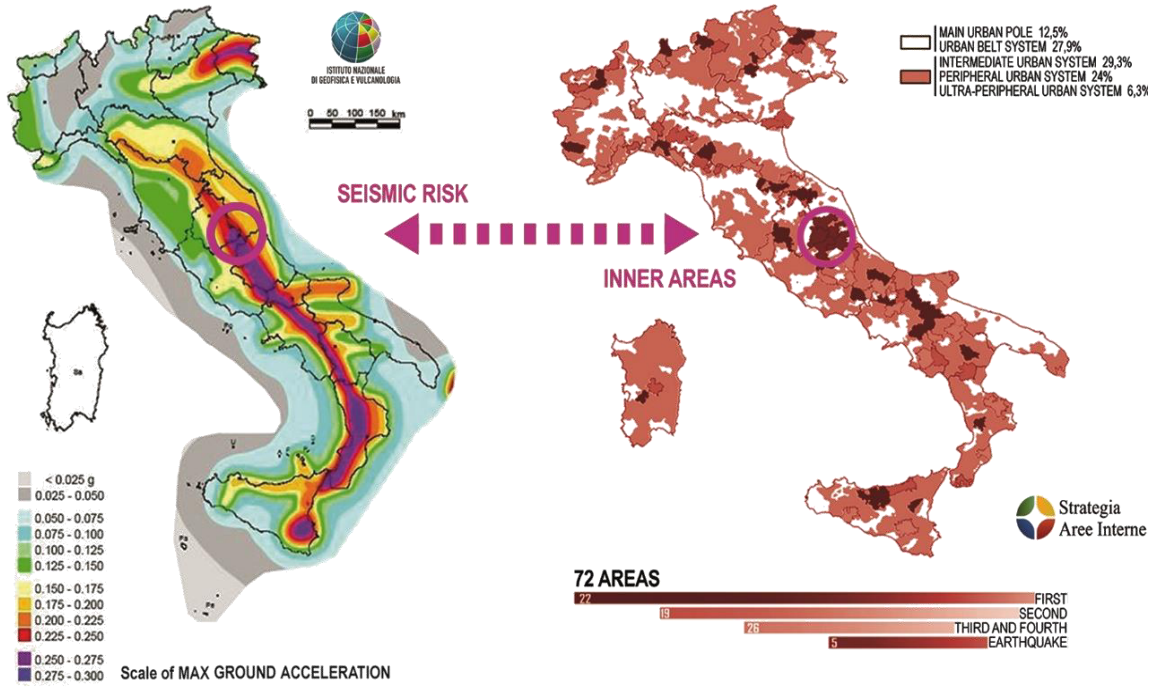


Fig.1 Seismic risk and distribution of inner areas in the national territory. Source: Ordinanza PCM 3519 / 28 April 2006, All. 1b, Seismic risk referred to national territory and project areas selected by the inner areas technical comity , 2019

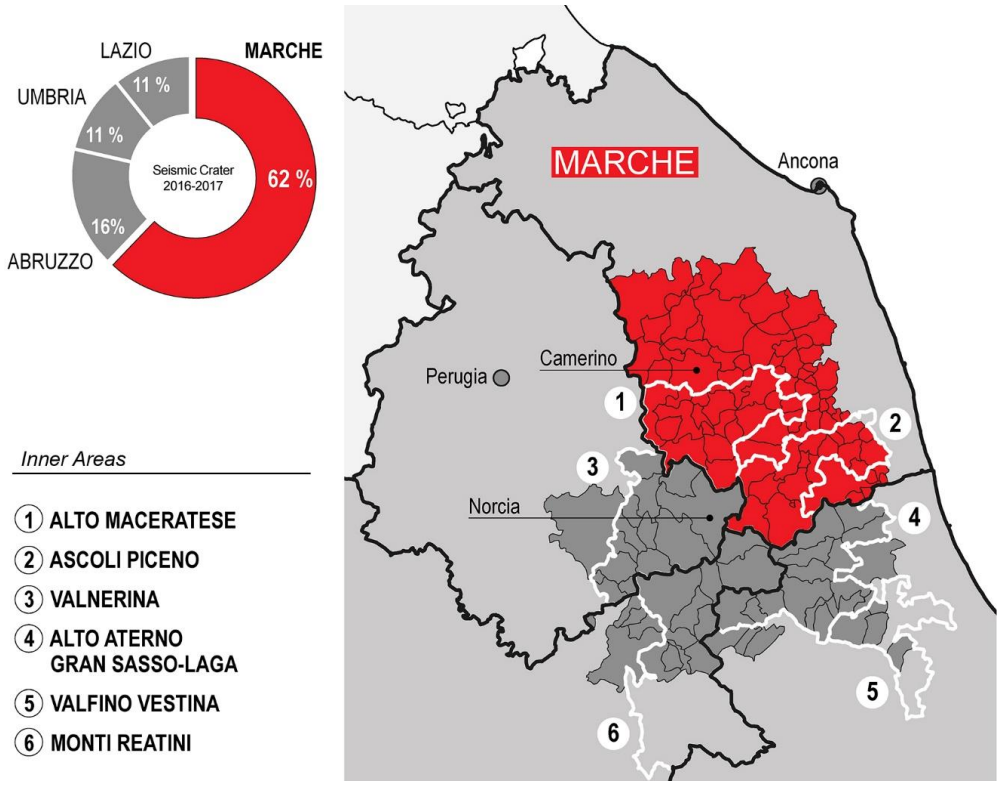


Fig.2 Seismic crater 2016-2017 e SNAI area Central Italy. Source: Nazional Law n. 229/2016, All.1-2, authors' elaboration

From the analysis of the documents produced by the SNAI (now included in the CIPE report for the year 2018) and now approved, it is clear that in spite of the limited resources, the territories privileged the rethinking of governance for the public transport system, and somehow profited of the increased contractual power when facing the transport providers, given by the support of national level professionals, and by the power a minister has in comparison to a local authority. Among the 138 municipalities affected by the

earthquake, 84 falls under one of the 3 categories of Inner area defined by SNAI, also defined by the proximity to an essential service provider.
In total there are 4 project areas defined by the SNAI (Fig.1): 2 in Marche region ("Ascoli Piceno" inner area, with 15 municipalities and 25.000 inhabitants and "Alto Maceratese" inner area, with 19 municipalities and 18.000 inhabitants), 1 in Umbria region ("Val Nerina" inner area, with 14 municipalities and 19.000 inhabitants, and one in Lazio region ("Monti Reatini" inner area, 31 municipalities and 34.000 inhabitants) giving a partial coverage of the examined area.
The topic of connectivity and accessibility to the territory, especially the inner ones hit by the seismic events is a core precondition to local development.
SNAI says: "for the peripherality not to transform in marginality it is necessary to improve the accessibility to basic services for inner areas, first of all, education and health. This can be obtained through 2 modes of action:
a) strengthen and rethink the service offering;
b) improve mobility, reducing the transport time to access the service hub".
It is then clear that accessibility is a fundamental and basic condition for the success of all the development intervention.

2. Marche Crater and SNAI strategies: General elements of an ongoing process

The two Inner Areas of "Alto Maceratese" and "Ascoli Piceno", appear as a highly complex system, diversified internally, but dominated by common factors.
The inner area "Alto Maceratese" occupies the south-western part of the province of Macerata, for a total of 17 municipalities and 885 sq km, with a resident population of 18,489 inhabitants as of 1 January 2016 (ISTAT, 2016), equal to approximately 8.7% of the entire Marche Region population, distributed throughout the territory with an average density of 22.8 inhabitants / sq km (much lower than the regional average, which is around 164.20 inhabitants / sq km).
The inner area "Ascoli Piceno": was identified in 2014 as a cluster of 15 municipalities[2], for a total of 30,790 inhabitants, distributed between the Tronto valley to the south and the Aso valley to the north. The surface is equal to 708 square kilometers and represents 58% of the entire territory of the province of Ascoli Piceno. The population density is low: 36 inhabitants per square kilometer compared to 172 for the provincial average. The territory includes the highest point in the province of Ascoli, the top of Monte Vettore (2,476 m asl).
A first common aspect that characterizes the two inter-municipal clusters is certainly given by the morphology of the areas, which determines a continuous sequence of valleys, hills and mountainous systems, which frame constantly changing landscape niches, the result of centuries of close interactions between human activities and naturalistic-environmental systems of great relevance (river networks, lakes, woods and forests, pastures and prairies, etc.), representing the backbone of the central Italian Apennines. The strong and profitable human-territory relationship is what has determined for long periods, in the past, the wealth of these territories, in which over time productions and activities strongly linked to the use and / or exploitation of local resources were developed. (Sargolini, 2017).
A second common element is represented by the historical settlement network of the areas organized in small villages and rural settlements spread throughout the territory, both in the valleys, especially in correspondence with historical itineraries, and in the hills or mountain slopes and ridges, in the cases of small, fortified villages and castles. Together with those, there are a myriad of historical and architectural

[2] later extended to 17 with the addition of the municipalities of Appignano del Tronto and Venarotta, DGR n. 1053/2018

sites and houses, scattered throughout the area and connected to agricultural lands, which help to determine and strengthen the image of the local landscape. The current configuration of the two Inner Areas is the result of profound socio-economic transformations that characterized the entire Marche Region and, more generally, the entire country. Starting from the second half of the last century, these areas, while following distinct trajectories, have witnessed a profound process of emigration of the population, especially younger ones, towards the coastal and foothills areas, in search for jobs in the manufacturing sectors and, later, construction. This migration phenomenon has generated, over time, a progressive and serious aging phenomenon of the resident population and the almost total lack of generational turnover in the productive sectors at the base of the local economy.

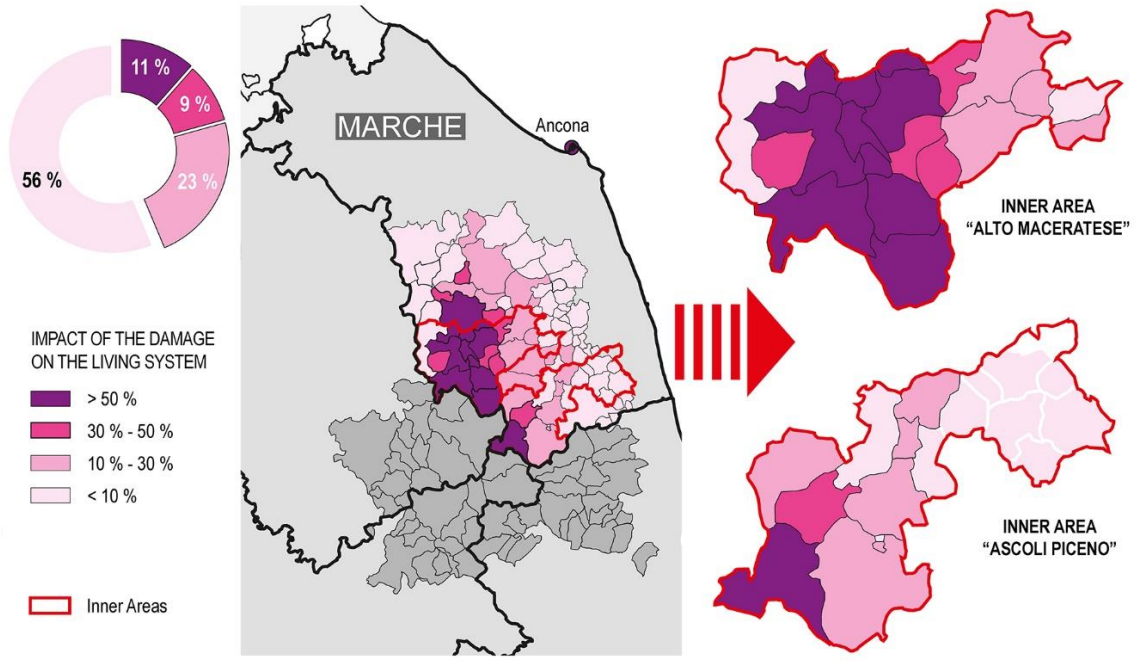


Fig.3 Impact of the earthquake on the housing system: Marche Crater and Inner Area Strategies. Source: Nazional Law n. 229/2016, All.1-2; authors' elaboration

The problems generated by the earthquake tragically added on top of the previous deeply embedded difficulties linked to depopulation. This event did not hit in a severe way everywhere (the damages and the discomforts of greater intensity were concentrated in the mountains), but the negative impacts resonated in the whole territory. In the proximity of the Sibillini mountains, whole populated areas have been destroyed, the road network has been compromised, part of the population has been displaced, the network of public services has been disrupted, the agricultural and livestock supply chains have been cut off or damaged, the accessibility to the two national parks was interrupted, together with the activities of hospitality and agritourism, hiking, sports and spas, later only partially resumed, thanks also to the stream of solidarity.

The elaboration of the two Strategies, which took place in 2018 between the post-earthquake emergency phase and the start of the reconstruction phase, is therefore considered as a unique experience compared to the general panorama of the strategies of the Internal areas due to the criticalities and opportunities that the reconstruction process can (and should) pursue.

In these territories the damage to the settlements has generated not only the destruction and the relative physical loss of urban fabrics and heritage (historical-artistic, archaeological, environmental) that contributed to the definition of local landscapes, but also the progressive abandonment of the devastated areas by the residents, with a potential risk to trigger dangerous "loss of creative and generative connection between man and the environment" (Sargolini, 2017), which will inevitably lead to the loss of attractiveness, fostering

a negative cycle which, if not controlled, will inexorably favor the accentuation of the phenomena of marginalization and abandonment.

Fig.4 Marche Region, Visso (MC), Damage to infrastructure caused by the 2016 Central Italy earthquake. Source: Visso municipality, Marche Region

3. Alto Maceratese post-earthquake infrastructural framework

For the Marche region, a first pilot case resulted in the definition of the Alto Maceratese Area (17 municipalities, headed by Unione Montana Marca di Camerino[3]), that profits of investments from the European Agricultural Fund for Rural Development (EAFRD) and Stability Law funding, to strengthen local public transportation, with the creation of 3 modal hubs and 17 pit-stop micro station to recharge electric vehicles. Hubs are seen as access gates to inner areas and to the Sibillini mountains National Park, exchange infrastructure for public transport, for the rental and recharge of electric vehicles, bike-sharing hub and public transport stop, connecting the road infrastructure for natural and cultural explorations.

The analysis of data and topics that emerged in the area returned a general condition of imbalance between the ability to offer services related to local public transport, the population distribution and the territory to be served.

This can be traced back to three issues:

- a lack of supra-local connective infrastructures, incapable of quickly connecting small inner centers with surrounding areas. In particular, the only way to travel from the Adriatic coast to the Apennines is with road transport along the two main extra-urban roads SS 76 and 77, while the connection to Umbria and Lazio proceeds through the last stretch of the SS 77;
- the dispersion and fragmentation on the territory of the residential fabric and built-up areas, necessarily leads to an increase in travel times and a reduction in commercial speed, but also produce an increase in the management costs of the local public transport system and a problematic renewal of the transport infrastructure;
- the morphological aspect of the area increases the difficulty to implement a service adequate to the actual needs of the residents and users of the area.

[3] Mountain union of the Camerino county (hence the name)

These issues traditionally afflict all low-density areas with a predominantly rural economy (Daniels, Mulley, 2012; Alonso-González et alii, 2018; Hunkin, Krell, 2018; Berg, Ihlström, 2019; ESPON, 2019). In this case, the access obstacles typical of these rural areas are accentuated by the earthquake and economic difficulties which exacerbate the differences between the territories, significantly encouraging emigration.

The rationalization and extension of the local public transport system, providing a hierarchy for the accesses and uses, is the priority objective of the strategy to improve the efficiency of the transport network.

On top of that must be added an action to design and develop strategic intersection nodes between the slow travel system of the area (itineraries, paths, minor roads, etc.) and the large systems of fast travel routes connecting with main infrastructures (Motorways, Quadrilatero[4], SS78, etc.).

In fact, this particular territory is well suited for the "slowness" of paths and journeys, as can be deduced by the dense network of paths and minor routes that connect the several small destinations in the area.

Nonetheless, there is the need to connect all territories, even the most internal ones, in a "fast" way, with quick links to hubs equipped with primary services (health, education, etc.,) a way that unfortunately today takes too long to be traveled.

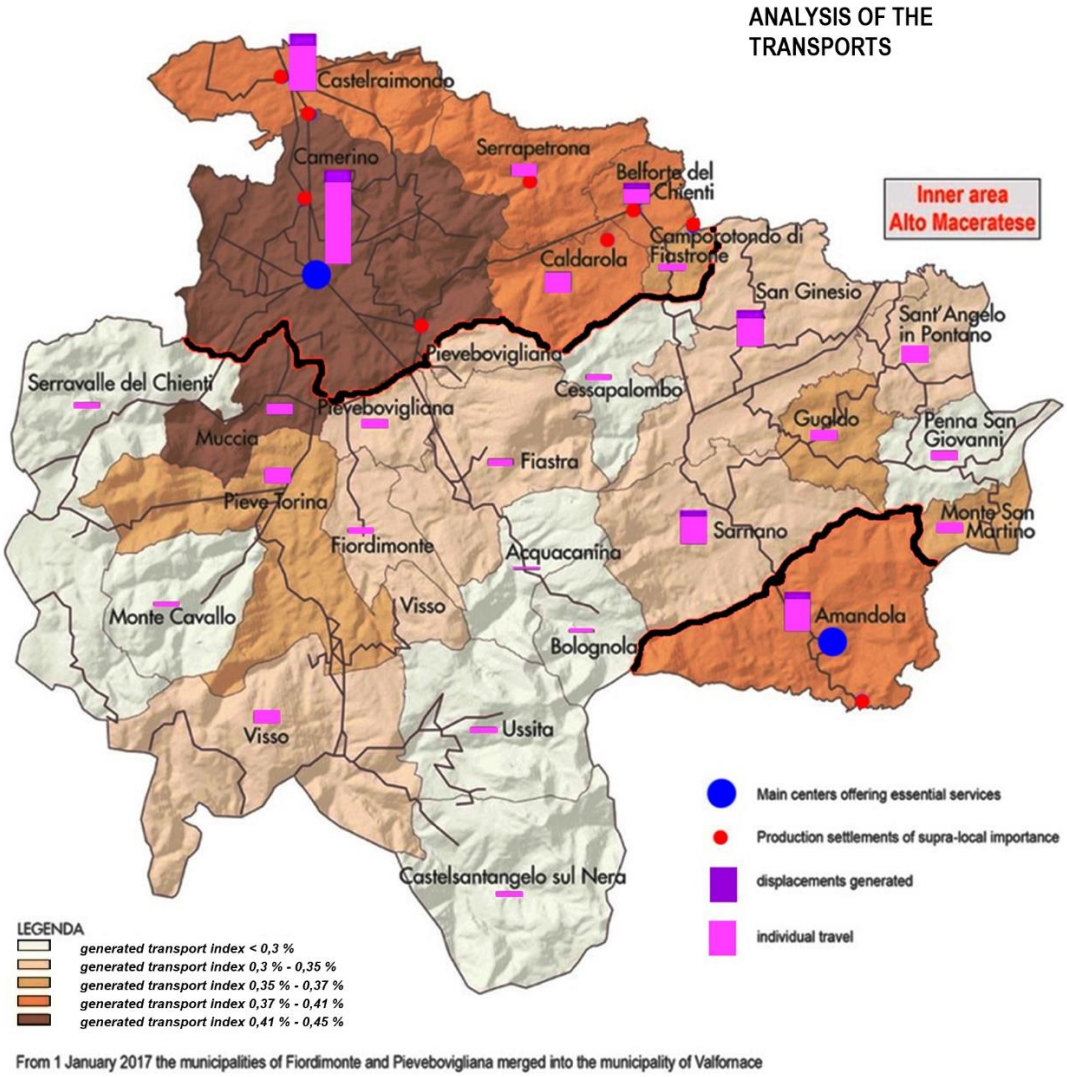
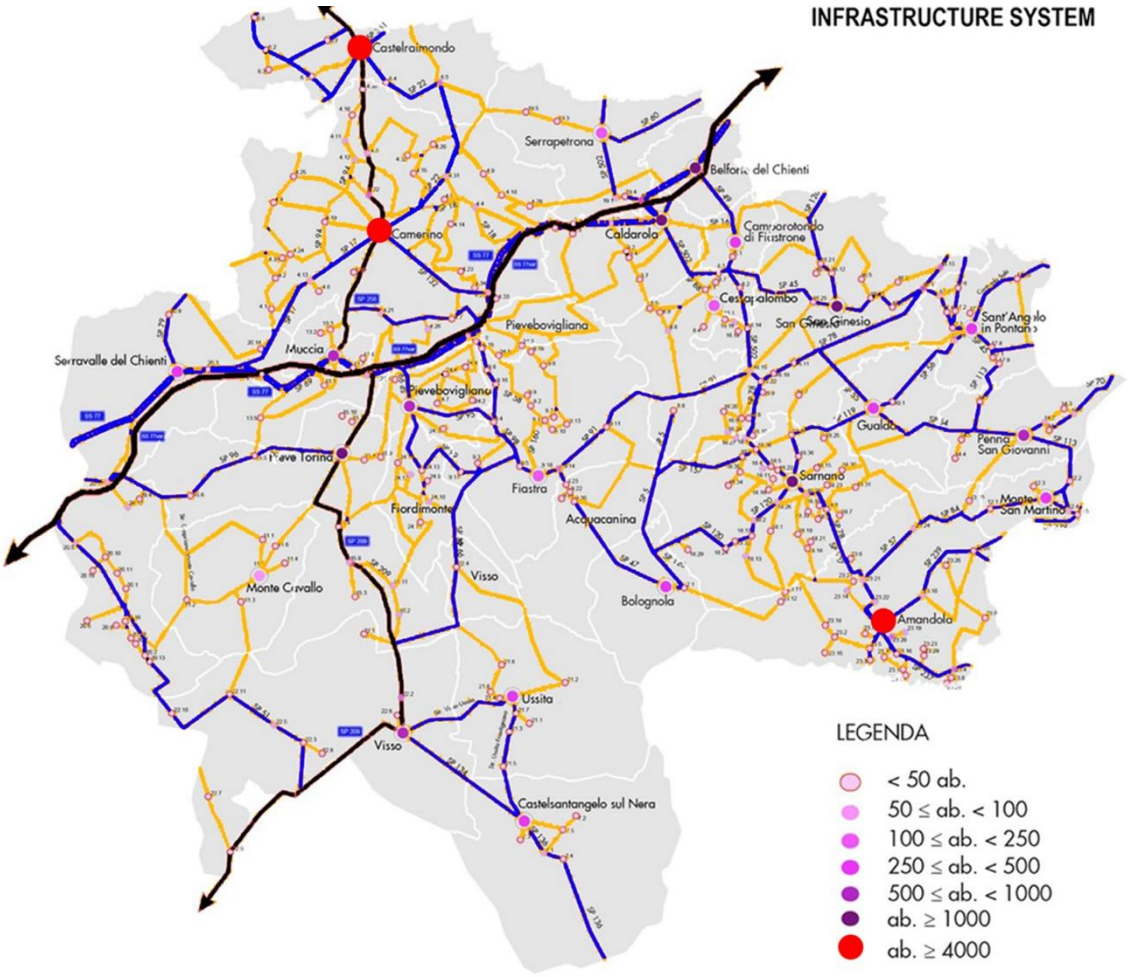


Fig.5 Area Alto Maceratese analysis of the transport, year 2018. Retrieved from: http://statistica.regione.marche.it/, Source: authors' elaboration

[4] A "quadrilateral" (hence the name) primary road network project composed by SS75, SS76, SS77 and A14



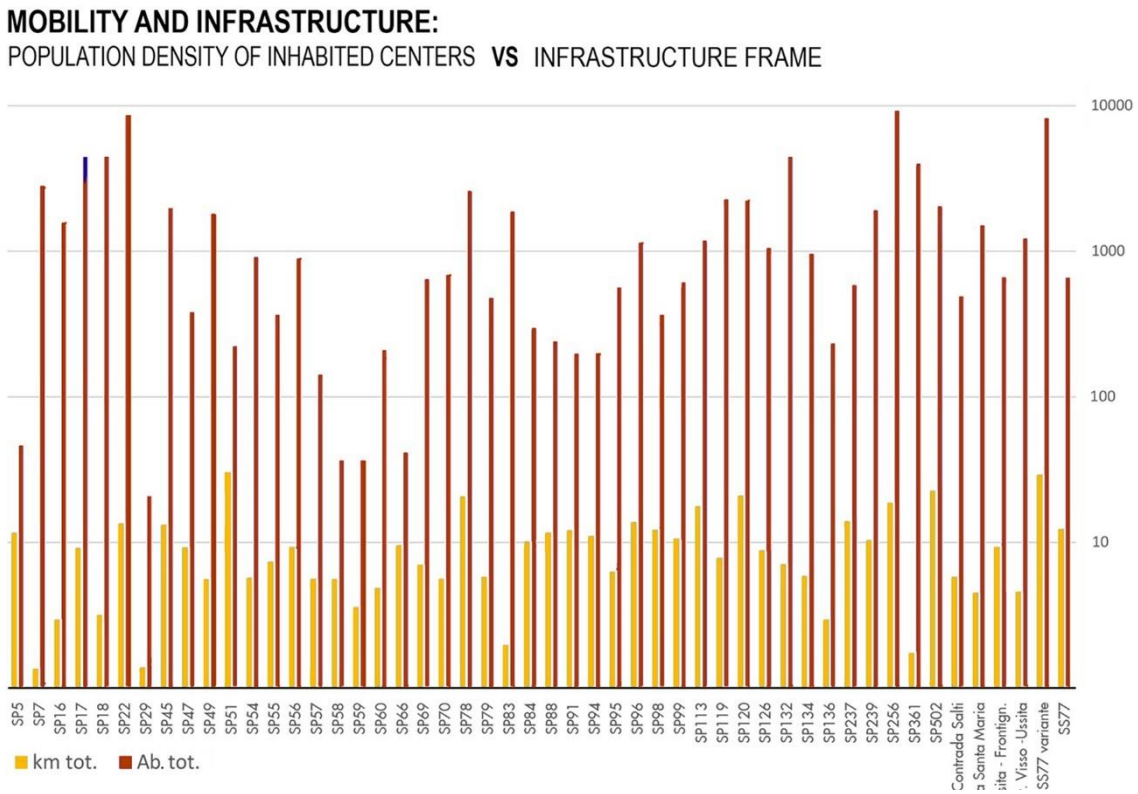


Fig.6 Marche region Inner area Alto Maceratese, secondary road network and population distribution related to road segments. Analysis of population risk exposure. Secondary road length related to population resident in proximity to each road sector. Retrieved from: http://statistica.regione.marche.it/, Source: authors' elaboration

For these reasons, the local public transport strategy proposes the two following macro-actions:

- ACTION 1. "Local and supra-local connections"; The intervention consists in the strengthening of the local public transport network and its connection with the supra-local public transport network, regarding the frequency and quality of the rides and the provision of dedicated equipment and vehicles, in order to reach more peripheral areas and main tourist and sports attractions, also during seasonal events.
- ACTION 2: "Hubs and strategic intersection and modal exchange nodes"; This intervention consists in the definition of strategic access nodes (hubs) that are designed as areas of intermodal exchange and connection to local and supra-local public transport. In these locations it is planned to create areas and spaces equipped with small marketplaces for local products, refreshment areas, waiting rooms, tourist information points, areas for the rental of electric bikes and other similar equipment.

It appears clear from the analysis of the data collected and illustrated in synthetic diagrams (Fig.5, 6 and 7) that the road network of the inner areas is currently not in the position to support a development plan based on the increase in visitor flows and the enhancement of productive investments for businesses, as envisaged in the strategy. The main cause of this criticality is the poor maintenance of a large part of the provincial and municipal road network, particularly in the hilly areas of the Fiastra, Fiastrone and Tenna valley. After the seismic events of 2016, the maintenance conditions of the road network in inner areas were further worsened by the risk of landslides or instability. The accessibility of the Pilot Area is a strategic element to ensure the impact and sustainability of all planned interventions. An adequate ordinary and extraordinary maintenance of the road network would improve access to basic services and the connection between slow and fast routes, offering as well a logistical infrastructure important during emergencies but also commercial transportations. It is clear that the topic of safety should be addressed together with a multi-risk approach, focusing on places and communities, analyzing the various components that can affect the level of safety (Fig.5 and 6). It is necessary to overcome the approach linked to homogeneous and undifferentiated policies on the national territory, in favor of targeted policies, defining specific action for each specific risk situation embedded in the site, taking into consideration the living conditions and customs of the communities that live in the area. In 2019, with the project "Nuovi Sentieri di Sviluppo per l'Appennino Marchigiano dopo il sisma del 2016"[5] the 2nd trajectory "Borghi in rete. Connettività e mobilità sostenibile nelle aree dell'Appennino Marchigiano"[6] promoted the extension of this strategy to the whole earthquake affected area, imagining an exchange hub network system, connected with natural and cultural heritage exploration paths, connecting national parks, and "Rete Natura 2000"[7] areas. The area explored by the project is characterized by limited connectivity, in terms of digital infrastructure, road network and public transport service. These problems are amplified in the inner areas, where the combination of "poor digital connectivity + poor physical accessibility" represents one of the greatest limitations to development and life quality. From the point of view of physical accessibility, the main criticalities are represented by an imbalance between the offer of services related to local public transport and the potential demand from the territories to be served. This can be traced back to three main structural characteristics of the territory:

- the diffusion and fragmentation of the settlement system, consisting of small villages, hamlets and historic centers, with low population density, which necessarily entails an increase in travel times due to the reduction of travel speed, and an increase in the management costs of local public transport services, thus making it uneconomic;
- the morphology of the area, which makes it difficult to activate a service suited to the needs of residents and visitors to the area; increased difficulty following seismic events for which, to date,

[5] "New development trajectories for the Marche Appennine area after the 2016 seismic event"
[6] "Villages network. Connectivity and sustainable mobility in Marche Apennine area"
[7] Natura 2000 network: European Union main instrument for the preservation of biodiversity

various infrastructures cannot be used, or are only partially, due to damage or due to risk situations induced by landslide slopes or other critical conditions;

- a limited hierarchy in the infrastructural system, due in particular to the lack of supra-local connection infrastructures, able to quickly connect the small inner centers with the surrounding area, both through adequate transversal north-south connections, and through east-west, or coast-inland, connections.

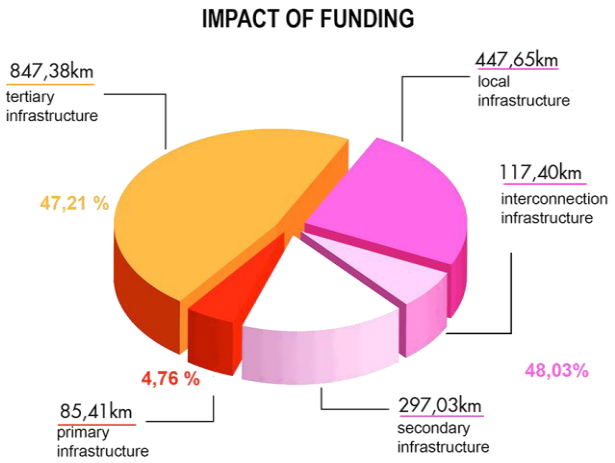


Fig.7 Marche region Inner area Alto Maceratese. Funds distribution for post-earthquake infrastructure reconstruction. Retrieved from: http://statistica.regione.marche.it/, https://www.stradeanas.it/it , Source: authors' elaboration

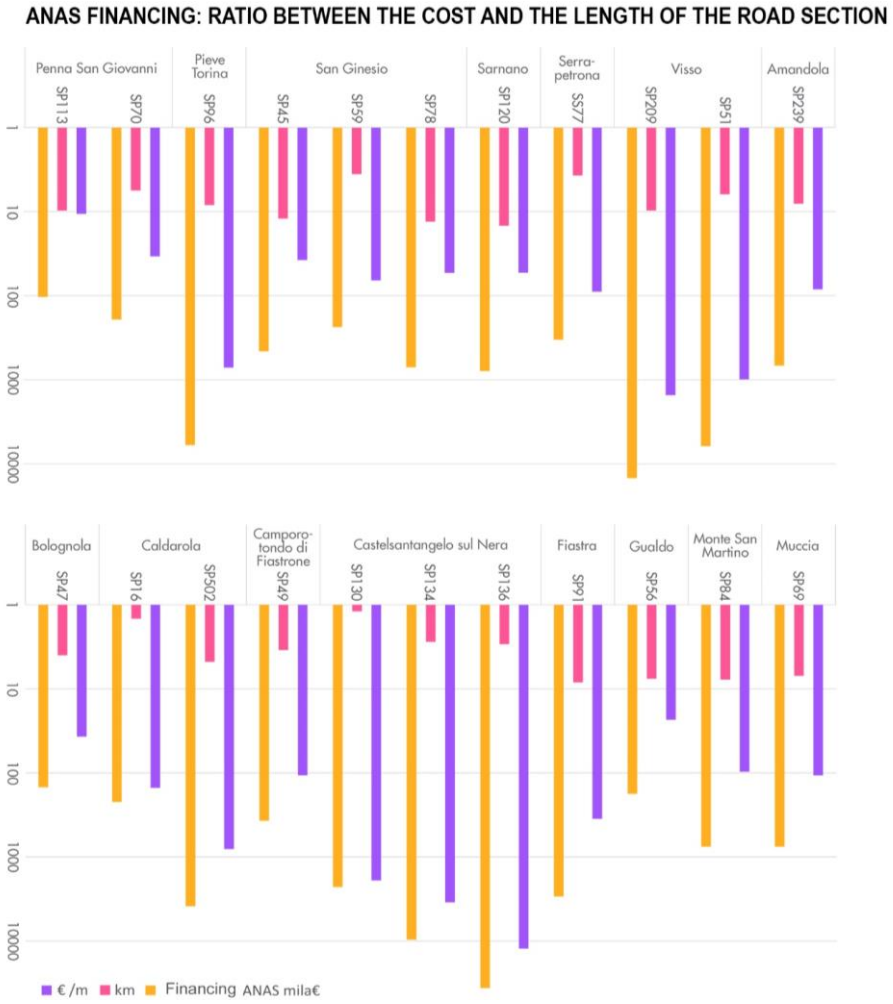


Fig.8 Marche region Inner area Alto Maceratese. Funds distribution for post-earthquake infrastructure reconstruction (1.849 million euros were spent between 2001-2011. Retrieved from: https://www.stradeanas.it/it , Source: authors' elaboration

4. Post-earthquake criticalities in the Marche's infrastructural framework: First assessments and opportunities

The 2016 earthquake highlighted not only the shortcoming of the existing infrastructural network, but above all its weakness: landslides of roadsides and detachments of road surfaces have worsened the capability to act during the emergency and made more difficult (in some cases prevented) the operation of rescuers (Esposito et al., 2017).

Moreover, the presence of collapsed or unsafe buildings at the fringe of some of the access roads to the main cities and villages, compromised even more the accessibility, especially where the road affected was the only way of access. The most recent primary road infrastructure, based on the "Quadrilatero Umbria-Marche" (State Road 76 "Vallesina" and State Road 77 "Val di Chienti"), Fig.2, has not suffered substantial damage, with the only exception of the State Road 4 "Salaria", interrupted due to landslides (Farabollini et al., 2018). Many municipal and provincial roads have suffered a worsening of accessibility, also caused by very little maintenance in recent years due to the scarce financial resources of the managing institutions (Fig.3). Also due to these criticalities, the Provinces of Marche have returned the management responsibility of the former state-road network to the Regional authorities, which in turn has established a partnership with "Anas"[8] for the maintenance of the aforementioned road network. This transfer of powers has caused a fragmentation of potential projects (divided between Anas, Provinces and Municipalities, with the Region only responsible as the owner for the ex-Anas viability), with the result that in the "Piano Operativo del Fondo Sviluppo e Coesione Infrastrutture 2014-2020"[9], approved with the "CIPE"[10] Resolution 25/2016, in the Marche's territory no road project has been funded.

Despite the infrastructural network of the Marche crater having shown all its vulnerability, on the other hand it highlighted undoubted positive aspects, especially regarding hillside and mountain tourism: the deficiency of the road network is balanced by the substantial environmental integrity of the landscape, with very few exceptions.

Up to now, the mountain has also been protected regarding the settlement of ski resorts and the maintenance of unobstructed views of the cultivated hills and promontories, which in themselves represent a natural resource to be preserved and enhanced.

For these reasons, the need for intervention on the infrastructural network of the Marche territory mitigating local and territorial vulnerability, cannot ignore the protection of the delicate balance between infrastructures and landscape composed by various landscape matrices (Sargolini, 2017), in line with the development of local economic activities (especially artisanal and agricultural), and of services related to tourism, which do not require new large and fast infrastructures, but rather a complete and safe network with constant maintenance.

4.1. Development goals for the secondary road network

It is evident that the reconstruction cannot ignore the reorganization of the infrastructural system and the sustainable development of the territory, through a renewed accessibility to the cities at the foothills and "Inner Areas", which allows to live in an effective condition of resilience to cope with future seismic events.

The reconstruction offers the opportunity to make substantial changes to the layout of villages and minor urban areas affected by the earthquake (regarding both the damaged buildings and the infrastructural network), giving a unique and unrepeatable opportunity for innovation and organic rearrangement of the territory (Marinelli, 2020). Pursuing this goal means first and foremost ensuring that:

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8 National Autonomous Road Corporation

9 "Operative plan of the infrastructure's development and cohesion fund" is a cohesion policy in Italy. It is financed with EU and national resources for actions aimed at economic and social rebalancing.

10 Inter-ministerial Comity for Economic Programming

- the Minimum Urban Structures (SUM) provided for by the O.C. 39 (ordinance governing the Reconstruction Implementation Plans), should consist of infrastructures with a low degree of vulnerability, achieved by a suitable road and building project (junctions, roundabouts, setbacks and localized voids, etc.);
- road layouts (regional, provincial and municipal) are made safe from landslides, through containment works, tunnels, reduction of tortuosity and what is necessary to ensure full accessibility even in emergency conditions.

A complex but long-lasting intervention, must not produce new roads, but involve the substantial improvement of the existing network and its accessibility, with the goal to make easily accessible all cities of the crater that are going to be rebuilt, in any weather condition and in any circumstance (Farabollini, 2018). An intervention with strong environmental sustainability qualities, which requires:

- the access to a subsidized and multi-year financial source;
- a singular implementing authority throughout the crater, or at least for each territorial area, through a design and consequent implementation in strict contact with local authorities, with the urban planning decision of each territory;
- the improvement of the transversal valley network (eg Val d'Aso, Val Tenna, etc.) connecting the area of the crater to the coastal road system, supported with regional and/or state funding.

4.2. Development goals for the primary road network

The road infrastructure of the crater area, in spite of the resiliency shown in 2016, requires a development project (being long-scheduled by ANAS) such as the foothill network Fabriano-Muccia (already designed) and Sforzacosta -Sarnano, that even if already part of the Quadrilatero network designed after 1997 seismic event, still demand a rapid completion.

The road network has to be completed, improving the existing system to facilitate the development of the area, exploiting tourism and the rich productive landscape (Antonelli, Viganò, 2007).

Finally, it is important to consider the problematic north-south regional connection, rethinking the primary road infrastructure, starting from the missing of the third highway lane in the region, cause of limitations especially in emergency situations.

5. Resilience infrastructures and lifelines for a territorial safety project

The theme of environmental risk prevention and management has been neglected for years, returning to the center of public attention only after calamities occur (Oliva, 2014). The awareness that the urban systems of our country are interested by a high level of vulnerability should, and must, trigger a growing demand for security, focused not only on preventing or limiting the damage derived by calamities, but also on considering the topic of "risk" as a mean/tool to invest in the competitiveness and quality of life of our country (Casa Italia, 2017).

The Italian regulatory system gives the regions the task of issuing laws on territorial governance, a hierarchy which, despite having shown its effectiveness in the past, has revealed its shortcomings regarding prevention and management of environmental risk, as emerged after the 2016 Central Italy seismic event (seismic crater between 4 regions: Abruzzo, Lazio, Marche and Umbria) (Fig.1).

Despite some legislative innovations matured in the regional contexts (Umbria LR n. 11/05, Marche LR n. 61/08, Emilia-Romagna LR n. 24/2017 and LR n. 6/2009, Calabria LR n.19/2002), it remains a strong separation between urban planning and risk planning.

The current regional laws only partially integrate the topic of prevention through ordinary planning tools for the management of the territory, with the exception of the Umbria Region which started in 2005, with L.R. n. 11/05, a path to integrate the topic of risk prevention into ordinary planning, introducing the identification of the Minimum Urban Structure (Struttura Urbana Minima - SUM) to reduce seismic vulnerability on an urban scale, and implement objectives and risk mitigation interventions, a path that in the general scheme led to the definition and approval of the programmatic lines of the "Multi-risk prevention coordinated regional plan" (DGR n.859 / 2018).

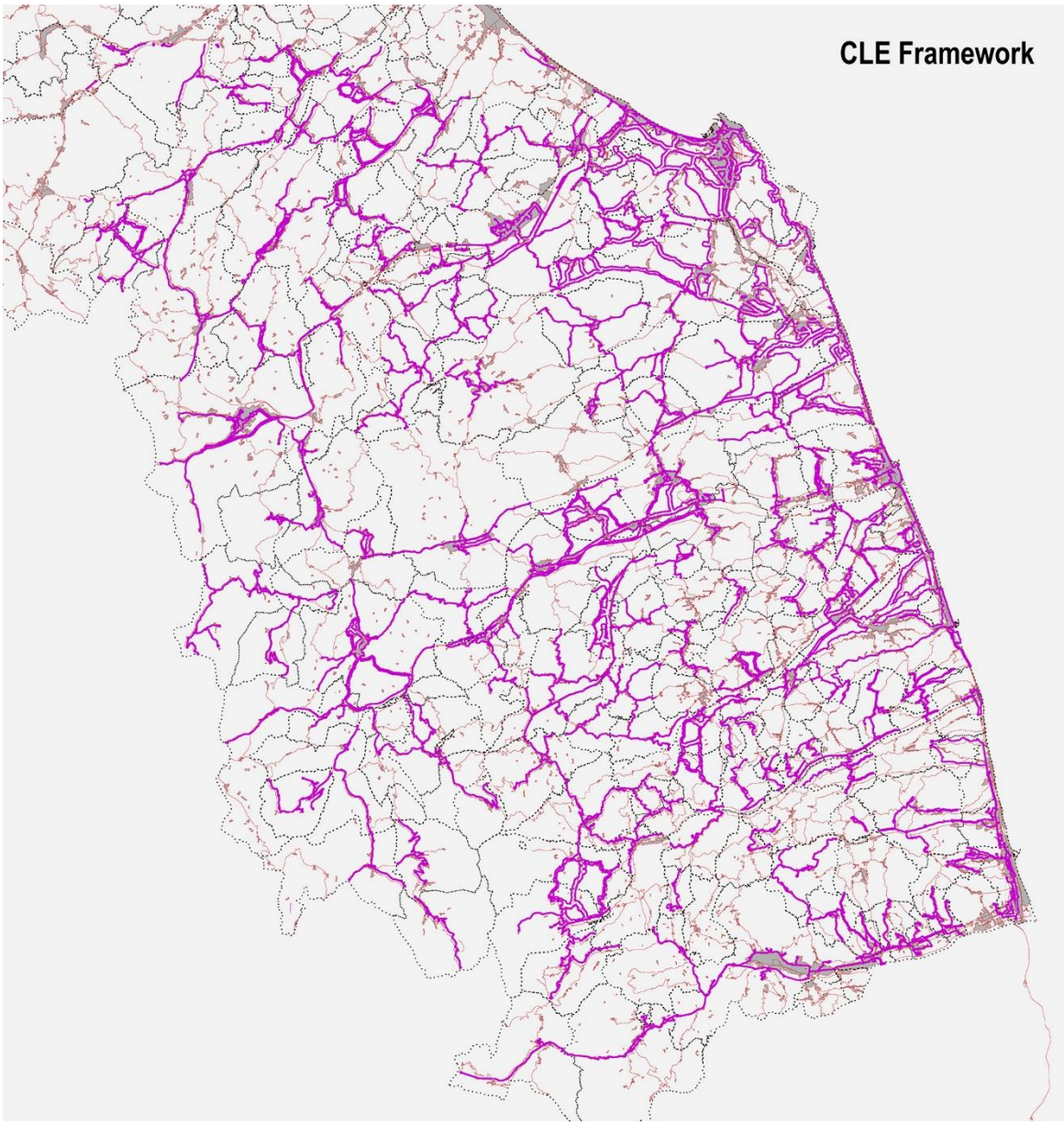

Fig.9 Regional Mosaic for Emergency Limit Condition (CLE). In orange connective and accessibility infrastructure included in CLE; in red the gaps between CLE regarding neighbouring municipalities. Retrieved from : https://www.regione.marche.it/Regione-Utile/Protezione-Civile, Source: authors' elaboration

The general seismic and environmental damage of the urbanities cannot be evaluated as a mere sum of isolated physical damage to buildings and infrastructures, since it also implies functional damage and loss of efficiency in the social system. The approach linked to temporariness, intrinsic to the emergency phase, must necessarily be overcome in favor of systematic preparation (Sargolini, 2017) and prevention strategies, focused on accepting risk as a permanent element to deal with, and include this "strategic component" in the urban-territorial and socio-economic project of the rebirth of territories, paving the future regarding spatial, hierarchical and functional choices for the planning of cities and territories (Domenella, 2019).

This study analyses the seismic crater of the Marche Region, focusing on the current state of drafting and implementation of the tools to support safety.
To achieve the goal of raising the level of security of the territories it is necessary to overcome the current municipal fragmentation regarding the safety project and to use the tools (CLE, PEC, MS) as guiding framework for the construction of a new and complex urban-territorial balance (Marinelli, 2018).
The seismic events of Central Italy 2016-17 highlighted the vulnerability of the local infrastructural system, so that the sequence of natural events affects the functionality of road infrastructures not only of local interest, but also the ones connecting the Adriatic coast to the Tyrrhenian one, often not providing an alternative route. The vulnerability of the territory is linked to the particular morphology of a mountainous area, which is composed by roads through which is not easy to reach small villages and inhabited centers scattered throughout the territory (Boni, 2018; Menoni, 2020). The main disruptions of the road infrastructures concern the opening of cracks in the road surface, subsidence and horizontal deformations. These effects are associated with the instability phenomena that involved landslide slopes and support structures. The damage caused to the road infrastructure by the Central Italy sequence is documented in detail in GEER (Geer, 2016, 2017) and Lanzo (Lanzo et al., 2019).
In the Marche region (the one hit the hardest by the 2016 events) the "safety project" consists almost exclusively of the Emergency Limit Condition (CLE), a tool that by definition represents the "Condition of the urban system under which, following the occurrence of a seismic event, even in conjunction with the occurrence of physical and functional damages resulting in the interruption of almost all the urban activities including the housing, the urban area still allows, as a whole, the operation of most of the strategic emergency activities, their accessibility and connection with the urban network "(OPCM n.4007, 2012). Even if the CLE evaluation is configured as a tool to verify the instruments of the emergency management system on a municipal scale (strategic buildings, safe areas, accessibility infrastructures), small-medium municipalities erroneously attribute to this the role of a "project", neglecting the constituent components of a project: definition of actions / interventions and their implementation (Olivieri, 2013).
The analysis and application of this tool is confined within the municipal boundary, limiting the seismic vulnerability assessments to individual centers and neglecting the territorial criticalities that may emerge following a calamitous event (Fig.4). This paradigm, gives rise to a fragmentation in the territorial safety project, in which the connection with the infrastructural systems on a regional scale is not always guaranteed. The peripheral urban systems are exposed to the "risk of isolation" in the event of a calamitous event, a condition found in 2016 following the earthquake, in which the secondary road infrastructures went into crisis, with many inconveniences for those living in the areas.

6. Conclusions and working trajectories: Risk prevention and territorial security in the re-population project

The integration between prevention tools, territorial development/revitalization strategies and ordinary planning for territorial management can no longer be postponed, there is a need to rethink new urban-territorial balances in the fragile territories of the seismic crater of Central Italy, with the goal of preserving the Italian historical environmental heritage. Overcoming the sterile debate on "where it was as it was", it is possible to outline cross-disciplinary principles and common elements, to define the foundation of the reconstruction actions:

- operating in areas hit by recent earthquakes means combining the "re-construction" plan with a "re-housing" project based on innovative tools and strategies in which prevention, urban quality and safety take on a complementary role for the regeneration of territories in crisis;

- accepting the risk and seismogenetics of the territory as a permanent factor to deal with is a necessary prerequisite to undertake the technical-cultural leap at the base of the process of reconstruction in Central Italy.

Highlight the gap, in temporal and economic terms, between the goals and desires of the citizens, and their possible fulfilment (Bronzini et al., 2017) and define concrete operational responses;

Develop a systemic risk prevention project, integrated into reconstruction plans and activate general planning for permanent preparedness of the fragile territories of the Central Apennines.

It is clear that the topic of safety should be addressed together with a multi-risk approach, focusing on places and communities, analyzing the various components that can affect the level of safety (Fig. 6 and 7). It is necessary to overcome the approach linked to homogeneous and undifferentiated policies on the national territory, in favor of targeted policies, defining specific action for each specific risk situation embedded in the site, taking into consideration the living conditions and customs of the communities that live in the area. As with all policies for inner areas, it should be noted that the entire system of interventions in transport that can be activated with the SNAI would greatly benefit from greater attention in national sector policies. Today these policies are unbalanced, leaning toward the centrality assigned to large urban areas and based on efficiency regulations that are "blind" to the territorial diversity of our country. Without reasonable criteria of flexibility, the planning and reorganization effort that the territories are putting in place risks to penalize transport services in inland areas.

The reconstruction strategy, profiting from the significant lever of public investments and from an integrated vision between material reconstruction and sustainable economic development, can be seen as "a politic among policies", without any ambition to replace them in a model of "mega-programming", for which the institutional and political prerequisites do not exist, but by practicing every form of dialogue and coordination for the achievement of common objectives.

The reconstruction involves a coherent reinterpretation of these policies with a goal to orient the implementation processes towards a successful strategy for the regeneration and development of the whole crater area, starting from its criticalities and strengths. For this reason, the reconstruction process is more effective and synergistic with SNAI's objectives when it defines interventions on minimum infrastructures for the repopulation.

The reactivation of the areas of the earthquake depends on a process of restitution and generation of value in territories that have been compromised by a sequence of events and crises that conditioned the capacity to generate value. Nonetheless, these territories can recover their capacity with combined systemic actions, capable of fostering recovery and eco-sustainable regeneration, based on the qualities present in the different geographical areas.

The idea that moves the PNRR program is that a successful use in Italy of the Recovery Plan related funding is only possible if it is first of all able to restore vitality and industriousness to those local communities that have been hit by the effects of a crisis that is now more than ten years old, removing the shortcomings in terms of infrastructures and determining real benefits for those who want to live and invest in these places, through the promotion of services and infrastructures capable of overcoming diseconomies and difficulties that have occurred in the recent years, which have reduced the population and the intensity regarding economic activity and social relations.

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Image Sources

Fig.1: Ordinanza PCM 3519 / 28 April 2006, All. 1b, Seismic risk referred to national territory and project areas selected by the inner areas technical comity, 2019, Authors' Elaboration;

Fig.2: Source: Nazional Law n. 229/2016, All.1-2, Authors' Elaboration;

Fig.3: Source: Nazional Law n. 229/2016, All.1-2, Authors' Elaboration;

Fig.4: Visso municipality, Marche Region, photographic documentation of the damage;

Fig.5: Retrieved from: http://statistica.regione.marche.it/, Source: Authors' Elaboration;

Fig.6: Retrieved from: http://statistica.regione.marche.it/, Source: Authors' Elaboration;

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