FROM TRADITION TO VULNERABILITY: THE SOCIO-ECONOMIC AND HERITAGE RISKS ASSOCIATED WITH THE DECLINE OF STONE PROCESSING IN VIȘTEA FOR THE LOCAL COMMUNITY

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ABSTRACT. From Tradition to Vulnerability: the Socio-Economic and Heritage Risks Associated with the Decline of Stone Processing in Vișstea for the Local Community. Stone processing is a traditional craft of the Călata region that historically contributed to the development of Cluj, based on the extraction and finishing of natural stone and limestone. Vișstea stone, a white limestone characteristic of the Cluj Hills, has been intensively exploited from the Bronze Age to the present and was used even in the construction of the Casa Poporului (House of the People) in Bucharest during the socialist period. The present study investigates the socio-economic and heritage risks generated by the decline of Vișstea stone processing for the local community, and how these risks are perceived by local actors. The study uses a mixed-methods design that combines a spatial component - including a GIS-based inventory of the built heritage and a mapping of active producers - with a qualitative component based on semi-structured interviews. The field inventory identified 228 buildings that met the classification criteria defined by the authors following the GIS-based inventory approach of Arias Tapiero et al., 2024, and the perceptions of local stakeholders regarding the decline of stone processing were captured through seven semi-structured interviews. The findings show that the economic vulnerability of the craft stems from several interrelated pressures -competition from imported stone, a shrinking and ageing workforce, the depletion of local quarries, and regulatory burdens. The results of the study show that informants perceive stone processing primarily as

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an occupation and a livelihood rather than a symbol of local identity. Its identity dimension appeared weaker and was voiced mainly by non-practitioners rather than by those who actually work with the stone. In addition, the community does not perceive significant environmental or health risks associated with quarrying and accepts it, or even views it as beneficial.

KEYWORDS
Vișțea stone, socio-economic vulnerability, heritage at risk, risk perception, social licence to operate, community resilience, Cluj County

1. INTRODUCTION

Traditional crafts based on local natural resources can become important components of both local economies and cultural heritage. However, the decline of such resource-based activities can threaten not only local livelihoods but also the continuity of the associated heritage. These issues are relevant to Vișțea, a village in Cluj County, Romania, where the traditional processing of Vișțea stone, a white limestone characteristic of the Cluj Hills, has a long history. According to local tradition, the stone has been used in both local and monumental construction, including during the socialist period. Today, the craft faces several challenges, including competition from imported stone, a shrinking and ageing workforce, the depletion of local quarries, and regulatory burdens. These pressures raise concerns about the future of the activity, the continuity of its associated heritage, and the community's perception of the risks involved. This study examines the socio-economic and heritage-related risks associated with the decline of Vișțea stone processing and how local stakeholders perceive them. Accordingly, the study addresses the following questions: (1) What socio-economic and heritage-related risks does the decline of Vișțea stone processing generate for the local community? (2) How is the craft perceived - primarily as a livelihood or as a marker of local identity? (3) How do local actors perceive the environmental and health risks of extraction, and how does this relate to its social acceptance? (4) What potential exists for heritage valorisation to support the craft's continuity and community resilience? Combining a GIS-based inventory of the built heritage and mapping of active producers with seven semi-structured interviews, it explores the relationship between economic vulnerability, heritage continuity, risk perception, and social acceptance.

2. THEORETICAL BACKGROUND

The presence of a local natural resource - in the case of Vișțea – limestone, creates the conditions for the development of a specific economic activity: stone processing. In many areas where stone is readily available, communities exploit and process this resource, and over time, through the

repeated practice and intergenerational transmission of these activities, a distinctive craft develops. Thus, the natural resource becomes the starting point of a local tradition, manifested both in vernacular architecture, such as stone houses, and in the knowledge and techniques transmitted from one generation to another. In the Romanian context, natural stone used as a building material has also been recognized as cultural heritage. For example, Ilinca et al. (2023) describe the Albești Limestone not only as a geoheritage but also as a heritage stone of national significance.

Beyond its material dimension, however, stone processing is also a craft: it produces both a tangible dimension – the stone buildings themselves – and an intangible one, the knowledge and skills behind their creation, whose continuity depends on transmission to the next generation, historically through the master-apprentice relationship (Karakul, 2015). This process also gives rise to intangible cultural heritage, which UNESCO (2003) describes as a living practice continually reshaped by communities in relation to their environment, nature, and history, and which nurtures in them a sense of identity and continuity. Vernacular buildings can thus be understood as an expression of a community's collective memory, shaped by its long-term adaptation to local conditions (Arias Tapiero et al., 2024). This craft however, which over time has in many cases become part of a local heritage, is not static. Like similar resource-based traditional activities, it is increasingly subject to a process of decline.

Although raw material extraction was regarded for a long time as a driver of local economic development, resource-dependent communities are especially vulnerable when the industry that they rely on declines. As Freudenburg (1992) argues, such communities tend to become over-adapted to one specific extractive activity, which leaves them exposed both to the exhaustion of the resource and to the loss of human, social and physical capital that might otherwise have supported traditional activities or economic diversification. The viability of intangible cultural heritage depends on the ongoing transmission of knowledge and skills across generations (UNESCO, n.d.). Consequently, any disruption of this transmission represents a serious threat to its survival. This is confirmed empirically by Falk and Hagsten (2025), whose analysis draws on the UNESCO Intangible Cultural Heritage database. In their findings, insufficient practice and weakening transmission together represent the most common category of threats, accounting for nearly half (47%) of those identified worldwide. Therefore, the decline of such an activity generates vulnerability for the community. This vulnerability can be understood within the broader context of social and environmental change. Vulnerability refers to the extent to which a community is at risk of harm from exposure to social, economic or environmental stressors, as well as to its capacity to adapt to such changes (Adger, 2006). From the perspective of safeguarding the craft as intangible cultural heritage, its vulnerability can be considered in relation to the community’s capacity to

maintain the continuity and transmission of its cultural practices (UNESCO, n.d.). This vulnerability is also closely connected to the broader social vulnerability of the communities in which such practices are embedded.

Nevertheless, the social aspects of vulnerability are not easy to define and quantify (Cutter et al., 2003; Holircă, 2020). Research has shown that social vulnerability is influenced not only by social inequalities but also by place-specific characteristics, including the economic vitality of communities (Cutter et al., 2003). In addition to these structural and place-based factors, understanding social vulnerability also requires consideration of how different social groups perceive and respond to risk. Such perceptions and responses contribute to the social construction of risk and can influence how communities cope with hostile conditions (Holircă, 2020). Consequently, social vulnerability can be understood as a multidimensional concept, reflecting the social and economic characteristics and experiences that shape a community's capacity to respond and adapt to change (Cutter et al., 2003). In the context of this study, this vulnerability is examined through three interconnected dimensions: socio-economic conditions, heritage-related vulnerability, and risk perception. (1) The socio-economic dimension reflects how characteristics such as income and employment shape a community's vulnerability to harm (Cutter et al., 2003), and includes challenges related to livelihoods, labour availability and market conditions (Freudenburg, 1992). Freudenburg (1992) further points out that increasing employment in extractive industries does not necessarily strengthen a community's capacity to adapt to changing circumstances and may, in some cases, reduce it. (2) The heritage-related dimension concerns the risk of losing the craft itself - the specialised knowledge and skills whose continuity depends on intergenerational transmission.

Beyond its economic dimension, such a craft can also become part of a community's collective memory and place identity. Research on extractive and resource-dependent communities has shown that long-lasting activity, and the remains it leaves in the landscape, can sustain place-based identities across generations (Wheeler, 2014; Measham et al., 2021); collective memory and identity may even shape the way how communities perceive the impacts and risks of the activity (Carballo-Cruz and Silva, 2026). (3) The risk-perception dimension reflects how individuals and communities perceive and evaluate the risks to which they are exposed (Slovic, 1987), which may differ considerably from externally defined or measurable risks. This perceptual dimension is linked to the concept of social licence (Gunningham et al., 2004) and more specifically to the notion of a "social licence to operate", that captures the degree of social acceptance of a resource-based activity by local communities and other stakeholders (Moffat and Zhang, 2014). Such acceptance often depends on the balance between perceived benefits and negative impacts. Research on community acceptance has shown that the perceived benefits and negative

impacts can influence attitudes towards resource-based activities, among these, employment and community development both represent important perceived benefits (Zhang and Moffat, 2015). Therefore, in some cases, communities may perceive the risks of a long-established activity as minimal, particularly when it is associated with economic benefits - a pattern that can translate into broad social acceptance (Moffat & Zhang, 2014). Ultimately risks affect the local community, nevertheless the community does not remain a passive recipient but it can actively respond to these changes. Community resilience refers to a community's capacity to draw on its resources to adapt to change and renew itself (Magis, 2010) - which is an indicator of social sustainability that shapes the community's ability to respond to the risks it faces. Cultural and heritage tourism has been proposed as one way to strengthen rural community resilience, by turning the conservation of local heritage into an economic asset (Gocer et al., 2024). Such valorisation can help sustain the connection between people and place, supporting the continuity of the craft. Its success, however, depends on cooperation among authorities, public agencies, and other local stakeholders (Gocer et al., 2024). Building on this framework, the present study examines how these risks, perceptions, and prospects for resilience are manifested in the community of Vișstea.

3. STUDY AREA

Vișstea is a village in Gârbău commune, Cluj County, located approximately 15 km west-north-west of Cluj-Napoca, the regional growth pole (Fig. 1). The built-up area is elongated along the valleys that meet in the centre of the village, and its surroundings are marked by limestone hills and quarries (Fig. 2).

According to the 2021 Population and Housing Census (INS, 2023a), Gârbău commune, to which the village of Vișstea belongs, had 2,133 inhabitants, 12.6% fewer than in 2011 (2,440; INS, 2013), and all five of its villages lost population; Vișstea itself declined from 781 to 694 inhabitants (-11.1%), reflecting a trend of rural depopulation. The age structure points to an ageing population, driven mainly by fewer young people: although the number of residents aged 65 and over remained almost unchanged (520 in 2011 and 512 in 2021), their share rose from 21.3% to 24.0%, while the number of children under 15 fell by almost a fifth, from 358 to 291 (from 14.7% to 13.6% of the population). The commune is ethnically mixed: in 2011, 1,190 residents (48.8%) declared themselves Romanian and 1,082 (44.3%) Hungarian (INS, 2013), while in 2021 the corresponding figures were 850 (39.9%) and 757 (35.5%) (INS, 2023b). The lower shares in 2021 mainly reflect the fact that ethnicity was not recorded for 23.2% of residents, as the ratio between the two groups remained almost unchanged; this mixed composition is reflected in the two languages used in the interviews.

Geologically, Vișteа lies on the north-western margin of the Transylvanian Basin, in the Gilău sedimentary area (Fig. 1). On the 1:200,000 geological map of Romania (Geological Institute of Romania, 2018), the area of the village is mapped on Quaternary deposits, Holocene gravels and sands, and Upper Pleistocene gravels, sands, red clays and polluvial deposits, and on Rupelian (Lower Oligocene) marly-sandy deposits with flysch-type facies, conglomerates, red clays and bituminous schists. The stone after which the village of Vișteа was named belongs to an older unit, the Vișteа Limestone (Răileanu and Saulea, 1956), a marine carbonate unit traditionally correlated with the "lower coarse limestone beds" of Koch (1894). The Vișteа Limestone is stratigraphically associated with the overlying part of the Eocene succession, above the nummulitic Căpuș Formation (Popescu, 1978), whose upper part is characterized by beds rich in Nummulites perforatus (Rusu et al., 2004). Further south, towards Gilău, this interval is represented on the geological map as the "Beds with N. perforatus" (Fig. 1).

This setting, a thin, laterally restricted limestone level within a Palaeogene succession, helps explain both the concentration of quarries around the village and the exhaustion of good-quality stone reported by interviewees (Section 5.3.1).

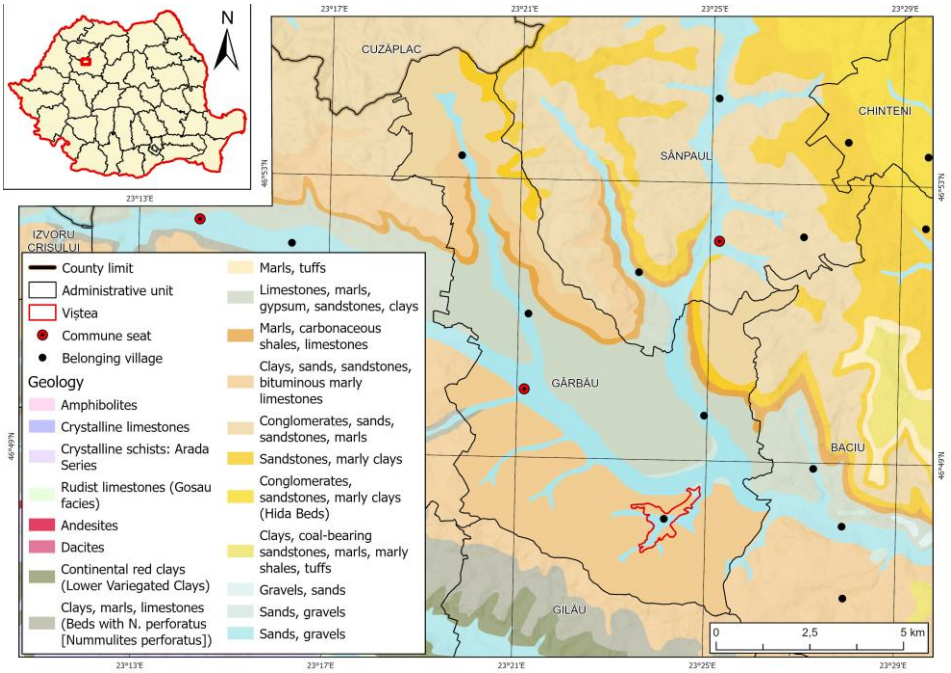

Fig. 1. Location and geological setting of the study area (Vișteа, Gârbău commune, Cluj County)

4. DATA AND METHODS

4.1 Research design

The study uses a mixed-methods design that combines a spatial component which includes a GIS-based inventory of the built heritage and a mapping of active producers, with a qualitative component that is based on semi-structured interviews. The spatial data show the material footprint of Vișlea stone in the local landscape, while the qualitative data capture how local stakeholders perceive and experience the decline of stone processing in Vișlea.

4.2 GIS-based inventory and field documentation

Documentation was carried out between May and August 2026 in three stages. The first, desk-based, involved building the spatial database: a feature layer was created in ArcGIS Online, configured to accept photographic attachments, and an ArcGIS Experience application was developed on 20 May 2026 to support point collection and photo capture in the field. The second stage, on 21 May 2026, consisted of field survey: points were located and mapped, photographed, and classified under the original Typology field (House, Fence, House + Fence, Outbuilding, etc.). In the third stage, again desk-based, the database structure was finalised. Four fields were added: House featuring Vișlea stone; Outbuilding(s) [barn, shed, etc.] containing Vișlea stone; Fence made of Vișlea stone; and Other elements/ornaments (columns, gates, window frames, etc.) made of Vișlea stone - each with a Yes/Partially/No domain, plus an "other" value for missing data. This field-based classification of buildings follows GIS-based methodologies developed for characterising vernacular-built heritage at a regional scale (Arias Tapiero et al., 2024).

The results of this documentation and data-structuring process were consolidated into an interactive (Web) map in ArcGIS Online, integrating the spatially referenced survey points, photographic documentation, and the attribute-based classification of the identified elements containing Vișlea stone. The Web map provides an accessible spatial representation of the documented vernacular-built heritage and allows the surveyed features to be explored interactively according to their location and recorded characteristics (see Section 5.1 and Fig. 3).

Quarries were mapped based on a combination of UAV (drone) observations and imagery, discussions with local residents, multi-temporal Google Maps and Google Earth imagery, and historical sketches covering both the built-up area and the area outside the built-up perimeter of the locality; several locations were also determined based on the account of one producer. Producers/manufacturers, by contrast, were mapped only for those reached in person during the day of the field study and those subsequently contacted by telephone.

Table 1. Field definitions and classification criteria (based on Arias Tapiero et al., 2024).

Field	Definition	Yes	Partially	No
House featuring Vișțea stone	Presence of Vișțea stone on the main dwelling	Stone is used on the entire structure or on a defining structural element (e.g., foundation, walls)	Stone is used on a limited or secondary portion of the structure (e.g., plinth, corner detailing)	No Vișțea stone present on the dwelling
Outbuilding(s) [barn, shed, etc.] containing Vișțea stone	Presence of Vișțea stone on one or more secondary/auxiliary buildings	Stone is used on the entire outbuilding or a defining structural element	Stone is used on a limited portion of one or more outbuildings	No Vișțea stone present on any outbuilding
Fence made of Vișțea stone	Presence of Vișțea stone in the boundary fence/wall	Fence is built entirely or predominantly of stone	Stone is used only for part of the fence (e.g., pillars, base course)	No Vișțea stone present in the fence
Other elements/ornaments (columns, gates, window frames, etc.) made of Vișțea stone	Presence of Vișțea stone in secondary architectural or decorative elements	Stone is used on one or more complete elements	Stone is used only on part of an element	No Vișțea stone present on any secondary element

Note: An additional "other" value was recorded where the relevant information could not be verified (No Data).

Once fieldwork was complete, the new fields and domains were populated for each mapped point based on the associated photographs. The dataset was then checked by a second team member against multi-year Google Maps and Google Earth imagery and against the attached photographs, to confirm accuracy. Where discrepancies were found, points and photographs were merged, removed, or repositioned as needed.

4.3 Spatial and architectural analysis

Inventory variables were analysed using frequencies and percentages for each of the four fields (house, outbuilding, fence, other elements/ornaments). GIS mapping was used to examine the spatial distribution of the buildings recorded across Vișțea and the concentration of stone use within the built-up area. The standardised records allowed comparison across building types of how often Vișțea stone appears, and of the extent of its presence (Yes/Partially/No) for each of the four fields - house, outbuilding, fence, and secondary elements.

4.4 Qualitative data collection

A qualitative, interview-based approach is efficient and useful to capture community risk perceptions, since conceptualizations at the territorial level may sometimes offer a more comprehensive understanding than expert assessments and reflect genuine concerns typically omitted from technical risk evaluations (Slovic, 1987). Thus, the perception of the local stakeholders regarding the decline of stone processing was captured through 7 semi-structured interviews made between May - June 2026. There were 4 informant groups created (see Table 2.): (1) entrepreneurs (1 owner + 2 managers); (2) Stone worker/craftsman; (3) institutional representatives (priest and local council representative); (4) local resident.

Table 2. Participants group (n=7)

Group	N	Role in the study
Entrepreneurs	3	Owner + 2 managers
Stone worker/craftsman	1	-
Institutional representatives	2	Priest, local councillor
Local resident	1	-

Participants were selected through purposive sampling, targeting individuals that have a connection to stone processing. The representatives of the three companies were contacted directly, as were the priest and the local council representative. In the case of the latter one, the municipal office was asked to recommend a councillor familiar with the village of Vișțea, who was then interviewed. The local resident was approached during the fieldwork in the village. Therefore, participant selection combined purposive sampling with a gatekeeper-mediated contact and an opportunistic encounter during fieldwork, reflecting the small size of the community. Each interview guide was customized to the respondent group and organized into four sections: opening questions, core questions, in-depth questions, and a closing question. The thematic areas covered included the history and economic role of stone processing; labour and

demographic change; the transmission and mechanisation of the craft; its role in local identity, memory and heritage; the perception of environmental, health and social impacts; and the prospects of crafts' future, including tourism and heritage valorisation. The English translation of the interview guides is provided in the Appendix section. It is important to mention that based on preliminary information the interview guides were initially developed based on the assumption that the quarry was closed in 2023. From the first interview onwards, however, participants clarified that quarrying remains active and stone is still extracted, although the number of operating quarries has declined and the availability of good-quality stone and labour has become limited. As semi-structured interviews, these guides served as a flexible framework; questions were adapted during the interviews to the responses and situation of each participant The interviews were conducted in Romanian and Hungarian languages according to the participants' preference and with the participants' consent; the interviews were audio-recorded and transcribed verbatim. The recordings were transcribed with the assistance of automatic speech-recognition software, and each transcript was subsequently checked in full against the original audio by the authors to ensure accuracy. Interview excerpts were translated into English by the authors, in some cases with the assistance of AI-based translation tools, with all translations checked for accuracy against the original transcripts.

4.5 Thematic analysis

The interview analysis is based on inductive thematic analysis suggested by Braun & Clarke (2006), a method that offers flexibility in analysing qualitative research and is based on the 6-phase guide which includes familiarizing with the data including its transcription, generating initial codes, searching for themes, reviewing themes, defining and naming themes and finally producing the report. Through this the authors identified five comprehensive themes. A total of 303 semantic units were organized into codes then codes were organized into themes. Coding consistency was cross-checked with the support of an AI tool, while all coding, theme development, and interpretation were carried out by the authors. These are detailed in subchapter 5.3.

4.6 Ethics and anonymisation

All those interviewed gave their consent for the interviews to be recorded and were assured that the data will be anonymized. To protect participants' anonymity, informants are referred to by group-based labels (e.g., Entrepreneur A, B, C; Stone worker; Institutional representative; Local resident) rather than by any personal or identifying information.

5. RESULTS

5.1 The built heritage footprint: stone houses

The field inventory identified 228 buildings that met the classification criteria presented in Section 4.2 GIS-based inventory and field documentation. These structures are distributed along the two valley branches that converge toward centre of the settlement (Figure 2.).

Rather than being scattered evenly across the locality, the structures form a continuous ribbon along the roads following both valleys, with only a small number of isolated points set back from the main axes. This pattern reflects the linear, road-following settlement morphology typical of the area. Two clusters of stone quarries and manufacturers bound the inventoried area at its extremities - one at the north-eastern end of the settlement and one further south along the second valley branch - while a smaller quarry sits closer to the built-up core, suggesting that the availability of raw material has historically shaped, at least in part, the spatial reach of stone use in construction.

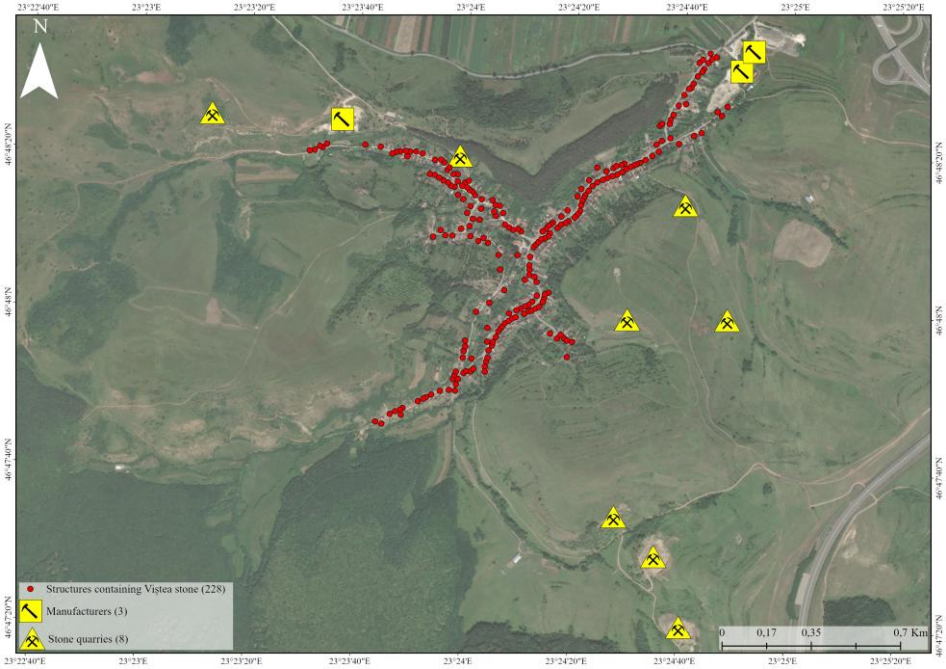

Fig. 2. Location/Distribution of inventoried buildings containing Vișlea stone relative to extraction and production sites

The disaggregated distribution of the four fields (house, outbuilding, fence, and other elements/ornaments), mapped individually by field and domain is ***also*** available as an interactive online map in ArcGIS Online

[https://cgeoreg.maps.arcgis.com/apps/mapviewer/index.html?webmap=af8d0db730b14668a04a028537fd38c6], providing an openly accessible spatial database of Vișțea stone's built heritage. This resource can support further research, heritage documentation, and local planning - for example, by informing the municipality's management of built heritage. The map indicates that stone use is not uniform across building components (Figure 3.). It is most frequent on the main dwelling, present on more than three-quarters of the recorded houses, and almost as common among secondary architectural elements such as columns, gates and window frames, present on over 70% of points. Fences show a more moderate presence, with stone used on just under a third of cases and a further 8% showing partial use, generally confined to pillars or the base course rather than the full length of the fence. Outbuildings display the lowest incidence, with stone present in only about a quarter of cases, indicating that its use was concentrated primarily on the house itself and on decorative elements rather than on secondary or utilitarian structures. Spatially, no clear clustering distinguishes stone-rich from stone-poor sections of the settlement - points with high and low values for each field appear interspersed along both valley branches, suggesting that the choice to use Vișțea stone was tied more to individual building practice than to location within the settlement (Figure 3.).

Table 3. Presence of Vișțea stone by structural/architectural category (n = 228).

Field	Yes	Partially	No	No Data
House featuring Vișțea stone	174 (76.3%)	2 (0.9%)	51 (22.4%)	1 (0.4%)
Outbuilding(s) containing Vișțea stone	64 (28.1%)	0 (0.0%)	163 (71.5%)	1 (0.4%)
Fence made of Vișțea stone	71 (31.1%)	19 (8.3%)	137 (60.1%)	1 (0.4%)
Other elements/ornaments made of Vișțea stone	161 (70.6%)	0 (0.0%)	66 (28.9%)	1 (0.4%)

Note: the single No Data record corresponds to one point for which the four fields could not be verified against the available photographic documentation; it is excluded from the percentages reported below but retained in the totals above.



Fig. 3. Distribution of Vișteа stone use by structural/architectural category (house, outbuilding, fence, and other elements/ornaments)

5.2 The stone-processing sector

Alongside the inventory of the built heritage (Section 5.1), the spatial component of the study also mapped the active producers in Vișteа. This section presents their main characteristics, based on fieldwork and interviews. At present, stone-processing activity in Vișteа is sustained by several active local producers with different specialisations and business histories. The interviewed producers range from larger companies employing a substantial number of local workers to very small family-run businesses. While some firms have maintained relatively stable levels of activity and established connections beyond the local area, others spoke about the decline of the sector, particularly through reductions in employment and production capacity. The producers described a gradual shift in the structure of demand. Mass-produced stone products, such as cladding and paving, have become increasingly difficult to market due to competition from lower-cost imported stone.

As a result, local production has increasingly focused on more specialised forms of craftsmanship, including unique architectural elements such as columns, capitals, architraves, and balustrades. These products are often associated with church restoration, architectural projects, and other forms of specialised construction.

The market for these products remains primarily domestic, although some producers also have developed connections with international markets. The distribution of products and sales are largely based on established professional networks and informal recommendations rather than on organised commercial promotion. Word-of-mouth remains an important tool through which producers

use to promote their companies and to maintain their market position (Fig. 2 shows the locations of the three active workshops)

5.3 Stakeholders' perceptions and experiences of stone processing

The thematic analysis of the seven semi-structured interviews identified five overarching themes that capture local stakeholders' experiences and perceptions of stone extraction and stone processing in Vișlea (Table 4.). Together, these themes highlight the economic and social challenges faced by the sector, the transmission of traditional craftsmanship and the risks threatening this living heritage, perceptions of environmental risk and social acceptance, the ways in which the craft is understood as part of local identity, and the prospects for its continuity and sustainable valorisation.

Table 4. Prevalence across the 5 Themes.

Prevalence across the 5 Themes (number of informants in the group / out of 7 who mentioned each theme)

Theme	Entrepreneurs (/3)	Stone worker (/1)	Institutional (/2)	Local Resident (/1)	Total (/7)	Codes (n)
1. Economic Vulnerability	3	1	2	1	7/7	125
2. Heritage at Risk	3	1	2	1	7/7	71
3. Identity and Memory	3	1	2	1	7/7	72
4. Risk Perception / Social Acceptance	3	1	1	1	6/7	23
5. Resilience and Valorization	1	–	1	1	3/7	9

5.3.1 Economic vulnerability

The first theme identified through the thematic analysis highlights the economic vulnerability of the local stone sector, which participants perceived as the result of the interaction between changing market conditions, the declining availability of natural stone resources, difficulties in recruiting skilled labour, and increasing regulatory pressure.

The first dimension of this theme concerns the transformation of the local stone economy. Market conditions and demand were mentioned by all seven participants, indicating that changes in the market represent one of the most significant developments affecting the sector. The interviews consistently showed that consumer demand has shifted, with traditional carved stone products

gradually being replaced by simpler products and imported stone. As one entrepreneur explained, imported stone "*is brought in in very large quantities from abroad... at a very good price*" (Entrepreneur C). At the same time, participants argued that the future of the profession lies in specialised craftsmanship, including artistic stone carving, bespoke commissions, and heritage restoration rather than mass-produced products. As Entrepreneur C noted, "*what will remain in the long run... is cutting and carving stone to special dimensions.*"

Although participants described the stone market as increasingly unstable, they also emphasized its broad geographical reach. One entrepreneur (B) stated that "*we have worked all across Europe, from Greece to England*," demonstrating that local businesses continue to operate beyond the national market. Nevertheless, most commissions are obtained through personal recommendations and originate primarily from churches and private clients. As Entrepreneur A explained, "*we work mostly for private individuals or churches*."

The second major aspect of this theme concerns labour shortages, which were mentioned by six of the seven participants. Participants consistently associated this problem with youth outmigration and the increasing difficulty of recruiting skilled workers. Most interviewees observed that fewer young people are willing to pursue stone masonry, preferring employment in other sectors or in nearby cities. Consequently, workshops face persistent recruitment difficulties because, as Entrepreneur C remarked, "*young people today avoid this kind of work*," even though wages have increased substantially compared with previous years: "*we pay much higher wages... and still cannot find workers*."

According to one stone worker, "*the quarries are not closed; there is simply no one left to work in them*" (Stone worker), illustrating that the problem lies less in the availability of resources than in the shortage of labour. Participants also described profound demographic changes within the profession. Entrepreneur B observed that "*the youngest stone carver is almost forty years old*," while Entrepreneur A explained that "*most of the people I worked with have already passed away... now there are only about five of us still working*." As a result, some companies have begun recruiting workers from neighbouring villages because the local labour force has declined considerably. As Entrepreneur A explained, "*workers now commute from distant villages*." This trend was also noted by a local resident, who stated that "*stone carving has declined a lot; many people gave it up and went to work in Cluj*."

Beyond labour availability, participants also identified access to raw material as a key condition for maintaining production. All interviewees discussed changes related to stone extraction and the viability of local quarries. They explained that the number of active quarries has decreased and that some traditional extraction sites have become exhausted (Figure 4. and Figure 5.). As Entrepreneur C recalled, "*the good-quality stone was depleted very quickly*."

Participants further noted that the quality of the remaining stone influences extraction decisions, leading several companies to source stone from other regions instead of relying on local quarries.



Fig. 4. Abandoned quarry in the surroundings of Vișteа.
Photo: Radu-Mihai Tamasi



Fig. 5. Active stone processing site near Vișteа, with stockpiled blocks and processing equipment.
Photo: Radu-Mihai Tamasi

Access to stone resources is also shaped by the regulatory framework. Six of the seven participants described administrative procedures and regulations as factors that complicate everyday business operations. Several interviewees argued that extraction permits are both costly and limited in duration. As Entrepreneur C explained, "*the permit is very expensive and is only issued for one year*," while Entrepreneur A added that "*all the documentation has to be submitted in Bucharest... so it is not really that easy*." Participants also perceived occupational safety regulations and administrative requirements as becoming increasingly restrictive, limiting opportunities for collaboration and public engagement. For example, one entrepreneur explained that, because of health and safety regulations, they no longer welcome school groups or other visitors to the workshop due to concerns about legal liability in the event of an accident.

These four dimensions - market change, labour shortages, resource decline, and regulatory pressure - recurred across the interviews as the aspects participants associated with the economic difficulties of the local stone sector.

5.3.2 Craft transmission and heritage at risk

The second theme highlights how participants perceive the risk of losing the traditional stone-working craft and the increasing vulnerability of the cultural heritage associated with it. Participants described the craft as a living heritage, passed to younger generations, and shaped by practitioners' adaptation to changing market conditions, particularly technological developments. The analysis of the interviews revealed two interrelated subthemes: the transmission of the craft and mechanisation resulting from technological change.

With regard to the transmission of the craft, this issue was raised by all seven participants and was particularly emphasized by institutional representatives and local residents who regarded it as the primary condition for safeguarding the continuity of the local stone-working tradition. A recurring idea throughout the interviews was that stone masonry is acquired through practical experience rather than formal education. As one entrepreneur explained: "*My mother advised me to become a stone carver. For the first month I only polished stone slabs by hand using a hand plane*" (Entrepreneur A). Similarly, another entrepreneur stated: "*They learn from me; some are better, some less so*" (Entrepreneur B), illustrating the importance of the master–apprentice relationship in transmitting practical knowledge and skills.

Several participants further emphasized that the survival of the craft has historically depended on intergenerational transmission within families. As one entrepreneur simply noted, "*My father was also a stone carver*." (Entrepreneur A). References to family-based transmission were made not only by entrepreneurs but also by local residents, institutional representatives, and stone workers. One institutional representative explained that this pattern was

widespread throughout the community, stating that "*it was like this everywhere*." These accounts indicate that the continuity of the craft has traditionally relied on the transfer of knowledge across generations within both families and the wider community.

Despite this strong tradition, participants consistently argued that the continuity of the craft is now under threat because fewer young people are interested in pursuing stone masonry. As Entrepreneur B stated, "*It will disappear unless something changes and young people start taking up the trade*." A local resident expressed a similar concern, observing that "*the generation aged 30–40 still practises it, but those who are younger are trying to do something else*." Together, these statements reflect a shared concern about the declining interest of younger generations in continuing the craft.

In response to this declining interest, participants also stressed that maintaining the transmission of the craft requires active community involvement and promotional initiatives. Institutional representatives referred to local events that had previously helped maintain public interest in stone carving. As one representative explained, "*When we used to organise the village festival, we always invited someone to demonstrate stone carving*," adding that "*people were interested, especially the children*." Such initiatives were perceived as important opportunities for introducing younger generations to the craft and strengthening community awareness of its cultural value.

Another important change described by all seven participants concerns the mechanisation of stone processing and the adoption of new technologies. There was broad agreement that mechanisation has substantially increased productivity and efficiency. As Entrepreneur C explained, "*Technology has helped us enormously*," while also predicting that "*in the future, machines will do most of the work*." Nevertheless, participants emphasized that manual craftsmanship continues to be regarded as superior for artistic work and heritage conservation. One entrepreneur reflected on the limitations of modern technologies by stating: "*We tried using CNC machines, but there is a huge difference between something made by hand and something made by a machine*." At the same time, interviewees pointed out that the transition towards modern technologies is constrained by the high costs of equipment and limited access to specialised machinery. As one stone worker noted, "*Here we still worked traditionally. The tools are expensive and have to be imported from abroad*."

While the craft is primarily described in occupational and economic terms, some participants - particularly institutional representatives and older residents - also associated it with the community's heritage and identity. The following theme examines this dimension in more detail, including how stone working relates to local identity and collective memory.

5.3.3 The craft between occupation, memory, and identity

This third theme highlights how participants related to the stone-working craft primarily as an occupation and a means of living, and, to a lesser extent, as a component of collective memory and local identity. While stone processing as an occupation emerged as a transversal strand present across all groups, and remained strongly present in the community's collective memory, its role as a symbol of local identity was less clearly articulated in the interviews.

Among the three strands, the dominant one presents the craft primarily as an occupation. The quarry provided employment for many local people: "*Very many people from the village worked here in the quarry*" (Entrepreneur C). Beyond being an occupation, it was also described as a means of living and a form of professional continuity, transmitted within the family - "*My father was also a stone carver*" (Entrepreneur A) - and historically associated with the community's livelihoods. Stone processing was thus presented as an occupation strongly rooted in the community: "*At every third or fourth household, stone was being processed*" (Entrepreneur C). According to a local resident, there was also specialization within the stone-working occupations: "*Not everyone could do everything; each took up the work they were skilled at*" (Local resident).

Some participants - particularly institutional representatives and a local resident - also associated the craft with local identity. Alongside stone, traditional clothing was mentioned as well: "*Stone, and we also have others... the clothes worn by our ancestors*" (Institutional representative). Beyond these material elements, local identity also rested on collective memory, expressed through the mention of craftsmen, families, and the historic role of stone in the village's development. Three participants evoked the reputation of renowned stone carvers, for example: "*He was a very renowned stone carver... he even worked in France... I know this from my grandfather*" (Stone worker), and the remaining master stone carvers are respected locally: "*There are about 25 stone carvers, and they are all valued because we know what they have accomplished*" (Institutional representative) (Figure 6.).

The interviewees also reflected that occupational continuity persisted across political periods, which was likewise traceable in historical memory: "*I worked in this field during the communist period as well*" (Entrepreneur B). Two of the interviewees highlighted the compulsory labour mobilization applied during that period: "*Back then they forced us... they wouldn't let us go into anything else*" (Entrepreneur B). The large-scale employment during the Casa Poporului project was also mentioned: "*For the construction of Ceaușescu's Palace... half of our village worked*" (Local resident), and participants recalled that these communist-era projects offered high wages: "*They were very well paid*" (one institutional representative) and "*When they began building Ceaușescu's Palace... the money started to flow*" (another institutional representative). At the time, a large-scale transport of Vișlea stone to Bucharest also took place: "*A great*

deal of stone left from here... entire trainloads departed... they took them to the marble works to be cut and processed" (Stone worker).



Fig. 6. Tombstone depicting a stone carver - stone-working commemorated in the built and funerary heritage of the community.
Photo: Radu-Mihai Tamasi

Nevertheless, participants perceived the occupational basis of stone-working as declining. Two out of seven interviewees said that locally trained workers leave stone work for urban employment: "*They learned here and then left*" (Entrepreneur B) and "*They gave it up and went to the city, to Cluj*" (Local resident). In addition, there is a decline of local firms - "*There is another firm next to us... there was also another firm at the old quarry. But it is not doing very well*" (Entrepreneur A) - and only a few craftsmen remain: "*Most of the people I worked with... have already passed away... there are about five of us still working*" (Entrepreneur A).

The decline affecting stone-working was described by two of the seven interviewees as part of broader changes affecting other local traditions. In the case of traditional costume, for example, participation by younger generations appears to have declined: "*Unfortunately, the folk costume too... We, the older generation, still wear it, but the young people do not. They no longer want to wear it, not even to church*" (Local resident). Nevertheless, the same participant describes the manual practice of embroidery and beadwork, still carried out today. These traditional household activities also had an economic role, as she explains: "*Through this handwork, we women were able to contribute financially*" (Local resident). Similar patterns of change were thus described across other traditional, craft-based activities in the community, not only in stone-working.

5.3.4 Environmental Risk Perception and Social Acceptance

The fourth theme addresses participants' perceptions of environmental risk and the social acceptance of stone extraction and processing. Six of the seven participants discussed this theme, generally regarding quarrying as a long-established and socially accepted activity rather than a source of environmental conflict. Participants primarily associated the stone industry with its economic importance for the community, although they also acknowledged several practical challenges related to quarrying.

The first aspect concerns the social acceptance of quarrying. Five of the seven participants reported that quarrying has generated only few conflicts with the local community, a perception expressed primarily by entrepreneurs and, to some extent, by a local resident and an institutional representative. They largely attributed this to the fact that the quarries are located away from residential areas and have historically provided employment. As one entrepreneur explained, "*No, there was none - because the place where they extracted the stone was remote*" (Entrepreneur A), while an institutional representative explained that "*The quarries are far from the village [...] they are actually beneficial because at least they provide us with jobs*." Similarly, a local resident recalled that "*That period was good for the whole village… people were able to build their houses*".

Participants generally perceived the environmental impact of stone processing as limited and referred to several everyday practices such as water recycling and the reuse of stone-processing residues. As one entrepreneur explained, "*We have settling tanks; the water is pumped back, so we use the same water all the time*" (Entrepreneur B). These practices were described as routine working methods rather than formal environmental management measures. A similar perception applied to dust: one local resident expressed concern about her son inhaling stone dust, but also reported that, according to him, it "*does not cause harm, because it dissolves*" (Local resident).

Although environmental concerns were not dominant, participants acknowledged several practical challenges associated with quarrying. A stone worker highlighted the impact of blasting on raw material quality: "*Blasting cracks the entire stone... it can no longer be used for carving*." (Stone worker).

Overall, participants associated the stone industry with the economic development of the village, emphasising its historical role as a major employer. As one entrepreneur explained, "*Very many people from the village worked here in the quarry*" while an institutional representative estimated that "*about 70% of the people were very well paid.*" Participants further linked this period of prosperity to improvements in local infrastructure.

While this theme focused on perceptions of environmental risk and social acceptance, the final theme explores how participants believe the community can respond to current challenges through strategies of resilience and heritage valorisation.

5.3.5 Resilience and heritage valorisation

This final theme examines the elements through which participants believe or consider that the stone-working craft can be maintained or valorised in the context of economic and social change. While the previous themes addressed the vulnerabilities of the sector, this subtheme instead concerns the community's capacity to adapt, placing particular emphasis on collaboration, heritage promotion, and the development of new economic activities. These perspectives were expressed mainly by three of the seven participants - one of the entrepreneurs, a local resident, and an institutional representative - rather than all those interviewed.

From the participants' perspective, tourism was described as a resource that could support local development as an economic alternative and could also contribute to the promotion of the local culture: "*Tourism is still doing quite well here.*" (Local resident). It was also seen as a resource that had existed in the past: "*Quite a few visitors came in the past*." (Institutional representative). In addition, some participants also mentioned collaboration between entrepreneurs, institutional involvement, and community support as important tools for the conservation of heritage.

Economic adaptation was also regarded as a condition for the survival of the craft, with some participants emphasizing the importance of diversification and a stronger orientation towards specialised products. As one entrepreneur noted, "*What will remain in the long run is custom cutting and shaping to specific dimensions*." (Entrepreneur B).

Regarding the future, some participants expressed cautious expectations, conditioned by the involvement of younger generations and institutional support. Next to this, vocational education was also mentioned as important for the survival of the craft: "*It wouldn't be a bad idea to have a vocational school*." (Institutional representative).

6. DISCUSSION

The findings of the study suggest that the continuity of stone processing in Vișlea is influenced mainly by economic conditions. Because stone processing is primarily a livelihood-generating activity, though also associated with local heritage and identity, present economic conditions threaten its survival. The interviews reveal a range of pressures affecting its long-term continuity: a declining local labour force, rising production costs, competition from imported stone, a decreasing number of producers and workers, changing patterns of demand, and the fact that the craft is not regarded or valorised as a tourist attraction. These findings cannot be separated into distinct processes; rather, they form part of the three dimensions also discussed in the theoretical review - socio-economic conditions, heritage-related vulnerability, and risk perception. These

dimensions are interconnected and together influence the capacity of the local community and its producers to maintain and adapt the traditional activity.

The findings indicate that economic vulnerability in Vișstea results from the interaction of several pressures affecting the long-term viability of stone extraction and processing. Freudenburg (1992) provides a useful framework for interpreting this pattern through the concepts of the cost-price squeeze and over-adaptation. The interviewed local producers reported increasing production costs and competition from cheaper imported stone, while the declining labour force and closure of smaller firms further weaken the economic basis of the craft. Participants also pointed to the depletion of good-quality local stone and the declining number of active quarries, which has led some producers to source raw material from other regions - further undermining the resource base of the craft. This suggests that a community historically built around a single craft can face a reduction in its capacity to sustain the craft and adapt to changing economic conditions (Freudenburg, 1992). In addition, regulatory requirements are an additional pressure on the craft. Participants suggested that increasing administrative and safety requirements can create additional costs and limit opportunities for public engagement. In particular, increasingly strict health and safety requirements may limit opportunities for public access and visits to production sites, which in turn can reduce the transmission of knowledge and interaction with younger generations.

Cutter et al. (2003) highlight that social vulnerability is shaped not only by social inequalities but also by place-specific characteristics, including the economic vitality of communities. In Vișstea, the declining economic basis of the stone industry can therefore be understood as part of the broader vulnerability of the local community. Overall, this economic vulnerability does not stem from a single factor but from the combined effect of these pressures, which also extend to other craft-based activities in the community.

In terms of craft transmission and heritage at risk, the findings suggest that the vulnerability of the craft comes mainly from the weakening of intergenerational transmission. This concern was raised across all participant groups, but voiced most strongly by institutional representatives and local residents rather than by the producers themselves. The decline of such transmission has been identified as one of the most frequent threats to intangible cultural heritage worldwide (Falk & Hagsten, 2025; UNESCO, n.d.). In the past the craft was transmitted through practical experience, family relationships, and through the master-apprentice transfer (Karakul, 2015). Nowadays, the craft is increasingly affected by declining interest among younger generations. At the same time, mechanisation has improved productivity while also changed the role of manual craftsmanship. This does not necessarily mean that it has eliminated the traditional skills but it suggests that technological change might reshape their role in maintaining the craft as living heritage. While the transmission of the craft

reflects the social and educational dimension of heritage, mechanisation highlights how technological changes reshape traditional practices redefining the skills required in stone processing.

Regarding the role of the craft in the occupation, memory, and identity trio, an important finding is the contrast between the economic importance of the craft and its more limited role in current local identity. Based on our findings, stone-working remains present in the collective memory of the community through family histories, well known craftsmen, and the built heritage of the community.

While extractive and craft-based communities often develop strong place-based identities around their industry (Wheeler, 2014; Measham et al., 2021), the interviews suggest that participants related to it primarily as an occupation and a source of livelihood, with its identity dimension appearing weaker and voiced mainly by non-practitioners – the priest, the councillor, and an elderly resident - rather than by those who work with stone. This resonates with findings from other post-extractive communities, where perceived economic benefits weigh more heavily than symbolic or environmental concerns, and where collective memory and economic benefits make environmental risks seem less serious or acceptable (Carballo-Cruz and Silva, 2026). This suggests that the decline of the stone working may represent not only the loss of an economic activity but also a gradual disappearance of the craft's practice that the community still remembers. As the craft declines, the built heritage - the stone houses themselves - may increasingly become its most visible trace.

In terms of environmental risk perception and social acceptance, the findings suggest that environmental risks were generally perceived as limited and manageable. Rather than weighing benefits against risks, most participants did not perceive significant environmental or health risks in the first place; the industry was recalled mainly as a source of employment and local prosperity. This can be linked to the concept of a social licence to operate, whereby the long-term presence and perceived benefits of an activity sustain its community acceptance (Gunningham et al., 2004; Moffat & Zhang, 2014).

Stone dust, in particular, was described by several participants as harmless or even beneficial - one manager, for instance, recalled that it was given to animals as a source of calcium. Where health concerns were voiced, they remained ambivalent: a local resident worried about her son inhaling dust, yet also reported the belief that it "*does not cause harm*". Producers, however, emphasised the economic importance and acceptability of the activity most strongly. In contrast to high-profile cases of opposition to extraction in Romania, such as the gold-mining conflict at Roșia Montană (Szabó et al., 2022), the residents of Vișlea broadly accepted local quarrying - experiencing it not as an environmental or health hazard, but as a source of livelihood and a tradition they take pride in.

In terms of resilience and heritage valorisation, the results show that some participants perceive local heritage not only as something to be preserved, but also as a resource that can contribute to local economic and social development. In this context, resilience depends on the capacity of local actors to collaborate, promote the heritage, and adapt to changing economic and technological conditions (Gocer et al., 2024). Heritage valorisation, including through tourism, may therefore provide opportunities to maintain the craft (Gocer et al., 2024), contributing to community resilience (Magis, 2010). Some participants pointed in this direction, although their views on the potential of tourism were not entirely consistent. Overall, the findings suggest that the future of the craft may depend in part on the community's capacity to transform heritage from a threatened tradition into an active resource for the local economy.

Limitations

The results are based on the participants' perceptions and estimates rather than on official statistics. Any figures mentioned by informants (for example, the number of workers employed in the industry) represent personal approximations and were treated as such rather than as verified values. Because of the small and purposive sample size (n=7), the results cannot be generalized, and full anonymity cannot be guaranteed, as individuals may be identifiable from contextual details in a small community despite the use of anonymised labels. In addition, the council representative was suggested by the municipal office, so a gatekeeper bias may be present. Finally, the number of companies operating in stone processing and the number of active quarries is based on fieldwork rather than on official statistical data. In addition, the inventory recorded the presence of Vișlea stone but not the occupancy status of the buildings (for example permanent dwelling, secondary residence or abandoned). Including this dimension could provide a further indicator of the decline of the built heritage and would be a useful direction for future research.

7. CONCLUSIONS

The study's main research question was to what extent the decline of Vișlea stone processing generates socio-economic and heritage risks for the local community, and how these risks are perceived by local actors. The study shows that, in this case, economic vulnerability arises from several interrelated pressures, rather than a single cause: market pressure arising from imports and shifts in demand, a shrinking and ageing workforce, the depletion of quarries and stone resources, and regulatory burdens collectively threaten the survival of the craft. Consequently, the heritage faces a dual threat consisting of the disruption of intergenerational transmission due to young people's declining interest, and mechanisation, which however does not eliminate the craft but redefines it. One of the most important and perhaps most surprising findings is that stone is

perceived as a livelihood rather than a symbol, because informants primarily experience stone-working as an occupation and a means of making a living, rather than as a symbol of local identity. Identity appears as a weak thread, expressed mainly by non-practitioners (the priest, a councillor, and an older resident). The study's most distinctive finding is the limited risk perception and broad social acceptance. The main contribution of this research is that it applies a risk and vulnerability framework to a traditional craft and reveals an unusual pattern of risk perception, based on the finding that the active extraction of raw material is not a source of conflict within the community - a finding that stands in contrast to many other cases. The community does not perceive significant environmental or health risks associated with stone extraction and largely accepts the activity, or even considers it beneficial. This acceptance does not stem from a conscious weighing of potential harm, but rather from the low visibility of risks and the historical importance of the industry's economic benefits (a social licence to operate, consistent with the findings of Gunningham et al., 2004, and Moffat & Zhang, 2014). In terms of resilience, this represents a partially unexploited opportunity: the study shows that heritage valorisation through tourism, specialised carving and restoration, and education could offer opportunities to sustain the craft, but this potential has so far been realised only to a limited extent. Future research could involve larger samples and different communities to enhance the generalisability of these findings. A practical contribution of this study is the openly accessible online database of the built heritage, which can serve as a tool for future research, for heritage documentation, and for local authorities in planning.

ACKNOWLEDGEMENTS

The results of this study stem from the spatial planning field practice organised by the Center for Regional Geography, Faculty of Geography, Babeș-Bolyai University, Cluj-Napoca, conducted between May and August 2026. The authors would like to express their gratitude to all students involved in the field data collection activities, as well as to the individuals and institutions that contributed to the acquisition of data and information relevant to the research topic. We are especially grateful to the interview participants, who have generously shared their time, their recollections and knowledge of the village.

CRediT authorship contribution statement

Patrick-Cristian Trufan:, Methodology, Investigation, Data curation, Formal analysis, Visualization, Writing - original draft; Radu-Mihai Tamasi: Investigation, Data curation, Visualization, Writing - original draft; Ștefan-Alexandru Moroianu: Investigation, Data curation, Formal analysis; Lavinia Constanda: Investigation, Data curation; Marian-Dorel Sighiartău: Methodology, Formal analysis, Data curation, Investigation, Visualization, Writing - original

draft, Supervision; Júlia Angéla Nagy: Conceptualization, Methodology, Formal analysis, Investigation, Data curation, Writing - original draft, Supervision.

Declaration of generative AI use

AI-based tools were used at: (1) speech-recognition software for initial transcription, verified against the audio by the authors; (2) AI-based translation of some excerpts, checked against the transcripts by the authors; (3) an AI assistant to check coding consistency and as a critical interlocutor; (4) AI-based assistance with language editing, the translation of the authors' own text, and the structuring of the text. All transcription, translation, coding, theme development, interpretation and the final content of the manuscript were the responsibility of the authors.

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