

ENHANCING TERRITORIAL RESILIENCE AND QUALITY OF LIFE IN POST-MINING REGIONS: THE JIU VALLEY EXPERIENCE

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Abstract

European mining regions are undergoing profound structural transformations driven by industrial decline, demographic change, and the energy transition. The Jiu Valley represents a relevant example of a post-mining region where the effects of mine closures after 1990 continue to shape demographic dynamics, the built environment, and quality of life. Massive job losses have led to sustained out-migration, particularly among young and working-age populations, along with declining birth rates and an intensified process of demographic ageing. This study analyses the relationship between population decline and housing stock degradation, using visual field observation and the interpretation of demographic indicators. The findings reveal a vicious cycle in which depopulation and residential degradation mutually reinforce each other, negatively affecting territorial attractiveness and quality of life. Nevertheless, natural landscapes and cultural heritage provide opportunities for revitalisation, while integrated interventions focused on urban regeneration, economic diversification, and the strengthening of community services can support the transition toward a more resilient post-mining future.

Keywords: quality of life, urban regeneration, territorial resilience, demographic decline, housing degradation, cultural heritage.

Classification JEL: R11, R23, J11, O18, Q01

1. Introduction and context of the study

European mining regions are undergoing major structural transformations driven by the transition toward low-carbon energy systems. This process is accompanied by the accelerated decline of traditional extractive industries, leading to profound economic restructuring and significant job losses. In parallel, demographic changes—manifested through migration, population ageing, and declining birth rates—intensify socio-economic vulnerabilities and deepen territorial disparities across these regions (Apostu, S., și Șoica, 2025).

The Jiu Valley represents a relevant example of the profound structural transformations that have characterised European mining regions since the post-1990 period, with economic restructuring exerting direct and long-lasting effects on living conditions, social cohesion, and the built environment (Bănică & Turnock, 2011; European Commission, 2020). The progressive closure of mining operations led to massive job losses, reflected in rising unemployment rates and a decline in the employed population, which in turn stimulated both internal and external migration, particularly among young people (INS, 2000–2022; Benedek et al., 2021). As a result, the region has experienced a continuous decrease in total population, a persistent negative migration balance, and an accelerated

process of demographic ageing, evidenced by the growing share of the elderly population and declining birth rates (Eurostat, 2023; Sandu, 2018).

Demographic decline has generated structural effects on quality of life, manifested through reduced access to public services, the contraction of the local economic base, and an increased risk of social exclusion (World Bank, 2019; ESPON, 2020). Socio-demographic indicators—such as the demographic dependency ratio, population density, and trends in the young population (aged 15–34)—confirm the intensification of territorial vulnerabilities and the weakening of local communities’ capacity for spontaneous regeneration (INS, 2011; Benedek & Cristea, 2014).

From a spatial perspective, these processes are closely linked to the degradation of the housing stock and the built environment. Population decline has led to an increase in vacant dwellings, the abandonment of residential buildings, and the deterioration of urban and rural infrastructure (Haase et al., 2013; Ianoș et al., 2012). Indicators such as the share of vacant housing, the technical condition of buildings, and the extent of degraded built-up areas reflect the direct impact of depopulation on residential space (Eurostat, 2022; ESPON, 2017). The images analysed in this study visually illustrate these trends, capturing both manifestations of residential decline and the existence of latent regeneration potential.

Integrating visual analysis with demographic and housing indicators enables a deeper understanding of the relationship between depopulation, residential degradation, and quality of life, highlighting the need for policies focused on urban regeneration, economic diversification, and the strengthening of territorial resilience in the Jiu Valley, in line with the objectives of sustainable development and the just transition (European Commission, 2021; ESPON, 2020).

2 Methodology

The starting point of the analysis is the photographic documentation of rural and peri-urban areas that display a clear pattern of physical degradation. The study employs visual field observation, demographic interpretation and comparative regional analysis to understand how long-term socio-economic decline affects quality of life in the Jiu Valley.

Photographs of rural and peri-urban areas show abandoned houses, collapsing structures and unmanaged vegetation—clear indicators of depopulation in settlements such as Uricani, Câmpu lui Neag and Jieț..





Fig.1 Abandoned rural dwelling illustrating advanced structural decay

These images act as evidence of a broader territorial process: the retreat of human presence and weakening residential stability.

The total population of the Jiu Valley declined significantly from over 160,000 inhabitants in 2000 to fewer than 100,000 in 2022, reflecting a persistent process of demographic decline driven by both internal and external migration (INS, 2000–2022; Eurostat, 2023). This population loss is closely linked to the collapse of the mining industry, which drastically reduced employment opportunities and accelerated the out-migration of the working-age population, particularly young people (ESPON, 2018; European Commission, 2020). Consequently, the region has experienced a consistently negative migration balance, accompanied by declining birth rates and an increasingly ageing population structure (INS, 2011; World Bank, 2019). These demographic dynamics have weakened the local labour market, reduced housing demand, and increased pressure on social protection systems and public services (Eurostat, 2022; European Commission, 2021). In the long term, continued population decline poses major challenges to regional development, territorial cohesion, and quality of life in post-mining regions such as the Jiu Valley (ESPON, 2020; European Commission, 2022).

Table 1 presents the main indicators used to analyse demographic decline, socio-economic restructuring and residential degradation in the Jiu Valley, based on census data, national statistics and regional estimates.

Table 1 Evolution of Demographic and Socio-Economic Indicators in the Jiu Valley (2000–2022)

Indicator	2000	2010	2011	2021	Overall Trend
Total population Persons	~160,000	~120,000	119,484	~100,000	Strong decline
Birth rate ‰	~10.5	~8–9	7.1	<7	Decreasing
Net migration	negative	negative	negative	negative	Persistent out-migration
Young population (15–34) %	high	declining	low	very low	Population ageing
Employment in mining persons	~20,000	~10,000	~8,000	<3,000	Structural decline
Vacant dwellings %	low	increasing	increasing	high	Residential abandonment

The birth rate in the Jiu Valley experienced a pronounced decline, from values exceeding 10‰ in the early 2000s to below 8–7‰ by 2011, remaining consistently below the national average and indicating a significant natural population deficit. This trend reflects the reduction of the young and economically active population, driven by the large-scale migration of individuals of reproductive age, particularly in the context of post-mining economic restructuring. Declining fertility is also closely associated with economic insecurity, job instability and deteriorating living conditions, which have discouraged family formation and childbearing decisions. Combined with increased mortality linked to an ageing population structure, these dynamics have intensified natural population decline and accelerated demographic ageing. In the long term, persistently low birth rates undermine the region’s demographic regeneration capacity and exacerbate socio-economic vulnerabilities in the Jiu Valley.

The analysis of population trends in the Jiu Valley indicates that net migration has been negative since the late 1990s, closely linked to the restructuring of the mining industry and the resulting loss of jobs. Statistical evidence shows that following the large-scale layoffs in the mining sector during 1997–1998, the region began to record a surplus of departures over arrivals, as reflected in the negative migration balance in the post-1998 period. This shift suggests that employment opportunities in the Jiu Valley declined sharply as mines closed, prompting young people and working-age adults to seek jobs in other parts of Romania or abroad. Recent reporting also points to a high share of young residents expressing an intention to leave the area due to limited economic prospects, a dynamic associated with human-capital loss and accelerated population ageing. In practice, negative net migration combined with a negative natural balance (fewer births than deaths) helps explain the overall population decline and highlights the region’s severe challenges in social and economic regeneration.

After 1990, the transformation of the Jiu Valley’s economic structure was dominated by the collapse of the mining industry, following the progressive closure of coal mines that had previously constituted the backbone of the local economy. During the 1990s, mining employment in the Jiu Valley was estimated at between 40,000 and 50,000 workers, including underground and auxiliary staff; however, sectoral restructuring between 1990 and the early 2000s led to a rapid and sustained reduction in employment (INS, 2000; European Commission, 2020). By 2000, the number of mining employees had declined to approximately 18,000–20,000, and continued downsizing reduced this figure to around 8,000 workers by 2012 (INS, 2012; ESPON, 2018). In the early 2020s, mining employment fell below 3,000 workers, marking a historical minimum and indicating a loss of more than 90% of the original mining workforce (European Commission, 2021).

This dramatic contraction of mining employment exerted substantial pressure on the regional labour market and contributed to persistently elevated unemployment levels. At the national scale, Romania’s unemployment rate fluctuated between approximately 4% and 10% during the period 2004–2025, peaking in 2010 and declining to around 4–5% by 2023 (Eurostat, 2023). In contrast, available regional estimates indicate that unemployment levels in the Jiu Valley and Hunedoara County were significantly higher during peak restructuring phases, frequently exceeding national averages and reaching 25–30% in periods of acute labour market distress (INS; Matec Conferences, 2020).

Overall, the large-scale loss of mining jobs represents a key structural driver of regional economic decline, contributing to long-term unemployment, labour out-migration, reduced household incomes, and broader social vulnerability during the post-mining transition (ESPO, 2020; World Bank, 2019).

The impact of declining mining employment was also felt at the institutional level, through a reduced capacity of local administrations to finance public services and development projects. Consequently, employment decline affected not only individuals but also weakened the overall functioning of the regional socio-economic system, reinforcing the vulnerability of the Jiu Valley in the context of post-mining transition.

The comparative unemployment trends over the last two decades indicate that the Jiu Valley has consistently recorded higher unemployment rates than the national average. While Romania experienced a gradual decline in unemployment following the post-2010 recovery, the Jiu Valley shows more persistent and volatile unemployment levels, reflecting the long-term structural effects of mining industry decline and limited labour market diversification (INS; Eurostat).

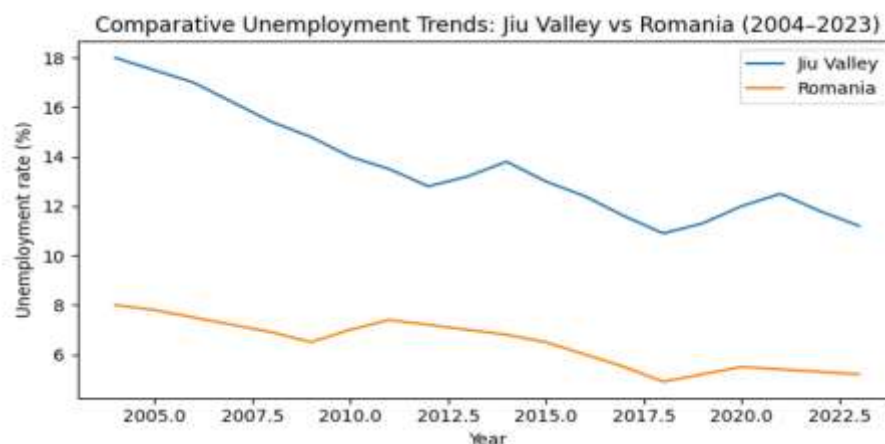


Fig 3 Comparative Unemployment Trends in the Jiu Valley and Romania (2004–2023)

Parallel demographic data confirm that the region has lost nearly half its population over the past twenty-five years, particularly young adults, leading to increased housing abandonment.

Comparative examples from Upper Silesia and the Ruhr region highlight dynamics similar to those observed in the Jiu Valley, demonstrating that residential degradation is both a consequence of and a factor accelerating socio-economic decline. In both regions, the contraction of industrial activities led to massive job losses, out-migration of the working-age population, and reduced housing demand, resulting in abandoned or underused residential areas. The deterioration of the built environment, in turn, contributed to declining territorial attractiveness, discouraging investment and the settlement of younger populations. The experience of the Ruhrgebiet shows that fragmented interventions were insufficient to halt these processes, making integrated urban regeneration and functional reconversion policies necessary. Similarly, the case of Upper Silesia underscores the importance of aligning housing policies with strategies for economic diversification and social inclusion. These comparative examples confirm that addressing residential degradation requires a broader regional development vision focused on territorial resilience and quality of life.

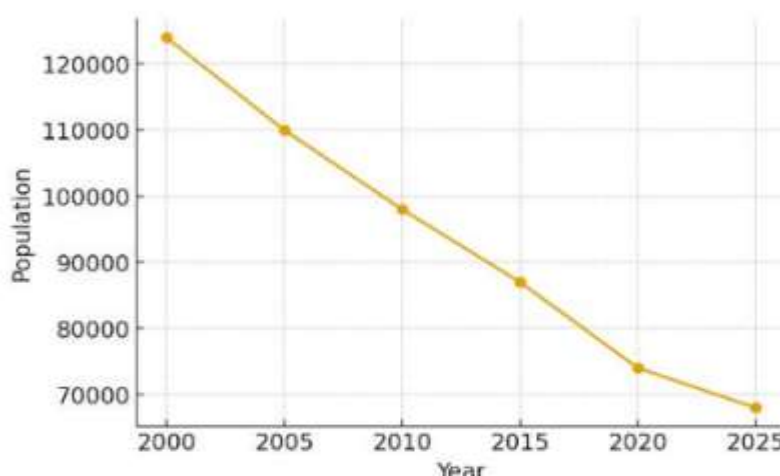


Fig.2 Estimated population decline in Valea Jiului (2000–2025).

The pronounced depopulation of the Jiu Valley has had a direct impact on the housing stock, leading to an increase in the number of vacant and abandoned dwellings. Population decline, particularly through the out-migration of young and working-age residents, has reduced housing demand and weakened households' capacity to maintain existing buildings. As a result, many residential properties have entered a process of physical degradation, manifested through structural deterioration, lack of maintenance, and the emergence of vulnerable residential spaces. Housing degradation reflects not only a lack of investment but also the weakening of local communities and the loss of stable residential functions in certain areas. This process contributes to the intensification of urban and rural decline, reducing territorial attractiveness and negatively affecting the quality of life of the remaining population.

Overall, the study demonstrates how demographic decline and built-environment degradation reinforce each other, creating a vicious cycle that constrains improvements in quality of life in the Jiu Valley. Population loss reduces demand for housing and services, leading to residential abandonment, building deterioration, and declining territorial attractiveness. In turn, the degradation of the built environment accelerates out-migration and discourages the settlement of younger populations, further intensifying demographic and socio-economic imbalances. Nevertheless, the presence of valuable natural and cultural resources—such as the mountainous landscape, industrial heritage, and strong local identity—provides tangible opportunities for revitalisation. The strategic valorisation of these assets through integrated urban regeneration policies, economic diversification, and the strengthening of territorial resilience can help break the cycle of decline and support sustainable regional development.

The profound demographic and socio-economic transformations that have affected the Jiu Valley over recent decades have generated a cumulative set of territorial vulnerabilities, reflected in population decline, housing stock degradation, and a deterioration in quality of life. The interdependence between population loss and the deterioration of the built environment highlights the need for coordinated interventions that go beyond sectoral approaches and simultaneously address the economic, social, and spatial dimensions of regional development. In this context, the proposed solutions are grounded in an integrated approach aimed at sustainable revitalisation and the strengthening of territorial resilience in the Jiu Valley.

❖ **Integrated Urban and Residential Regeneration.**

The rehabilitation of the degraded housing stock should be addressed through integrated urban and rural regeneration programmes that include the renovation of abandoned buildings, the functional reconversion of underused spaces, and improvements to basic infrastructure. Such interventions may involve transforming vacant dwellings into social housing, housing for young people, or community-oriented facilities, thereby contributing to population stabilisation and increased residential attractiveness.

❖ **Economic Diversification and Local Job Creation**

Reducing negative net migration requires the development of viable economic alternatives to the mining industry by supporting local entrepreneurship, the green economy, sustainable tourism, and creative industries. The creation of stable employment opportunities is essential for retaining the active population and encouraging the return of young people to the region.

❖ **Policies Targeting Young People and Young Families**

Addressing declining birth rates and demographic ageing entails implementing support measures for young people and families, including facilitated access to housing, education and childcare services, incentives for returning migrants, and locally oriented professional integration programmes.

❖ **Valorisation of Natural and Cultural Heritage**

The mountainous landscape, mining industrial heritage, and strong local identity represent strategic resources that can be integrated into cultural tourism, ecotourism, and heritage

education projects. Harnessing this potential can generate alternative income sources, revitalise local communities, and contribute to rebuilding a sense of belonging.

❖ **Strengthening Social Infrastructure and Public Services**

Improving access to healthcare, education, social assistance, and mobility services is essential for enhancing the quality of life of the remaining population. Investments in social infrastructure can reduce territorial vulnerabilities and support social inclusion in communities affected by decline.

❖ **Coordinated Local Governance and the Use of European Funds**

The effective implementation of the proposed solutions requires efficient coordination among local, regional, and national authorities, as well as the strategic use of European instruments, particularly the Just Transition Fund. A participatory approach involving local communities and relevant stakeholders can enhance the effectiveness of revitalisation policies and territorial resilience.

4. Conclusions

Overall, the analysis shows that the Jiu Valley is at a critical transition point, where the cumulative effects of demographic decline, economic restructuring, and built-environment degradation continue to negatively affect quality of life. However, the findings also indicate that these processes are not irreversible, as the region possesses significant territorial resources that can support alternative development pathways. Natural landscapes, cultural and industrial heritage, and strong community identity represent strategic assets that can be leveraged through coherent regeneration and reconversion policies. Also, tourism represents a viable economic alternative for former mining regions undergoing structural restructuring, as it enables the valorisation of natural landscapes, industrial heritage, and local identity while contributing to employment diversification, income generation, and the long-term socio-economic revitalisation of affected communities. Tourism is identified as a strategic development alternative for the Jiu Valley, with particular emphasis on the valorisation of natural resources, cultural heritage, and local identity as key drivers for increasing regional attractiveness and supporting post-mining economic diversification (Slusariuc, 2023).

The transition toward a more resilient post-mining future depends largely on the capacity of local and regional actors to implement an integrated, long-term development vision. Fragmented or purely sectoral interventions have proven insufficient to address the region's structural challenges, highlighting the need for coordinated policies that combine urban regeneration, economic diversification, and the strengthening of social infrastructure. In this regard, strategic planning should focus not only on revitalising the built environment but also on rebuilding social and human capital. Furthermore, active involvement of local communities is a key factor in the success of revitalisation processes. The participation of citizens, local organisations, and the private sector can enhance the legitimacy and sustainability of interventions, ensuring that solutions are better aligned with the real needs of the population. When combined with the effective use of European funds dedicated to just transition, such local engagement can accelerate the region's structural transformation.

In conclusion, through coherent strategic planning, sustained investment, and strong partnerships between authorities and communities, the Jiu Valley has the potential to overcome the challenges associated with post-mining decline and to evolve toward a development model based on territorial resilience, improved quality of life, and long-term sustainability.

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