



What futures for the Apennines? The anthropo-systemic value of mountainous inner areas

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ABSTRACT

This paper contributes to the debate on the future of mountainous inner areas experiencing chronic depopulation by evaluating the costs and benefits of their abandonment. To this end, our analysis surveys and assesses their unique territorial capital—both in its tangible and intangible elements—that is often neglected or trivialized, especially in the economic debate. We refer to these characteristics as Anthropo-systemic assets and values, namely local factors activated by local communities whose existence is threatened by the ongoing depopulation process they are experiencing. Against this background, we provide a case study regarding the 2016–17 seismic crater in Central Italy which suggests that abandoning these areas represents a local and collective net loss, even from a public budget perspective. Instead, enhancing the liveability of these contexts is essential for regenerating and reactivating their territorial capital that would otherwise be irretrievably lost.

1. Introduction

This paper aims to contribute to the debate on the future of mountainous inner areas³ affected by long-term demographic shrinkage (European Parliament, 2018), which threatens the viability of local communities. Some European regions, in fact, are facing a potential “nightmare scenario” (Davoudi et al., 2010), where a drastic population decrease could lead to societal collapse (Brozović, 2023) and to the loss of several local assets accumulated over centuries (Dematteis, 2016). Settlement hollowing, thus, poses a serious threat to social and territorial cohesion (Pezzi & Urso, 2017), raising major concerns in terms of socioeconomic (Wang et al., 2020), cultural heritage and biodiversity impacts (Rey Benayas et al., 2007). Inner areas, in fact, represent complex systems, shaped to a great extent by multiple socio-ecological relations (Mareggi & Lazzarini, 2024). This is particularly evident in the Mediterranean cultural landscapes, which resulted from a centuries-old coevolution between humans and nature (Lloret et al., 2024).

Nevertheless, most of current literature lacks of analytical depth. Future scenarios are often designed according to partial (Van Assche et al., 2021), biased and stigmatizing metrics (Sisson, 2021) that relegate mountains to fragile, unproductive and empty areas,

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³ Hereafter also labelled as inner areas.

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condemned to a dramatic decline (Syssner, 2022). This stereotyped view justifies controversial top-down policy and fuels a fatalistic “culture of depopulation” among the residents (Bryant et al., 2011).

On this background, our work has two meta-objectives: 1) to identify and quantify both the market and non-market value of the territorial capital in inner areas, highlighting potential losses and gains associated with deanthropization; and 2) to contribute to the long-lasting debate on balancing territorial competitiveness and cohesion (Fratesi & Perucca, 2019). In this regard, the challenges in implementation and effectiveness of cohesion policies (Rodríguez-Pose, 2013) should not detract from the importance of addressing this issue, urging policymakers to enhance these policies’ robustness and responsiveness to local needs.

Starting from the definition of territorial capital, we encapsulate natural and semi-natural capital, cultural heritage, and economic activities like farming and tourism-related ones in the concept of Anthro-systemic value, namely the unique and multidimensional value of place-based resources activated and preserved by local communities. This concept is particularly relevant to the dense networks of small villages in the Italian Apennines at risk of abandonment, which constitute the focus of our analysis. We provide empirical evidence to these arguments through a two-step process: first, by identifying the municipalities at risk of abandonment (MRA); and, second, by evaluating the Anthro-systemic value of these MRAs.

The remainder of the article is as follows. We first discuss the potential risks of settlement hollowing and contextualize the notions of territorial capital and Anthro-systemic value. Next, we assess the costs and potential benefits associated with the extreme assumption of their abandonment and subsequent desertification. Finally, we discuss the results and offer some policy suggestions.

2. Depopulation of inner areas: are we close to a critical crossroad?

A substantial portion (almost 60 %) of European NUTS 3 regions classified as Predominantly Rural or Intermediate by adopting the Eurostat (2019) classification have experienced a prolonged structural demographic decline (Syssner, 2022), leading to economic function loss and population aging (Amcoff & Westholm, 2007). This unbalanced age structure has been exacerbated by exogenous shocks like the 2008 Great Crisis (Reynaud & Miccoli, 2019) and recurrent natural disasters (Wang et al., 2020), predominantly affecting mountainous rural areas (Jiang et al., 2016). Moreover, the situation is expected to worsen further in the coming years. According to Istat’s 2023–2043 demographic projections for Italian municipalities exceeding 5000 inhabitants in 2023, the only three towns between 5000 and 10,000 residents within the 2016–2017 seismic craters—Camerino, Cittaducale, and Montorio al Vomano, are projected to experience continued depopulation and aging. Their median scenario forecasts a 10 % population decline over the next decade and a 20 % decline over the next 20 years, alongside significant aging. The old-age dependency ratio is expected to increase from the current 0.45–0.58 by 2033 and to 0.73 by 2043. By 2043, one-third of the population in these towns will be over 65 years old, with 18 % over 75 years old (Table A, Appendix).

The aging process is likely to be even more pronounced in the smaller villages within the seismic crater, which already have an older age structure than these three larger municipalities. The direct and mutually reinforcing relationship between depopulation and aging will probably create a vicious cycle of facility closures, essential service shortages, further outmigration, and land abandonment. This pattern threatens the demographic, economic, and social sustainability of many settlements (Reynaud & Miccoli, 2018, 2023) and could become irreversible once a certain threshold is crossed.

These criticalities have been increasingly considered as relevant issues both at the EU level, committed to the principle of “leaving no place and no one behind” (Proietti et al., 2022), and at the Italian level, with the adoption of the SNAI (Strategia Nazionale per le Aree Interne, National Strategy for Inner Areas; Barca et al., 2014). However, since the effectiveness of cohesion policies remains still controversial (Rodríguez-Pose, 2013), there is potentially room for different medium-term strategies. Lloret et al. (2024) summarise five alternative options to manage rural depopulation: 1) non-intervention; 2) maintenance of the historical landscape configuration; 3) active conservation; 4) extensive, sustainable land use; and 5) intensified land use, each of them characterised by a specific demographic and ecological impact.

Among these options, the non-intervention strategy can result from deliberate choices routed in both the economic and ecological fields. Settlements abandonment, for instance, can be aimed at rewilding a given area (Navarro & Pereira, 2015). However, the ecological literature is controversial on this point. Most conservationists, concerned about the negative impact of human beings, highlight the environmental benefits of the settlement hollowing (Navarro & Pereira, 2015; Ustaoglu & Collier, 2018) whereas other scholars cast doubts about the functionality and possibility of recreating wilderness areas in distinctively anthropized settings (Gross, 2008). Recent studies highlight that location matters in this regard. Northern European forests are more suited to rewilding (Van der Zanden et al., 2017), while this choice poses ecological concern about extensive shrublands, fire risks and landscape homogenization despite of the limited carbon sequestration in Mediterranean mountains (García-Ruiz et al., 2020; Ustaoglu & Collier, 2018). As for the economic field, although at present it lost momentum, especially after the 2008 crisis and the Covid-19 pandemic, non-intervention strategy basically refers to the people-based (or space-neutral) approach (Glaeser & Gottlieb, 2008). This option suggests that public investments should be headed where their returns are higher, and thus towards dynamic urban areas, most suited to contemporarily generate and benefit from agglomeration economies and innovation.

Apart from a few recent ecological contributions recognizing that “ecological and social dimensions should not be separated when assessing rural depopulation” (Lloret et al., 2024: 491), most of the conservationist and economic literature lacks the necessary integrated, holistic view. Economic literature, in particular, largely consists of short-range, one-dimensional analyses (Mareggi & Lazzarini, 2024) that fail to exhaustively evaluate plausible alternatives.

In addition, while the causes of depopulation are well-known, the economic literature often lacks a comprehensive assessment of the costs associated with irreversible deanthropization in slow-burning inner and mountain regions (Pike et al., 2010). These areas, often described as “geographically remote, economically marginal, politically powerless, and socially inhomogeneous” (Blowers &

Leroy, 1994: 203), are considered futureless (Mareggi & Lazzerini, 2024) due to the lack of infrastructure, social capital (Leibert & Golinski, 2016), effective institutions (Tödting & Tripl, 2005) and essential services provision (Barca et al., 2014). However, despite these challenges, some scholars argue that the potential of inner areas is underestimated due to the predominant focus “on metropolitan or economically growing regions” (Gormar & Lang, 2019: 488) and the subsequent adoption of biased, place-blind metrics. This underscores the necessity for a comprehensive analysis of the multidimensional value of mountainous inner areas, considering contextual factors and path-dependent processes that shape local development (Webber et al., 2018), particularly as globalization has increasingly emphasized the importance of local level peculiarities.

2.1. Territorial capital and Anthro-systemic values

Assessing the multidimensional value of mountainous inner areas requires a holistic approach grounded on various academic disciplines, including anthropology, economics, geography, and sociology. To this end, we adopt the territorial capital approach, originally developed to evaluate competitiveness in terms of economic growth and development objectives at the EU regional level, within the context of labour and capital hypermobility driven by globalization (Bristow, 2010; De Rubertis et al., 2019). In 2001, the OECD (2001) highlighted the growing importance of territorial units in explaining development gaps, shifting the focus from the national to the regional level. OECD noted that each area has its own “territorial capital” based on local geography, climate, traditions, business networks, and social capital. Subsequently, the definition of territorial capital was enriched by the contributions of several scholars. Ventura et al. (2008) referred to the stock of place-based, tangible and intangible resources considered as common goods for local communities, thus producing collective benefits (Dematteis & Governa, 2005).

Finally, Camagni (2009) and Camagni and Capello (2013), aimed at operationalising the notion, proposed a taxonomy of territorial capital (Fig. 1) disentangling the set of local assets according to their characteristics of materiality (tangible, intangible or belonging to an intermediate mixed category) and rivalry in their use (public, private and impure public or “club goods”). Public goods, for instance, exhibit low rivalry because one person’s use does not diminish the ability of others to use the same good., as exemplified in Fig. 1. Private goods, on the contrary, have a high level of rivalry, since their consumption by one person makes the good unavailable for another consumer.

The different mix of these elements creates specific configuration of territorial capital at the local level, shaping regional performance (Camagni & Capello, 2013), sustainable development strategies (Ruiz Pulpon & Canizares Ruiz, 2020), and regional identity (Capello, 2019). The focus on the regional level, however, hides dramatic territorial heterogeneities, calling for the assessment of territorial capital at a sub-regional level (Benassi et al., 2021).

Although some efforts have been made in this direction (Castelnovo et al., 2020), such quantification remains challenging due to the lack of appropriate proxies, the heterogeneity of assets requiring specific measures, and scarce data availability at a finer spatial scale (Camagni, 2017). This task is even more crucial in inner areas, due to the peculiarities territorial capital gets there. First, its strong decreasing returns to scale (Camagni, 2017) imply heterogenous effects depending on the concerned territorial context. Closing down a factory or a museum in a depopulated area, where they are relatively scarce, has a greater impact than in an urban area. Second, several local assets in inner areas consist in tangible non-market goods and services. Farmers and rural entrepreneurs, in fact, even though linked to the market, also act as providers and custodians of public goods with no market value and for which they receive no compensation, such as in the case of the ecosystem services⁴ (Regoli et al., 2019). Third, many mountainous inner areas, particularly along the Apennines, have preserved their local identity—cognitive, relational, and cultural—more than other types of settlements over the past century (Morettini & Compagnucci, 2024). This suggests that their tangible and intangible assets could be more deeply intertwined with local contexts, further accentuating the non-mobility characteristic of territorial capital. Finally, it is worth noting that the main question TC aims to respond is how local resources can support local communities to meet their needs and goals (De Rubertis et al., 2019). However, in a situation where the survival of local communities is at risk, that question should be reversed in how can local communities continue providing and maintaining local resources to meet their needs.

Based on these considerations, we propose the notion of Anthro-systemic value to contextualise territorial capital in mountain inner areas. This framework is useful not only to realise the complexity of interdependencies between services and human beneficiaries (Department of the Environment, Water, Heritage and the Arts, 2009), but also to understand that under specific circumstances their value is intrinsically tied with the presence of local communities. Their collapse, in fact, will be inexorably mirrored in the halting or decreasing of the production of local resources, with negative local and supralocal effect: ancient houses require dwellers, cultural heritage needs custodians and visitors, and fields need farmers, herdsman, and livestock breeders. A scheme of the theoretical framework is presented in Fig. 2.

These elements may positively influence economic resilience (Fratesi & Perucca, 2019) or even stimulate endogenous development, but only in so far as the presence of residents is provided. In other words, these assets have not only an intrinsic existence value (Attfield, 1998) but also a use value which generally can be exploited only in a specific setting. These resources, and the positive externalities they trigger, hence, will be likely lost forever without their owner communities, unlike less place-based activities, that can

⁴ With ecosystem services we intend those identified by the Millennium Act (Millennium Ecosystem Assessment, 2005) and split in four categories: 1) provisioning services (i.e. food, water, timber, wood fuel, plants, medicinal benefits); 2) regulating services (i.e. pollination, decomposition, water purification, erosion and flood control, and carbon storage and climate regulation); 3) supporting services (photosynthesis, nutrient cycling, the creation of soils, and the water cycle); 4) cultural services (local culture and knowledge, music, art, architecture born from interactions with nature, recreation).

Rivalry	High rivalry	<u>Private fixed capital stock</u> Pecuniary externalities (hard) <u>Toll goods</u> (excludab.) c	<u>Private relational know-how in:</u> - firms' external linkages - transfer of R&D results - <u>university spin-offs</u> i	<u>Human capital:</u> - entrepreneurship - creativity - private know-how Pecuniary <u>externalities</u> (soft) f
	(club goods)	<u>Proprietary networks</u> <u>Collective goods</u> (commons): - landscape (rur./urb.) - cultural heritage ("ensembles" : historical centres) b	Cooperation networks: - strategic alliances in R&D and knowledge - p/p partnerships in large develop. schemes <u>Quality of institutions</u> Governance on land and cultural resources h	<u>Relational capital (associationism):</u> - cooperation capability - collective action capability - collective competencies - Identity e
	(impure public goods)	Resources: - natural cultural (punctual) Social overhead <u>capital:</u> - infrastructure a	<u>Accessib./Connectivity Agglomeration and district economies</u> <u>Local receptivity-enhancing conditions</u> <u>Agencies for R&D transfer/transcoding</u> g	<u>Social capital (civiness):</u> - institutions - behavioural models, values - trust, reciprocity - reputation d
Low rivalry	(public goods)	(hard)	(hard + soft)	(soft)
Materiality				

Fig. 1. The matrix of territorial capital. Source: Camagni (2009).

be displaced towards other locations where they can be more effectively exploited.

Moreover, the concept of Anthropo-systemic value draws inspiration from ecosystem services, accounting for the positive externalities provided by human presence to their habitat. This is the case of the Italian Apennines, which are shaped by a centuries-long coevolution between humans and nature, resulting in specific semi-natural landscapes and cultural heritage (García-Ruiz et al., 2020; Van der Zanden et al., 2017). These landscapes, characterized by agro-sylvo-pastoral activities, ecosystem services, and a unique local identity, still play vital economic, social, environmental, and aesthetic functions (Lucatelli & Storti, 2019). It, thus, entails a systemic approach to jointly address environmental, economic and social goals (Arora-Jonsson, 2023; Atkinson, 2019). Failing to consider these elements can lead to poor sensitivity to local contingencies, resulting in biased expectations and ineffective policies (Markey et al., 2008). It can also prevent the inclusion of embedded resources in local planning, despite their potential role in promoting endogenous development (Sørensen, 2018).

Following these considerations, the empirical section will focus on both inherited basic resources, such as natural, artistic, and cultural heritage, as well as on assets with a strong place-based characterization, such as agriculture, farming, and tourism.

3. Data and methodology

3.1. The choice of the case study: municipalities at risk of abandonment (MRA)

MRA have been sought among the municipalities struck by the 2016–2017 Central Italy earthquake sequence. The “Amatrice-Norcia-Visso” seismic sequence began the August 24 2016, with epicentres between Accumoli (RI) and Arquata del Tronto (AP), affecting 62 municipalities of Lazio, Marche, Umbria and Abruzzo regions (Decree Law of October 17, 2016, no. 189), followed by those of 26 and 30 October 2016, which hit other 69 municipalities (Decree Law of November 11, 2016, no. 205). Lastly, the earthquake of 18 January 2017 further expanded the seismic crater by 9 municipalities (Decree Law of April 10, 2017, no. 84),

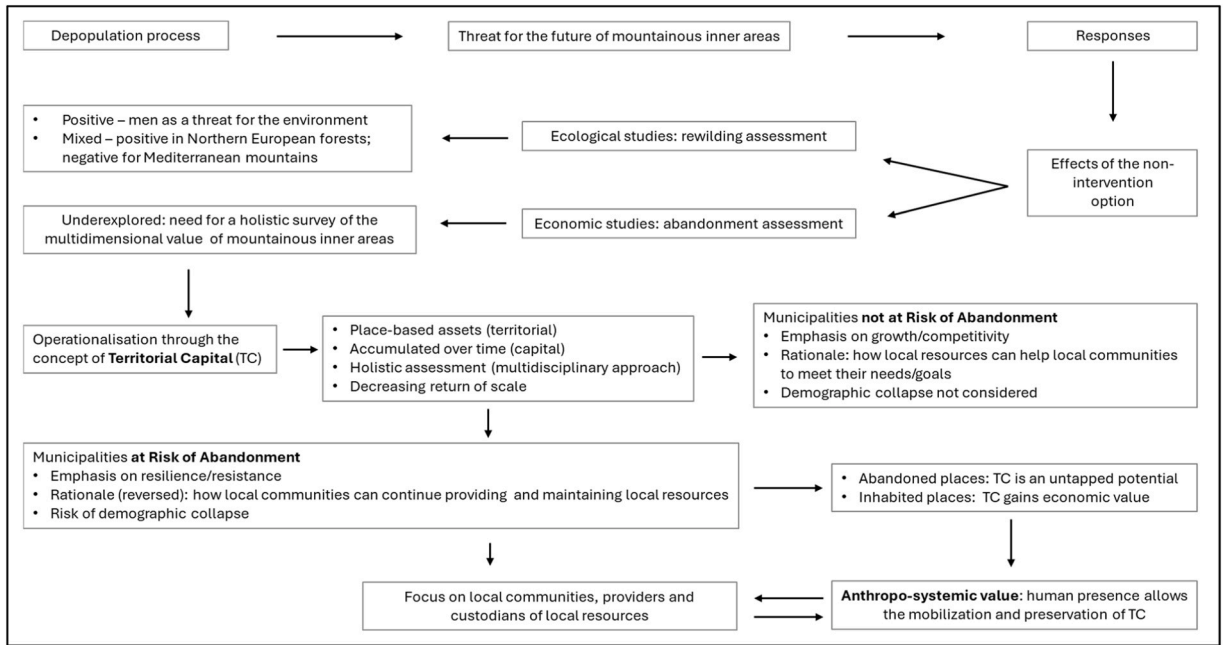


Fig. 2. Theoretical framework.

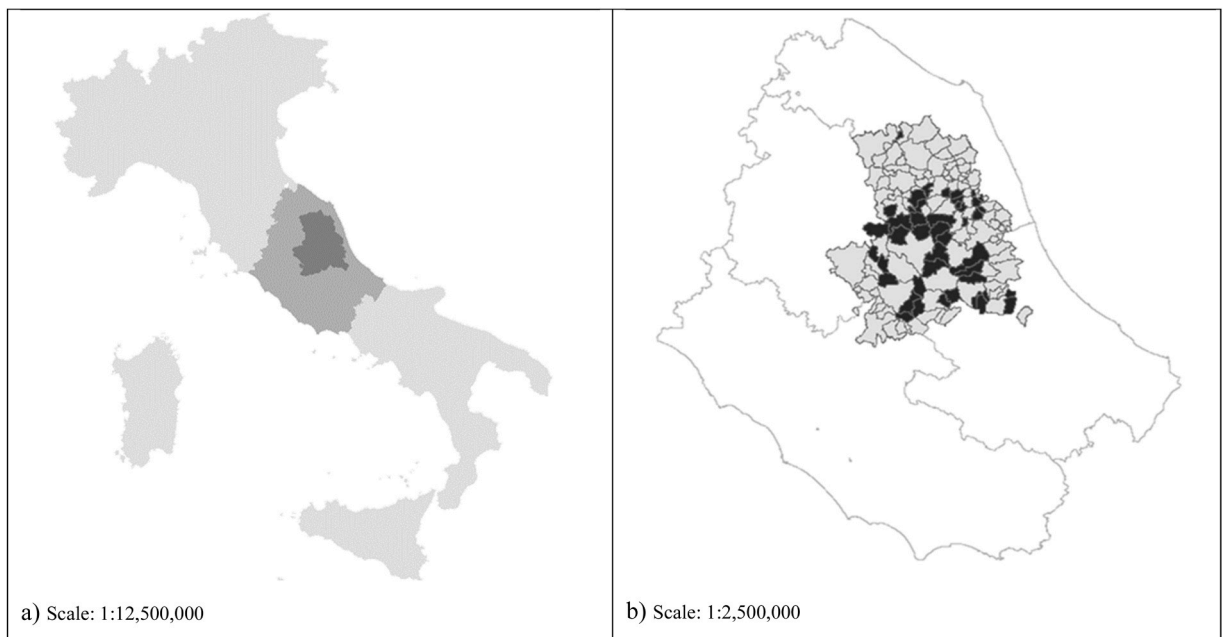


Fig. 3. The seismic crater area in the national and regional contexts. a) dark grey: the crater area within Umbria, Marche, Lazio and Abruzzo regions (grey) and the Italian context (light grey). b) light grey: municipalities included within the seismic crater; black: MRA.

bringing the total number of municipalities included in crater area to 140 (Fig. 3a). This area, longitudinally crossed by the Central Apennines, covers a surface of approximately 8000 km² inhabited by about 600,000 people living in 140 municipalities.

It is a prevalently mountain region where 75.4 % of municipalities are classified as totally mountainous and 6.5 % as partially mountainous.⁵ Although the crater hosts the provincial capitals of Teramo, Macerata, Ascoli Piceno and Rieti, its settlements' fabric is

⁵ <http://www.simontagna.it/portalesim/comunimontani.html#LetteraC>

markedly polycentric and dominated by small-sized municipalities: those with less than 2000 inhabitants account for 68 % of the total population (Compagnucci & Morettini, 2020).

The crater resulting from the 2016–17 seismic sequence is the quintessential of remote inner and mountain areas, with few flat and fertile soils, scarce accessibility, a harsh climate and rugged orography. Population shrinkage is, here, particularly intense, as well as the risk of abandonment. Furthermore, this is one of the most seismic areas in Europe (Zullo et al., 2020), where endogenous and exogenous shocks both add up in causing decline and potentially driving to a definitive settlement abandonment (Dottori, 2024). The 2016–2017 earthquakes caused the material destruction of several mountain villages, the temporary population displacement in the coastal areas which, in some cases, has become permanent, and the magnitude of the reconstruction costs, leading Central Apennines close to the collapse of their settlement structure. Local communities are therefore increasingly pervaded by a resigned fatalism that makes mountain abandonment inevitable and sometimes desired in the view of rewilding.⁶ Lastly, it hosted a homogeneous and original civilization, organised according to a polycentric settlement model based on villages which date back to the 12th–13th centuries (Wickham, 1988) and left for posterity a huge cultural, architectural, and historical heritage. These “in-between places”, neither densely populated human settlements nor pure wilderness areas (Bryant et al., 2011), reflect the experience of many mountains, especially those in the Mediterranean region (Collantes, 2009).

MRA were selected according to the following criteria:

1) they belong to the category of inner areas. According to the SNAI, they are characterised by low accessibility to basic services, such as health, education, and transport (Barca et al., 2014);

2) their resident population at 2015 must be lower than 1334 inhabitants (the average population of inner areas' municipalities within the seismic crater with less than 5000 inhabitants);

3) they must have experienced a population loss between the 1951 and 2011 censuses higher than 47,7 % (the average population loss of inner areas' municipalities within the seismic crater with less than 5000 inhabitants). This criterium indicates a chronic loss of population in a territory that could be affected by “slow burn” (Pike et al., 2010);

4) the share of population over 65 and above at 2015 exceed the 25 %, since aging is a main driver of settlement decline (Recaño, 2017).

Based on this algorithm, 42 MRA have been identified (Fig. 3b and Tab. B in Appendix), representing the area of the seismic crater at higher risk of abandonment.

3.2. The anthropo-systemic value of MRA

The second step of the analysis consists in estimating costs and benefits related to the existence of MRA. With respect to the taxonomy proposed by Camagni and Capello (2013), we mainly focus on tangible goods (private fixed capital stock, landscape, cultural heritage, natural and punctual cultural resources). This choice basically responds to three stylised facts: first, these goods are still widespread within inner areas, whereas mixed goods (such as relational density and agglomeration externalities) as well as intangible goods (human, relational, and social capital) have become increasingly scarce, weakened by decades of socioeconomic marginalisation. Secondly, many of them are not priced by market mechanisms, and consequently, do not generate direct monetary flows. The difficulty in translating their value in monetary terms resulted in their marginalisation within the economic discourse, although the crucial role they have also, but not only, in the economic domain. Finally, tangible assets, such as cultural heritage and landscape, importantly characterize and affect local development patterns interacting with the more intangible ones. Since they are physical representation of a place, they inherently carry intangible meanings, deeply linked to territorial identity and the sense of belonging (Cerisola, 2019).

This situation is presented in Table C (see Appendix), showing a comparison between MRA and the other municipalities of the same provinces. The results show that MRA are poorer in both social capital (indicated by lower electoral participation and a reduced propensity to volunteer) and human capital (lower education level and entrepreneurial rate). This does not imply that intangible goods are not important or completely absent in MRA, as the substantial presence of commonalities, cooperation networks and collective goods demonstrates. However, from a static perspective, the impact of a definitive loss of their mixed and intangibles goods, in which inner areas are poorer, would be less substantial than the loss of tangible goods, in which they are comparatively richer. In addition, it is worth noting that many of these assets overlap with those assumed providing ecosystem services, as previously defined.

To operationalise these considerations, we assume the extreme hypothesis of a complete depopulation of MRA. Subsequently, we first adopt a public budget perspective accounting for the savings and losses resulting from their abandonment (1). Secondly, we provide a monetary assessment of MRA's Anthropo-systemic value based on agricultural (2), livestock (3), real estate stock (4), core touristic activities (5) and agricultural landscape values (6). Finally, we discuss the importance of cultural heritage (7) and ecosystem services (8). While we do not provide a direct monetary valuation of these last two cases, we offer an estimate based on a national-level assessment in the discussion of results. Table 1 summarizes the variables used in the empirical section.

Finally, it is worth highlighting that both the spatial identification of MRA and their Anthropo-systemic values have been inspired by a conservative approach, aimed at minimising the extension of the concerned area and the value of its territorial assets. Data, when possible, have been collected for the year 2015, thus before the 2016–17 seismic events.

⁶ <https://rewildingeuropa.com/>

Table 1
Proxies considered to assess the Anthro-systemic value of MRA.

Proxy	Source	Year
Cost related to public budgets	Open bilanci - Open Municipal Budgets	2010–2014
Residents' individual income subject to taxation	Ministry of Economy and Finance	2015
Agricultural activities	Istat, Census of Agriculture; Italian Revenue Agency	2010; 2015
Animal production	Istat, Census of Agriculture; CRA-INEA	2010; 2015
Building stock	Istat, Census of Population; Italian Revenue Agency	2011; 2015
Tourism activities: accommodation and food	Istat, database ASIA - employees and firms; Istat, Capacity of collective accommodation establishments by type of accommodation and municipality; Marche Region tourist observatory; Enterprises economic indicators - regional level	2015
Agricultural landscape	Ciaian & Gomez y Paloma (2009); Istat, Census of Agriculture	2010
Historical and cultural heritage	Italian touring Club (TCD); Archive of goods of great historical interest of the Superintendence for Architectural Heritage and Landscape	2012

4. Results and discussion

4.1. Results

As stated in the previous section, the quantification and assessment of savings and losses related to the abandonment of MRA is based on the following dimensions:

1) Direct public expenditure savings (DPES). The first analysed dimension is related to one of the most common issues in the public and political debate, namely the costs for the functioning of local public administrations in remote and shrinking municipalities and the eventual direct public expenditure savings (DPES) resulting from their abandonment. (Table 2). Drawing data from “Open Bilanci” (Open Municipal Budgets⁷), public transfers (from the national level, the Region or other public institutions) to MRA amounted to about 13 million Euro on average for the 2010–2014 period, equal to 502 Euro per capita. These potential savings (avoidable costs by municipality i - AC_i), however, must be considered net of the unavoidable costs (UC_i), namely public costs which will be incurred anyway, even in case of abandonment. With UC we refer to the sole current expenses, neglecting investments or upgrading costs, as well as the maintenance of the architectural heritage, municipal paved and dirt roads, that could be use as fire break path within the woods (Mareggi & Lazzarini, 2024). In the absence of references in the literature, we propose a conservative estimate of the spending cut based solely on service provision (excluding staff costs). To assess UC, we selected the following proxies: a) costs related to the maintenance of cemeteries; b) costs referred to the maintenance of road systems and water infrastructures which, because of their systemic nature, will be partially covered by a different public administration. According to the municipal budgets of the largest MRA, the lowest percentage of service provision costs for cemeteries out of the total is 10 % (Visso). For road system maintenance, it is 35 % (Montemonaco), while for water infrastructures is 20 % (Visso). Applying these percentages to the respective total service provision expenditure results in a UC of 2,6 million Euro. In conclusion, according to [1], DPES will be equal to 10,4 million Euro.

$$DPES = \sum iAC_i - \sum i\% * UC_i \quad (1)$$

2) Agricultural activities. Although they substantially contribute to the preservation of landscape and land quality (Battaglia et al., 2019), we focus here solely on market production. To assess the agricultural activities value (AAV), which is closely linked to the work of local farmers and would cease in the absence of inhabitants (since farming, and especially animal production, require continuous human presence), we first consider the 2015 average agricultural land value (ALV)⁸ per hectare and type of crop (j) at the municipal level (i), provided by the Italian Revenue Agency. AAV is thus the sum of the monetary values of different types of croplands multiplied by the utilised agricultural area (UAA) per municipality:

$$AAV = \sum i \sum j (ALV_{ij} * UAA_{ij}) \quad (2)$$

In 2015 this amounted to 438,7 million Euro (Table 3)

3) Animal production. Like agricultural activities, animal production (AP) plays an important economic role within inner areas. Its assessment is based on the definition of Standard Output (SO) which, according to Eurostat,⁹ results from the average monetary value in Euro of the agricultural output at farm-gate price, per head and type of livestock (j). The animal production value is thus the sum of the products of SO, provided by CRA-INEA¹⁰ for the Marche region in 2010, and the number of livestock (NL) per type and municipality:

⁷ <https://openbilanci.it>

⁸ ALV are the benchmark land values used in official transaction for any type of farmland, provided by the provincial commissions of Italian Revenue Agency. <https://www.agenziaentrate.gov.it/portale/web/guest/schede/fabbricaterreni/omi/banche-dati/valori-agricoli-medi>.

⁹ [https://ec.europa.eu/eurostat/statistics-explained/index.php?title=Glossary:Standard_output_\(SO\)](https://ec.europa.eu/eurostat/statistics-explained/index.php?title=Glossary:Standard_output_(SO))

¹⁰ <https://rica.crea.gov.it/produzioni-standard-ps-210.php>

Table 2
Public costs and expected savings in the MRA, 2010–14 - Euro.

Variable	Euro	UC (% of current costs)
Public transfers or available costs-AC	13,014,669	
Resident population	25,919	
Public transfers per capita	502	
Cemeteries	102,776	(10 %)
Water service	512,577	(20 %)
Road system	2032,101	(35 %)
Unavoidable costs - UC	2647,454	
Direct public expenditure savings - DPES	10,367,215	

Table 3
Total value of farmland by crops for all the municipalities considered - Euro.

Agricultural products	Total value of farmland
Coppice woodland	91,368,762
Tall trees woodland	45,895,293
Mixed woodland	8353,546
Chestnut trees	3350,707
Orchard	15,660,965
Fallow	10,988,260
Garden	4514,256
Irrigated garden	1379,153
Grazing land containing trees	45,326,480
Shrubby grazing land	21,395,182
Grassland	90,112,813
Arable crops	79,303,017
Olive plantation	9393,359
Vineyards	11,665,880
Total value of farmland	438,707,673

$$AP = \sum_i \sum_j (NL_{ij} * SO_j) \quad (3)$$

Animal production is estimated to amount to 508,7 million Euro (Table 4).

4) Real estate assets. It is assumed that municipalities' abandonment will result in the progressive deterioration of the dwelling stock (coupled with the abandonment of public spaces) and the subsequent loss of value of residential buildings (VRB). Drawing from the 2011 Census of the Italian population, we considered the total area in square metres of dwellings occupied by residents (AREA_OCC_{ij}), by municipality *i*, and by different kinds of localities *j* (central, peripheral, scattered), and the minimum monetary value of residential buildings by municipality *i* in 2015 (MMV_i, Euro/m² by locality) provided by the OMI dataset.¹¹

$$VRB = \sum_i \sum_j (AREA_OCC_{ij} * MMV_{ij}) \quad (4)$$

The resulting VRB amounted to 648 million Euro (Table 5), reflecting the potential monetary loss caused by settlements desertion which, once announced, is expected causing a sudden slump of VRB. It is also worth noting that this value refers to only 34,5 % of the total building stock, the majority of which consists of unoccupied dwellings. These are usually used as second homes paying a higher municipal tax on immovable property than primary residences.

5) Core tourism activities. It is assumed that the deanthropization of MRA will lead to the collapse of the local tourism industry. While this assumption is strong, it is nevertheless true that the abandonment of a municipality will result in the discontinuation of water, energy, and gas supply, making it particularly challenging to provide standard touristic services. To estimate their economic value, we considered accommodation and food service activities. Regarding the value of accommodation service (VAS), we multiply the number of Italian (*ita*) and foreign (*for*) tourists (NPRES_i) in each municipality, by their accommodation expenses (ACC_i) and extra-expenses (EXP_i):

$$VAS = \sum_i [NPRES_{i,ita} * (ACC_{i,ita} + EXP_{i,ita}) + NPRES_{i,for} * (ACC_{i,for} + EXP_{i,for})] \quad (5)$$

Based on [5], accommodation generated a monetary value of 13,4 million Euro (Table 6).

As for the value of food service at the municipal level *i* (VFS_i), we considered the number of their employees (EMP_i) in 2015,¹² and

¹¹ The Italian Revenue Agency provide six-monthly real estate quotations that identify, for each homogeneous territorial area (OMI area) of each municipality, a minimum/maximum range per unit area (in euros per square meter) of market prices, by type of real estate and state of conservation.

¹² Istat, ASIA database.

Table 4

Total value of livestock for all the municipalities considered - Euro.

Type of livestock	Number of livestock	Per capita value of livestock	Total value of livestock
Bovines > 1 year-old	2379	1265	3009,435
Bovines 1–2 year-old, female	901	740	666,740
Bovines 1–2 year-old, male	373	593	221,189
Bovines > 2 year-old, male	118	692	81,656
Bovines > 2 year-old, dairy heifers	1524	558	850,392
Bovines > 2 year-old, heifers for slaughter	152	558	84,816
Bovines > 2 year-old, dairy cows	1649	558	920,142
Bovines > 2 year-old, cows for slaughter	2788	1844	5141,072
Equine population	2000	649	1298,000
Sheep	63,917	293	18,727,681
All other ovine	6943	113	784,559
Goats	2402	306	735,012
All other caprine	365	57	20,805
Pigs < 20 kg	741	299	221,559
Pigs 20–50 kg	590	575	339,250
Pigs > 50	15,052	575	8654,900
Boars	29	575	16,675
Sows	220	167	36,740
Other sows	0	167	0
Broilers	174,200	2016	351,187,489
Laying hens	33,157	2786	92,375,008
Turkeys	3653	5761	21,042,323
Guinea fowl	80	1101	87,532
Geese	165	1678	276,337
Other poultry	94	1101	103,788
Rabbits	31,845	56	1783,320
Apiculture	1586	44	69,784
MRA	-	-	508,736,204

Table 5

Total value of the occupied dwellings – Euro.

Code Istat	Municipality	Occupied dwellings	Total dwellings	% occupied dwellings	Area (m ²) of dwellings occupied by residents	Value of occupied dwellings
	MRA	11,817	34,241	34.5	1188,278	648,591,720

Table 6

Total value of accommodation and extra-expenses of Italian and foreign tourists - Euro.

Tourist per provenance	Number of presences	Accommodation expenses per tourist	Total accommodation expenses	Extra-expenses per tourist	Extra-expenses	Total
Italian	128,902	37	4769,374	31	3995,962	8765,336
Foreigner	54,545	38.5	2072,710	47	2563,615	4636,325
MRA	183,447		6842,084		6559,577	13,401,661

the amount of the regional turnover in food service activities (RTFS) per employee for Abruzzo, Umbria, Lazio and Marche region¹³ in 2015. We finally selected the Abruzzo's turnover (the lowest value, equal to 44,000 Euro/employee) multiplied by the number of employees (436).

$$VSF = \sum_i (EMP_i * RTFS) \quad (6)$$

Food service activities generated a monetary value of 16,3 million Euro.

6) Agricultural landscape. It falls into the category of public goods without market price. To estimate its value, we multiply the hectare minimum value of rural landscape (MVL_{ij}) by land type (L_{Aij}) (grassland and permanent crops, arable land) provided for 2009 by [Ciaian & Gomez y Paloma \(2011\)](#), according to a benefit transfer function based on Italian willingness to pay per hectare.

¹³ Istat, Enterprises economic indicators – regional level.

$$LNDS = \sum_i \sum_j (LA_{ij} * MLV_{ij}) \quad (7)$$

LNDS is estimated in about 16,4 million euro (Table 7).

7) Cultural capital. This asset embodies, stores or gives rise to cultural value in addition to whatever economic value it may possess (Throsby, 1999). It often involves public or common goods, physical (buildings, monuments) or intangible assets (folklore, traditional practices) that do not necessarily provide monetary revenues, including both indirect benefits to society as a whole and an existence value disengaged from its use, shaping collective identity and local landscape. We identified 15 artistic excellences in the selected area (awarded with the Italian Touring Club stars, indicating valuable places, monuments, environments and artworks), 25 museum, and 9 libraries. Additionally, we explored the database “Vincoli in rete”,¹⁴ which collects all artistic and cultural heritage under a preservation order by the Ministry for Cultural Heritage and Activities. The selected MRA include 1,852 protected assets, encompassing 692 houses, 479 churches, 171 palaces, 46 towers, 22 mills, 20 city walls, 19 bell towers, 17 sacred aediculas, 15 convents, 14 cemeteries, 13 villas, 12 castles and other types of heritage. The adoption of different metrics is the only way to include cultural heritage in the assessment of territorial capital, overcoming the difficulties in estimating in monetary terms its non-use value, which represents a major contribution to the heritage capital of inner areas (Sagger et al., 2021).

8) Ecosystem service. Assessment this type of service is particularly complex, depending on the concerned time horizon. In the long run a complete rewilding process, together with a slump in the local human activities, could lead to higher performances in terms of carbon sequestration capacity as well as in pure water and air supply. However, in the short-medium term the settlement abandonment could cause substantial drawbacks. In particular, the halting of agricultural and forestry interventions would negatively affect land maintenance during the transition to rewilding, by preventing: maintenance/restoration of the surface drainage network in agricultural areas; land stabilisation and protection from slope erosion; forest management and fire prevention; maintenance/restoration of agricultural terraces and of the minor hydrographic network (Giupponi et al., 2009). This could ultimately reduce soil stability.

To this regard, a glaring example is the Vaya tempest which severely hit Northern Italy on October 29, 2018 causing the felling of 42 million trees over an area of 41,000 ha (Motta et al., 2018). The storm more severely affected forests left to a natural regrowth process after the 1920s. Forestry management, such as leaving sufficient space among trees, would have limited such heavy damages, and allowed continued provision of ecosystem services (Tymstra et al., 2020).

Although we do not provide here a monetary value of these last two assets, the next section will supply an indirect estimate based on a national-level assessment

4.2. Discussion of the results

In the 42 selected municipalities, abandonment is not merely a theoretical concern, but the potential outcome of political decisions. We assume a sudden and irreversible abandonment of these MRA at time t , estimating the costs and benefits arising at that time. Our results show that abandonment might initially appear to be an effective strategy (Table 8). It would allow public savings for 10,4 million Euro (502 Euro per capita). This fairly modest amount dispels the clichés that small mountain municipalities are excessively costly for the public budget.

However, we must also consider that public resources allocated to inner areas could be more effectively invested elsewhere, where the “territorial interest rate” is higher, ultimately resulting in greater collective well-being. Additionally, the advantages of relocating people, employees, and firms elsewhere should not be neglected. Individual income would be taxed in a different municipality, where essential services could be provided more effectively due to economies of scale. Firms could benefit from a higher turnover due to increased agglomeration economies. In conclusion, the abandonment option could lead to a reduction in public transfers, a higher return on private and public investments and a better utilisation of currently underutilised human capital. But this is only part of the story, which must be discussed considering several potential losses. Assuming low factor mobility in the agriculture and tourism sectors, abandonment will immediately devalue fixed capital, possibly lowering investment capacity. Secondly, assuming a very conservative flat tax rate equal to 1 % for agriculture (valued at about 947 million Euro – AAV+AP) and 20 % for the tourist sector (with a turnover of about 37,5 million – VAS+VSF), the 10,4 million Euro in public savings would be lower than the tax revenues losses, amounting to at least 5 million Euro. This result questions the economic effectiveness of the abandonment option, without considering the immediate depreciation of the local building stock (valued at about 650 million Euro), the substantial losses in the cultural and historical heritage, and the short-term issues related to soil protection and stability. These factors highlight the option value of place-based assets: since abandonment is an irreversible choice, it would deprive future investors and generations of a territorial capital accumulated over time and place-bounded (Rolston III, 1985).

Our findings could be corroborated by simple (and certainly simplistic) calculations aimed at assigning monetary value to ecosystem services. The Italian Institute for Environmental Protection and Research¹⁵ recently estimated the total value of ecosystem services in Italy to be around 340 billion euros per year. According to UNCEM,¹⁶ two-thirds of these services are produced in inner areas, crediting them with a value of approximately 225 billion euros. Given that MRA cover a 1954 km² area, or 0.65 % of inner areas, the MRAs would produce approximately 1.46 billion Euros.

Theoretically, our findings show that inner areas are neither empty nor devoid of valuable assets; rather, they possess a specific

¹⁴ <http://vincoliinrete.beniculturali.it>

¹⁵ https://www.isprambiente.gov.it/files2019/pubblicazioni/stato-ambiente/annuario-2018/Dati_sullambiente_2019_Ridotto.pdf

¹⁶ <https://uncem.it/wp-content/uploads/2021/03/PNRR-e-Montagna-mar2021.pdf>

Table 7

Total value of agricultural landscape.

Code Istat	Municipality/land type	Area (hectares)		Value (thousand euro)		
		Grassland and permanent crops	Arable	Grassland and permanent crops	Arable	Agricultural total value
	MRA	44,165	20,468	12,675	3766	16,441

Table 8

Final assessment of the costs and savings related to MRA's abandonment.

Cost/Saving		Euro	Tax rate
Public contributions	A	13,014,669	
Unavoidable costs	B	2647,454	
Agricultural activities		4387,077	(1 %)
Livestock		5087,362	(1 %)
Accommodation		2680,332	(20 %)
Food services		3263,585	(20 %)
	Public balance (A-B)	−5051,141	
Agricultural landscape		16,441,372	
Occupied Dwellings		648,591,720	
Number of cultural protected assets		1852	
Number of artistic excellences		15	

territorial capital based on a unique, centuries-old interplay between natural and cultural elements. This capital is incremental and dynamic: it drops to zero with settlement abandonment, nullifying both its use and existence value. However, it can grow if repurposed in innovative ways (Magnaghi, 2020). This suggests the need to move beyond a conservative view of local assets, maintaining and enhancing them as drivers for endogenous development (Battaglia et al., 2019).

Moreover, the abandonment of the 42 MRA implies a further loss in their intrinsic value of existence and inheritance, which cannot be estimated in monetary terms. Recognizing a non-use value to MRA often confines the debate to ethics. Our analysis, on the contrary, provides an estimate of the basic use value of local assets, which could be more effectively exploited by enhancing the scarce endowment of advanced place-specific resources like education, technological capabilities and communication infrastructures (Fay, 2002).

4.3. Concluding remarks and avenues for future research

The future of the mountains will be defined by the ability to address the challenges posed by widespread settlement hollowing, leading to the irreversible loss of significant, albeit often underutilized, local assets. The demographic issue is at the forefront of political and academic attention not only, but especially, in inner mountainous areas which experienced a drastic demographic collapse. The combination of ageing and chronic population decline has triggered a vicious cycle that threatens social sustainability and the existence of small mountain settlement with highly unbalanced demographic structure, putting them at high risk of abandonment in the coming years. The situation is so critical that some areas are nearing a point of no return to the extent that they are considered without a future, as our case study has shown. While the momentum generated by the NRRP (National Recovery and Resilience Plan) has temporarily ruled out policy options such as planned abandonment or non-intervention, the early signs of a return to austerity are bringing these options back into the debate. If the effects of a possible deanthropization of these areas have been considered in environmental literature, with most recent studies questioning the rewilding option especially in the Mediterranean mountains, less efforts have been carried out in the economic field.

Faced with this scenario, our article aims to provide a holistic assessment of the costs and benefits associated with the definitive abandonment of 42 MRA in Central Apennines, actively contributing to the debate over balancing competitiveness within cohesion policies. To this end, our work also emphasizes the importance of using appropriate, non-stigmatizing metrics to assess the value of local assets. Planning future scenarios increasingly relies on quantitative metrics which, despite their apparent neutrality, convey highly contestable rationalities and a complexity reduction, extending market principles to the assessment of common goods or cultural heritage. The future of inner mountains should be thus determined through context-dependent, multidisciplinary and systemic metrics, able to recognize the peculiarities of areas characterized by a centuries-old coevolution between man and nature.

Territorial capital is the proper tool for a quantitative, comprehensive and detailed survey at municipal level of the multiple assets available in inner mountains. However, territorial capital only provides a potential value, because a large part of this capital in MRA is unused or underused due to rarefaction in economic and social relationship they experienced. It follows that in these areas, unlike urban ones, the emphasis should be primarily put on their inhabitants, who activate and preserve local resources.

The proposal of the concept of Anthropo-systemic value represents a relevant theoretical refinement in this direction, not only semantically but also ontologically. While territorial capital was initially conceived to evaluate the competitive potential of regions not at risk of desertification and to understand how local resources can help communities meet their needs and goals, the anthropo-systemic value concept flips the situation. Within MRA, in fact, competitiveness in a narrow sense is less relevant than the capacity

for resistance and resilience. The fundamental question here is to realize how local communities can continue to provide and maintain the local resources necessary to meet their own needs as well as those of the national community. As the empirical section have demonstrated, without the presence and contribution of local communities, a considerable range of goods and services would cease to be produced, maintained and distributed, given their strong territorial anchoring. Hence, the Anthro-systemic refers to the value of the services that human presence provides not only to local and super local communities, but also to the ecosystem. Besides, emphasizing the role of ecosystem services further contributes to the adoption of place-based, not stigmatizing metrics.

By avoiding a free-market logic which would have mispriced commons and ignored the untapped local potential of mountain inner areas, we attempt to give them dignity and “place consciousness” (Magnaghi, 2020), valuing assets and specificities often seen as worthless. Besides, by estimating the Anthro-systemic value of a relatively large sample of villages at risk of desertification, we fill a gap in the current literature, which rarely investigates the municipal level showing that, even from a purely budgetary approach, the abandonment of these areas is not advantageous for local and national communities.

The Anthro-systemic approach also aligns with the growing demand for regenerating mountains through place-based (Barca et al., 2014) or place-sensitive (Iammarino et al., 2019) policies. The concept of place identifies a lived-in space presupposing human presence that, in the Apennines, has represented and represents an eco-factor. We therefore support, from an economic perspective, what has already emerged in ecological studies—namely, that extensive, sustainable land use is the best response to the challenges posed by depopulation (Lloret et al., 2024).

Acknowledging the limits of this work, regarding the analysis of a single case study, the number of variables chosen, their quantification and the fact that we assume a quasi-total immobility of local resource, our next research step aims to widen the spatial dimension of the case study to the national level and the range of considered assets of territorial capital. We also intend to focus more on the intangible goods dimension, such as the common exploitation of some natural assets, which contributes to the systemic character of the mountain settings. Public goods, impure public goods, and club goods such as landscape, natural and cultural resources, can play a crucial role in facing the current issues of climate change, biodiversity loss, and hydrogeological instability.

European mountains have reached a crucial turning point. It is time to embark on original paths combining development and conservation. The future of European mountains does not lie in an anachronistic restoration of a lost past or a return to wilderness that never existed, but rather in establishing an anthropic civilization aimed at new sustainable development (Magnaghi, 2020).

A future marked by a new humanism, where humans are not a disturbance to the environment but a factor of identification, regeneration and activation of local capital. With the awareness that all that does not regenerate, degenerate (Morin, 2001).

CRedit authorship contribution statement

Gabriele Morettini: Writing – review & editing, Writing – original draft, Methodology, Formal analysis, Data curation, Conceptualization. **Fabiano Compagnucci:** Writing – review & editing, Writing – original draft, Data curation, Conceptualization.

Declaration of Competing Interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

Appendix

Table A

Population forecast for municipalities in the seismic crater under 10,000 inhabitants as of 2023

Municipality	Population			Variation %		Average age						
	2023	2033	2043	2023–33	2023–43	2023	2033	2043				
Camerino	6164	5498	4794	−10.8	−22.2	49.9	52.2	54.2				
Cittaducale	6443	5931	5452	−7.9	−15.4	48.3	50.6	51.8				
Montorio al Vomano	7438	6574	5768	−11.6	−22.5	47.3	50	51.9				
Total	20,045	18,003	16,014	−10.2	−20.1							
Age classes - absolute values												
	2023				2033				2043			
	0–14	15–64	65 +	75 +	0–14	15–64	65 +	75 +	0–14	15–64	65 +	75 +
Camerino	597	3728	1839	1016	457	3076	1965	1041	385	2478	1931	1156
Cittaducale	696	4006	1741	876	551	3421	1959	1017	543	2925	1984	1163
Montorio al Vomano	928	4539	1971	1014	653	3817	2104	1101	598	2973	2197	1220
Total	2221	12,273	5551	2906	1661	10,314	6028	3159	1526	8376	6112	3539
	2023				2033				2043			

(continued on next page)

Table A (continued)

Municipality	Population			Variation %			Average age					
	2023	2033	2043	2023–33	2023–43	2023	2033	2043	ODP	OAI	%65 +	%75 +
Camerino	0.49	3.08	0.30	0.16	0.64	4.30	0.36	0.19	0.78	5.02	0.40	0.24
Cittaducale	0.43	2.50	0.27	0.14	0.57	3.56	0.33	0.17	0.68	3.65	0.36	0.21
Montorio al Vomano	0.43	2.12	0.26	0.14	0.55	3.22	0.32	0.17	0.74	3.67	0.38	0.21
Total	0.45	2.50	0.28	0.14	0.58	3.63	0.33	0.18	0.73	4.01	0.38	0.22

ODR: old dependency ratio

OAI: old age index

%65 + : share of population over 65 years old

%75 + : share of population over 75 years old

Table B

List of the Municipalities at Risk of Abandonment (MRA)

Municipality	Region (NUTS-2)	Province (NUTS-3)	Population 2015
Accumoli	Lazio	Rieti	665
Acquacanina	Marche	Macerata	121
Arquata del Tronto	Marche	Ascoli Piceno	1230
Borbona	Lazio	Rieti	630
Campotosto	Abruzzo	L'Aquila	564
Capitignano	Abruzzo	L'Aquila	699
Castel Castagna	Abruzzo	Teramo	509
Castelli	Abruzzo	Teramo	1159
Castelsantangelo sul Nera	Marche	Macerata	293
Cessapalombo	Marche	Macerata	521
Cittareale	Lazio	Rieti	481
Cortino	Abruzzo	Teramo	655
Fano Adriano	Abruzzo	Teramo	299
Fiastra	Marche	Macerata	687
Gualdo	Marche	Macerata	823
Micigliano	Lazio	Rieti	121
Monte Cavallo	Marche	Macerata	151
Monte Rinaldo	Marche	Fermo	383
Monte San Martino	Marche	Macerata	758
Montedinove	Marche	Ascoli Piceno	503
Montefalcone Appennino	Marche	Fermo	435
Montefortino	Marche	Fermo	1196
Montegallo	Marche	Ascoli Piceno	531
Monteleone di Fermo	Marche	Fermo	398
Monteleone di Spoleto	Umbria	Perugia	25
Montelparo	Marche	Fermo	790
Montemonaco	Marche	Ascoli Piceno	638
Palmiano	Marche	Ascoli Piceno	194
Penna San Giovanni	Marche	Macerata	1121
Pietracamela	Abruzzo	Teramo	285
Poggio San Vicino	Marche	Macerata	272
Poggiodomo	Umbria	Perugia	117
Posta	Lazio	Rieti	684
Preci	Umbria	Perugia	87
Rocca Santa Maria	Abruzzo	Teramo	540
Rotella	Marche	Ascoli Piceno	896
Sellano	Umbria	Perugia	90
Smerillo	Marche	Fermo	377
Ussita	Marche	Macerata	441
Valle Castellana	Abruzzo	Teramo	1003
Vallo di Nera	Umbria	Perugia	43
Visso	Marche	Macerata	1148

Table C

Comparison between MRA and the other municipalities of the same provinces according to different variables

Year	Capital type	variable	Total	MRA	Inner areas	Poles
2015	collective	PDO (protected designation of origin) producers on resident population	0.14	0.35	0.24	0.10
2011	social	No-profit institutions on resident population	0.56	0.44	0.55	0.56
2011	social	Volunteer in No-profit institutions on resident population	10.19	9.64	10.49	10.10
2013	social	Voter turnout 2013 (political elections)	78.1	71.1	77.9	78.3
2011	social	Voter turnout 2011 (referendum)	58.2	53.2	57.9	58.4
2011	human	Primary school (% on population older than 6 year)	20.45	27.54	22.23	19.70
2011	human	High school (% on population older than 6 year)	31.52	26.57	30.47	31.97
2011	human	Entrepreneurial rate on total population	8.6	4.6	7.8	8.9
2011	relational	Cooperative firms (% on total firms)	1.3	1.8	1.4	1.2
2010	relational	Commons (% on farmland)	13.3	26.4	14.1	10.5
2012	connectivity	Households not served by wireline network (% on total)	12.4	47.2	19.8	9.1
2012	connectivity	Households served with speed in range 0–2 Mbps (% on total)	4.3	9.2	5.3	3.8
2012	connectivity	Households served with speed in range 2–30 Mbps (% on total)	37.6	42.1	54.4	31.4
2012	connectivity	Households served with speed in range 30–100 Mbps (% on total)	26.0	1.5	13.8	30.9
2012	connectivity	Households served with speed in range 100–500 Mbps (% on total)	15.9	0.0	6.4	19.6
2012	connectivity	Households served with speed in range 500–1000 Mbps (% on total)	3.8	0.0	0.2	5.2

Data availability

Data will be made available on request.

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