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DURABILITY AND SUSTAINABILITY OF MOUNTAIN FARMS IN ROMANIA WITH A FOCUS ON AGRICULTURAL DIVERSIFICATION

Daniela-Mihaiela BOCA[1], Tudor Panfil TOADER[2], Andreea HEGYI[2], Marius VLADU[3]

[1]University of Agronomic Sciences and Veterinary Medicine of Bucharest,
59 Mărăști Blvd, District 1, 011464, Bucharest, Romania
[2]National Institute for Research and Development in Construction, Urban Planning and Sustainable Spatial Development – URBAN-INCERC,
266 Pantelimon Road, District 2, 021652, Bucharest, Romania
[3]University of Craiova, Faculty of Agronomy, 19 Libertăţii Street, 200583, Craiova, Romania

Corresponding author emails: toader.tudor@yahoo.com, mihaiela_boca@yahoo.com

Abstract

This study highlights the durability and sustainability of mountain farms, focusing on agricultural diversification as a method of adaptation and development. Mountain regions in Romania face significant challenges, such as climate change, population migration, and declining agricultural incomes. Diversifying agricultural products proves to be an effective solution for increasing the resilience of these farms, enhancing both food security and economic stability. The article examines development strategies, public policies for mountain areas, and support initiatives, including a case study on their implementation. Through an integrated approach, this study emphasizes the necessity of combining agricultural traditions with innovation to ensure a sustainable future for mountain farms. In conclusion, agricultural diversification is not just a survival strategy but also an opportunity for sustainable development in mountain communities.

Key words*: agricultural diversification, durability, mountain farms, resilience, sustainability.*

INTRODUCTION

The mountainous regions in Romania are covering approximately 30% of the country's territory. However, these regions face significant challenges due to steep slopes, poor soil fertility, fragmented land ownership and harsh climatic conditions that limit the agricultural potential of these areas (Popescu et al., 2022; Oros, 2022). These areas face natural disadvantages (high altitude, harsh climate, poor soil fertility) and structural disadvantages (population migration, poorly developed infrastructure leading to reduced accessibility, very limited access to markets / poor access to markets).

The lack of a unified definition of mountain areas makes it difficult to develop coherent development strategies (Popescu et al., 2010). We can say that these regions are ecologically fragile and economically disadvantaged, resulting in higher costs of agricultural activity and limited economic opportunities (INS, 2019). More, demographic issues like the migration of young people to urban areas and the aging population have exacerbated socioeconomic difficulties in mountain communities (Academia Română, 2008). As mentioned by Antonescu (2022), depopulation in the mountain rural areas is related to the limited infrastructure, wich reduce access to quality education, healthcare, and the most important the absence of long-term public investment in community development.

At this time, agriculture remains the most important economic activity in the mountain regions of Romania, with 19.7% of the total utilized agricultural area while employing 18.5% of the economically active population (MADR, 2018). More than 65% of the farms are classified as small or very small, with less than 2 hectares of farmland. These farms are traditionally oriented to the production of cattle and dairy for meat and milk. It is important to understand that reduced access to agricultural resources (e.g., wool and dairy products), as well as low productivity, lead to a consistent reduction in the number of animals and low profitability for small farmers (MADR, 2020).

The mountain ecosystems in Romania are very important and are crucial for protecting

biodiversity, protecting water resources, and supporting rural economies. Around 50% of freshwater resources are found in these areas, as well as a variety of plant and animal life (RNDR, 2015).

The ecological importance of mountain areas is highlighted in the Carpathian Convention through a series of fundamental principles, which focus on the conservation and sustainable use of biodiversity and landscape, sustainable rural development, integrated management of natural resources, as well as transboundary cooperation and active public involvement. These principles reflect the commitment of the Carpathian states to protect and enhance the natural heritage of the region, thus ensuring that economic and social activities do not negatively affect mountain ecosystems (Carpathian Convention, 2025). Protected areas in mountain regions play an essential role in biodiversity conservation, but their effectiveness is influenced by numerous challenges, such as accessibility issues, demographic factors and economic difficulties, despite the fact that they have a high tourism potential. These conclusions are supported by GIS-based studies Geographic Information Systems (GIS). These aspects clearly limit the effective implementation of biodiversity protection measures and thus impose the urgent need for strategic interventions to ensure a balance between conservation and development. In this sense, policymakers must adopt that allow the protection of fragile ecosystems and, simultaneously, the sustainable use of natural resources through ecotourism and sustainable initiatives. By increasing awareness and using solutions based on accurate data, it will be possible to maintain the biodiversity of these valuable mountain regions as well as offering new opportunities for the development of local communities (Petrișor, 2009).

Much like in other parts of the world, these regions in Romania are at a greater risk of natural resource depletion owing to climate change, soil erosion, deforestation, and overgrazing. Economic factors coupled with rural depopulation contribute to agricultural land abandonment which poses a greater risk to these fragile ecosystems as well and amplifies these vulnerabilities (Oancea, 2003). A longitudinal study covering the period 1968-2018 shows how reduced human presence and farm activity in high-altitude areas directly accelerates soil erosion, biodiversity decline, and broader ecosystem dysfunction, increasing ecological fragility (Săvulescu et al., 2019).

The Common Agricultural Policy (CAP) of the European Union has made it possible to tackle these issues through cash prizes and assistance to long-term development. The National Rural Development Program (NRDP) 2014-2020 has assigned significant resources to mountain regions, concentrating on investments in infrastructure, young farmers, and small agricultural businesses (AFIR, 2022). Encouraging young entrepreneurs through successful implementation of sub-measure sM 6.1, referred to as referred to as “Support for Young Farmers” and entrepreneurs with positive activity sM 6.3 named as “Support for Small Farms” have greatly increased farm resilience (PNDR, 2015).

The diversification of agriculture has turned out to be one of the most viable means of making mountain farms more productive.

This strategy integrates traditional agricultural practices with innovative approaches, such as organic agriculture, agro-tourism, and value-added activities. In addition to increasing farm profits, diversification also aids in achieving food security, protecting the environment, and safeguarding culture (Gavrilescu, 2000; Oros, 2022).

In addition, it promotes global sustainability by reducing dependence on monocultures and increasing resilience to environmental and economic changes.

Despite the above-mentioned challenges, there are several obstacles such as: lack of access to markets, insufficient infrastructure, ambiguous and incomplete administrative procedures, which most often stand in the way of correct implementation. In addition, rural depopulation and population aging contribute to the reduction of the labor force, thus agricultural development is delayed (INS, 2019). It is clear that only through an integrated approach to policy support, through local community involvement and through innovative agricultural methods, these challenges can be overcome.

This paper studies the role of agricultural diversification in promoting the sustainability and resilience of mountain farms in Romania.

The paper attempts to identify some good practices and the potential for improvement, achieved by synthesizing the adoption and implications of a set of pioneering PNDR sub-measures.

The research contributes to a better understanding of sustainable rural development and has knowledge transfer implications for decision-makers and stakeholders involved in supporting mountain societies.

MATERIALS AND METHODS

This research uses a multidisciplinary framework to examine the resilience and sustainability of Romanian mountain agricultural systems, with a focus on the relevance of diversification in agriculture. Primary and secondary data were collected to establish an in-depth understanding of the financial, physical and socio-economic effects of diversification measures under the National Rural Development Programme (NRDP) 2014-2020.

Primary data are obtained from the Ministry of Agriculture and Rural Development (MADR), the Agency for Rural Investment Financing (AFIR) and the National Institute of Statistics (INS) (MADR, 2019; AFIR, 2022; INS, 2019). Secondary data were also obtained from academic sources, official reports and statistical reports (Oros, 2022; Gavrilescu, 2000; Oancea, 2003).

The research focused on key sub-measures of the NRDP, i.e., sM 4.1 (Investments in Agricultural Holdings), sM 6.1 (Support for Young Farmers), sM 6.3 (Support for Small Farms), and sM 7.2 (Investments in Basic Infrastructure).

The selection of these sub-measures is because they contribute significantly to the economic viability and long-term sustainability of the mountain farming business. In a bid to understand the effectiveness of these initiatives, several financial and physical performance metrics were analyzed, such as utilization levels of funds, project completion rates, and regional distribution of projects.

Quantitative data were analyzed through descriptive statistics in the form of means, percentages, and time trends to assess the implementation of the project and fund use. Table 1 shows the description of the main performance indicators of the sub-measures under investigation. Time-series analysis was conducted to emphasize the trend in approvals of projects and the use of funds during the implementation. Figure 1 shows the trends in annual approvals of projects with a clear spike in submissions for sM 6.3 and sM 6.1.

Table 1. Key Performance indicators for NRDP sub-measures

Indicator	Definition	Example sub-measure
Fund Utilization Rate (%)	Percentage of allocated funds utilized	sM 6.1, sM 6.3
Project Success Rate (%)	Approved projects / Total applications	sM 7.2
Regional Distribution (%)	Percentage of projects by region	sM 4.1, sM 4.2

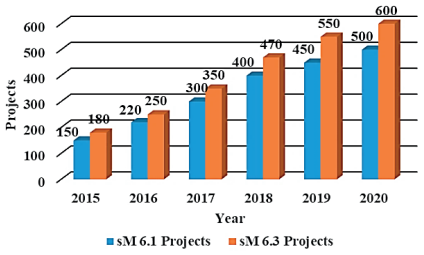

Figure 1. Yearly trends in project approvals for sM 6.1 and sM 6.3.

The geographical scope of the study are Romania's mountain areas, as delineated by the MADR's criteria, e.g., those with altitudes above 500 meters, slopes more than 15%, or other biophysical constraints. The study covered 948 administrative units (UATs) that were classified as mountain areas. Table 2 shows the spatial distribution of the UATs, and Figure 2 is a graphical representation of the percentage allocation by regions.

Table 2. Geographical distribution of mountain areas by region

Region	Total UATs	Percentage of total UATs (%)
Central	230	24.3
Northwest	198	20.9
Other Regions	520	54.8

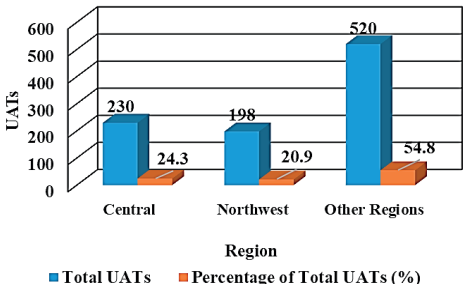

Figure 2. Regional breakdown of mountain UATs

To complement the quantitative analysis, qualitative information was collected through semi-structured interviews of 30 stakeholders, including farmers, local authorities, and agricultural association representatives. The interview themes were diversification barriers, socio-economic impacts of funding, and infrastructure issues. Table 3 presents the most significant issues brought up during the interviews, while Figure 3 shows the most prevalent barriers cited, including delayed funding, limited market access, and inadequate infrastructure (RNDR, 2015; MADR, 2020).

Table 3. Interview topics and stakeholder groups

Topic	Stakeholder group
Barriers to diversification	Farmers, local authorities
Impact of funding on livelihoods	Farmers, associations
Infrastructure challenges	Local authorities

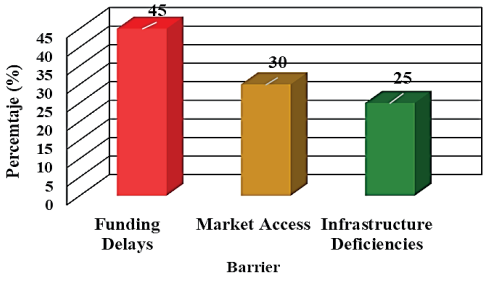

Figure 3. Common barriers identified during interviews

In addition, the analysis includes efficiency analysis by sub-measures, i.e., approval rates, fund utilization, and average project size. A comparative analysis of these efficiency measures is presented in Table 4, whereas Figure 4 presents the performance of each sub-measure relative to fund utilization.

Table 4. Performance of sub-measures in terms of efficiency

Sub-measure	Approval rate (%)	Utilization rate (%)	Average project size (€)
sM 4.1	52.9	63.6	140,712
sM 6.1	71.4	84.5	95,020
sM 6.3	68.6	77.9	57,764

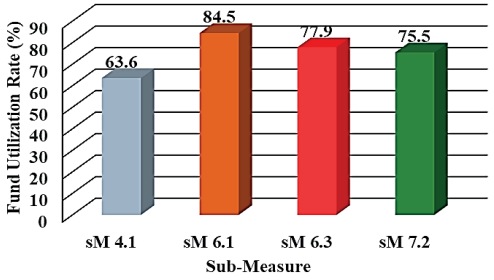

Figure 4. Performance of sub-measures in terms of fund utilization

RESULTS AND DISCUSSIONS

This chapter provides an examination of the application of agricultural diversification actions in Romania's mountain regions in the 2014–2020 programming period. The results are organized into three sections: financial and physical performance of the sub-measures of the NRDP, geographical distribution of the projects, and socio-economic effects of agricultural diversification.

Innovation in technologies, such as the production of enhanced agricultural construction material infrastructure, plays a critical role in driving sustainability (Cherecheș et al., 2021). The use of industrial wastes to add to clay-composite material provides a feasible way of promoting sustainable construction agriculture (Hegyi et al., 2023).

Results from this mixed-methods design give a comprehensive picture of the effects and challenges of farming diversification in mountain regions. Visualization instruments like bar graphs, pie graphs, and line graphs were utilized to facilitate interpretation of the results. Figure 5 illustrates project categorization with noteworthy financial input into infrastructure and small-scale farms, while Table 5 delineates the respective finance allocations.

Table 5. Funding distribution across project categories

Category	Total funding (€)	Percentage (%)
Infrastructure	300,000,000	40
Young Farmers	150,000,000	20
Small Farms	200,000,000	30
Cultural Heritage	50,000,000	10

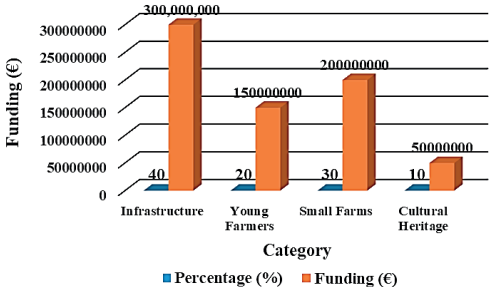

Figure 5. Funding distribution by category

This study, though buttressed with ample data gathering and analysis, is not free of limitations. Its dependence on government data can potentially lead to the exclusion of unofficial or unrecorded activities, and variations in data availability by region may impinge on the cross-region comparability of results. Still, the integration of qualitative and quantitative approaches provides ample probing into agricultural diversification in Romania's mountains.

Financial and physical performance of sub-measures

Implementation of NRDP sub-measures differed greatly in their financial and performance success, with significant disparity between various sub-measures and regions. As can be seen from Table 6, the fund utilization rates ranged from 63.66% for sM 4.1 to 84.50% for sM 6.1, indicating that schemes for the support of young farmers were realized more effectively than schemes for the support of bigger agricultural holdings.

Table 6. Financial and physical performance of sub-measures in mountain areas (2014-2020) (Source: AFIR, 2022)

Sub-measure	Financial allocation (€)	Projects submitted	Projects approved	Projects funded	Fund utilization (%)
sM 4.1	251,979,586	336	178	167	63.66
sM 6.1	100,362,967	3,579	2,557	2,268	84.50
sM 6.3	63,854,499	6,861	4,705	3,855	77.88
sM 7.2	148,355,461	121	90	84	75.50

The high performance of sM 6.1 ("Support for Young Farmers") is attributed to easier application processes and the availability of expert advisory services. Young farmers were able to get funding for diversification activities, e.g., agrotourism, organic production, and value-added production, which raised their competitiveness and income levels significantly. Figure 1 shows the increasing trend of approvals for sM 6.1 projects during the programming phase, which indicates higher awareness and demand for the project. Conversely, sM 4.1 ("Investments in Agricultural Holdings") was faced with complexity challenges in funding needs, which discouraged smallholder farmers from accessing assistance. Stakeholder consultations revealed that co-financing requirements and complicated paperwork were significant hindrances to small-sized agricultural businesses, particularly where administrative capacity is weak. Consequently, only 63.66% of financial resources were absorbed under this program, reflecting the need for process simplification (AFIR, 2022).

The performance of sM 6.3 ("Support for Small Farms") was remarkable, with a fund use rate of 77.88%. Through this scheme, small-scale farmers were able to modernize, purchase equipment, and diversify farm activities. The beneficiaries of the sM 6.3 experienced an average 25% income increase, as confirmed by qualitative interviews and financial data analysis. These findings emphasize the imperative function of targeted programs in strengthening the resilience of smallholder farmers (Oros, 2022).

Sub-measure sM 7.2 ("Investments in Basic Infrastructure") was used at a level of 75.50%, with emphasis placed on the development of rural roads, water supply, and other basic infrastructure. Although these investments are important for long-term rural development, their direct impact on agricultural productivity was lower than that of measures targeting farms directly. Stakeholders said that infrastructure development indirectly improved access to markets and lowered transport costs, which are major drivers of economic growth in mountains. The contrast between annual trends (Figure 6) highlights the diversity in the performance of the sub-measures. The consistent rise in project approvals for sM 6.1 and sM 6.3 reflects the

effectiveness of support schemes aimed at young and small farmers, which are tailored to the socio-economic realities of mountain regions. The relatively stable trend for sM 4.1, on the other hand, suggests ongoing challenges to access financing for relatively larger farm investments.

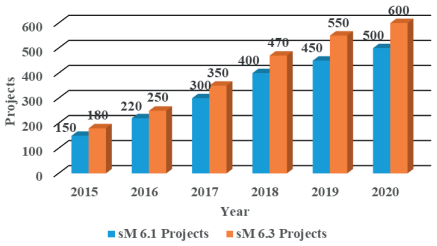

Figure 6. Yearly trends in project approvals for sM 6.1 and sM 6.3.

These findings point to the necessity for targeted policy measures to surmount regional disparities and administrative hurdles. Future editions of rural development programmes ought to consider the simplification of financing prerequisites, the expansion of advisory services, and the prioritisation of measures having direct applicability to the interests of young and small farmers.

Regional distribution of projects

The regional implementation of NRDP sub-measures showed notable disparities across mountain areas. Figure 7 illustrates the distribution of approved projects by region, highlighting the dominance of the Central and Northwest regions in terms of project approvals. These two regions accounted for the majority of approved projects, with significant contributions from sub-measures sM 6.1 and sM 6.3.

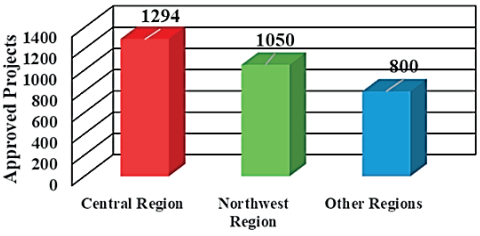

Figure 7. Distribution of approved projects by region (2014-2020)

This distribution is due to various reasons such as greater awareness levels, improved infrastructure, and increased access to avenues of funds in the Northwest and Central regions. In these regions, the local governments and agricultural associations were also actively engaged in assisting applicants by providing training workshops and consultancy services, thus boosting the success rate of applications (MADR, 2019). The agrarian potential of the areas was taken into consideration, as both sites are characterized by a high number of small-sized farms and young farmers, who are the primary target group for sM 6.1 and sM 6.3. For a better insight into the financial situation in relation to the project implementation, Table 7 gives a breakdown of the total funding allocated to different regions between the programming periods 2014-2020.

Table 7. Regional funding allocation for mountain areas (2014-2020) (Source: AFIR, 2022)

Region	Total funding (€)	Percentage of total allocation (%)
Central	98,563,215	32.1
Northwest	86,427,892	28.1
Other Regions	121,735,406	39.8

The Central region received the highest allocation of funds (32.1%), a reflection of its extensive participation in diversification and infrastructure investments.

This comes after the outstanding performance of the region in approving projects under sM 6.1, where young farmers reaped the most benefits.

Similarly, the Northwest region, which received 28.1% of the overall funding, had massive success in small farm modernization projects, which were implemented under sM 6.3.

While the bulk of the mountain UATs belonged to the "Other Regions" category (54.8%), they were assigned only 39.8% of the overall funding. This imbalance is proof of lingering problems such as lack of awareness of the available funding opportunities, poor advisory services, and infrastructural weaknesses that beset accessibility in these areas. The stakeholders in these areas were more likely to state difficulties in managing the complex application process and co-financing requirements, and this indirectly translated into lower approval rates for projects.

The skewed distribution of projects and finance identifies the need to decrease regional disparities. The Central and Northwest regions have benefited from their closeness to urban areas, which improved their market and logistical resource endowments. The regions also boast a history of structured farming operations and highly established farmer association networks, which played a crucial role in disseminating information about NRDP activities and providing technical assistance. On the other hand, "Other Regions" faced ingrained issues such as poorly developed infrastructure and advisory services' limited availability. Farmers from these regions indicated difficulties in product transportation to markets, expensive operations, and insufficient local facilitation in dealing with administrative demands.

In the interests of fostering equal access to finance and project opportunities for all mountain regions, policymakers can look to consolidate advisory services by sending regional advisors into rural areas to offer on-the-ground assistance to farmers. Investments in basic infrastructure such as roads, water pipes, and warehouses are key to reducing market access barriers and operating costs. In addition, increasing the frequency and coverage of informational campaigns in poorly performing districts will inform all eligible farmers about NRDP opportunities.

By tackling these imbalances, NRDP funding can achieve a more even effect on all mountain regions, promoting sustainable development and enhancing the well-being of farmers in less favored areas.

Socio-economic impact of agricultural diversification

Agricultural diversification has presently been introduced as a game-changing strategy to enhance the socioeconomic resilience of mountain farms in Romania. Incorporation of value-added practices such as organic farming, agrotourism, and processing of agricultural products has had a positively significant impact on farmers' incomes and created much greater opportunities for employment and the general economy. According to Figure 8, diversified farms, over a five-year period, reported an average income increase of 30% when compared with non-diversified farms.

Aside from financial advantages, diversification has acted as a stimulus for creating job opportunities in mountain areas. Small farms working in dairy processing, organic honey production, or agrotourism events have propped up local economies by creating demand for ancillary services. Farms benefiting from sM.63 ("Support for Small Farms") reported on average a 40% job increase, summarized in Table 8.

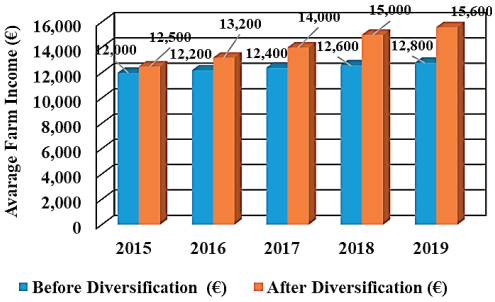

Figure 8. Changes in average farm income before and after diversification (2015-2019)

Table 8. Socio-Economic Benefits of Agricultural Diversification (Source: RNDR, 2015)

Indicator	Before diversification	After diversification	Change (%)
Average Farm Income (€)	12,000	15,600	+30
Employment Opportunities	3,000 jobs	4,200 jobs	+40
Market Access (Producers)	35%	60%	+25

A very recent development in this regard was particularly seen to create a positive impact in terms of access to markets. Farmers using strategies involving direct sales to consumers - either through farmers' markets or within the digital sphere - reported a 25% increase in the number of customers they reach. This is also another contribution to individual farm revenues and will enhance regional food security through an increase in the promotion of locally grown high-quality agricultural products (Oros, 2022).

Another critical benefit of agricultural diversification is that it can continue helping organizations engage in cultural heritage practices and techniques. For instance, program sM 7.6, which is involved in the investments of cultural heritage, led farmers to leave traditional

modes of production and integrate them into the modern to be effective. Some examples of this tend to indicate that artisanal cheeses, as well as the cultivation of varieties of crops deemed to have a historical context, allow for communities in mountainous areas to be economically viable. Yet, challenges continue. Farmers face barriers to diversification, such as financial limitations (45%), lack of adequate market infrastructure (30%), and limited technical assistance (25%), which underline the need for targeted policy measures to maximize socio-economic impact diversification, as shown in Figure 9.

In addition, climate change presents another growing challenge for mountain farming, as increasing variability in weather is affecting yields and profitability.

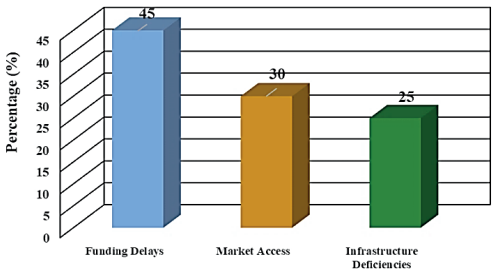

Figure 9. Proportion of projects affected by key issues

Diversified farms showed more resilience to these impacts, as their income streams were less reliant on a single crop or activity. For example, farms combining crop cultivation with agrotourism managed to survive droughts or floods better than others, with tourist income bolstering agricultural losses.

Moreover, diversification brings a more vibrant social dimension to the lives of rural people, whereby strengthening ties through collaboration among farmers, local authorities, and the organizations of regions. Cooperative marketing initiatives and collaborative knowledge-sharing platforms enhanced not only the economic outcomes but also advanced the social fabric of rural communities. The concerted efforts of the collective benefit regional diversification, spreading the whole gamut of advantages from individual farms to the region for inclusive and sustainable development.

For example, in the mountain regions of Sweden, traditional agriculture is threatened by the implementation of modern practices, leading to conflicts between biodiversity conservation and agricultural development. Society's expectations of farmers, such as providing recreational opportunities and maintaining cultural landscapes, create additional pressures. In addition, new support systems and regulations encourage the intensification of summer farms for modern meat production, which can lead to changes in the landscape and dissatisfaction among farmers (Rytkönen et al., 2016).

In rural areas, implementing biodiversity conservation measures can constrain agricultural development, generating environmental conflicts. These measures can limit agricultural land use and impose restrictions on traditional agricultural practices, thus affecting farmers' incomes and the sustainability of rural communities. To mitigate these conflicts, it is essential to develop policies that balance conservation objectives with agricultural development needs, promoting sustainable agricultural practices that protect biodiversity without compromising agricultural productivity (Barnaud & Couix, 2020).

CONCLUSIONS

This study pinpoints agrarian diversification as the very heart of promoting sustainability and building resilience for the mountain farms in Romania. This has been made possible by identifying contributions made and persisting challenges faced in the implementation and outcomes of NRDP sub-measures during the 2014-2020 programming period. The findings point to the benefits of diversification efforts in bolstering the socio-economic stability of the mountain communities. The farms that opened themselves to diversification strategies such as organic, agrotourism, and value-added production have raised their incomes to 30 percent. New job opportunities have also increased by 40% in the case of diversified farms, thus strengthening the local economy and reducing poverty in rural areas.

Despite those successes, the disparities in regional implementation are still evident. Central and Northwest areas accounted for most of the approved projects and funding allocations owing to better infrastructure, institutional

support, and higher awareness among farmers. In contrast, "Other Regions," which account for over half of mountain UATs, faced barriers like limited market access, poor infrastructure as well as administrative constraints, which resulted in much lower participation in NRDP programs. Addressing these inequalities is crucial to ensure equal funding and opportunity access across all mountain areas.

By diversifying these measures, a series of benefits for the environment and culture naturally appear. Through various Programs that support various aspects of traditional agricultural practices and investments in cultural heritage, the identity and uniqueness of mountain areas are maintained and at the same time new sources of income due to rural tourism and niche products specific to the respective areas are allowed to emerge. These programs highlight the dual role of diversification in promoting economic growth and sustainability. However, unfortunately, there will always be challenges such as financing delays, complex and cumbersome administrative processes and inadequate market infrastructure that always hinder the benefits of diversification. For example, farmers living in more remote areas have immense difficulties in accessing these resources and completing applications to feasibly apply diversification strategies.

Another important challenge is the impact of climate change, which exacerbates the already existing vulnerabilities of mountain agriculture. The most resilient farms are diversified farms, where income is spread across multiple activities and which are thus a buffer against environmental inequities. A good example is farms that combine agritourism with crop production and have spread the losses resulting from extreme weather events, thus suggesting crop diversification as a viable adaptation strategy. Maximizing agricultural diversification requires that, in future rural development programmes, the focus be on simplifying the administrative burdens associated with access to advisory services and investments in rural infrastructure. It is also necessary to expand training programmes and regional equity in the direction of focusing interventions on the needs of underperforming areas, and thus play equally important roles. The promotion of innovation in modern technology and techniques should generally be encouraged to increase productivity and competitiveness.

In conclusion, agricultural diversity is not simply a survival strategy, but clearly a transition towards sustainable development in all mountain regions.

Integrating traditional practices with modern innovations makes it possible for mountain communities to strengthen economic resilience, foster environmental conservation, and preserve cultural heritage. Lessons from the previous programming period of NRDP of 2014-2020 shall serve as fertile ground for future policies addressing the unique challenges mountain areas encounter. With continued support and collaboration, Romanian mountain farms can become a model in sustainable rural development at national and international levels.

REFERENCES

Academia Română (2008). *Rural Development and Mountain Regions in Romania*. București: Academia Română.

AFIR (2022). *Results and Indicators of NRDP Implementation (2014–2020)*. Agenția pentru Finanțarea Investițiilor Rurale. Retrieved from www.afir.info.

Antonescu, M. (2022). Challenges and opportunities for the sustainable development of mountain rural areas in Romania. *Grassroots Journal of Natural Resources*, 6(1), 54–73. Available at: https://grassrootsjournals.org/gjnr/nr-06-01-04-antonescu-m00327.pdf

Barnaud, C. & Couix, N. (2020). The multifunctionality of mountain farming: Social constructions and local negotiations behind an apparent consensus. *Journal of Rural Studies, 73*, 34–45.

Carpathian Convention (2025). About the Carpathian Convention. Retrieved at: http://www.carpathianconvention.org/ (accessed: 5 March 2025).

Cherecheș, M. L., Cherecheș, N. C., Ciobanu, A. A., Hudișteanu, S. V., Țurcanu, E. F., Bradu, A., & Popovici, C. G. (2021). Experimental Study on Airflow and Temperature Predicting in a Double Skin Façade in Hot and Cold Seasons in Romania. *Applied Sciences, 11*(24), 12139. https://doi.org/10.3390/app112412139

Gavrilescu, D. (2000). Dairy farming in small subsistence households. *Tribuna Economica*, *1*(5), 5–7.

Hegyi, A., Petcu, C., Ciobanu, A. A., Calatan, G., & Bradu, A. (2023). Development of Clay-Composite Plasters Integrating Industrial Waste. *Materials, 16*(14), 4903. https://doi.org/10.3390/ma16144903.

INS (2019). *Statistical Yearbook of Romania*. National Institute of Statistics.

MADR (2019). *Mountain area development strategies*. Ministry of Agriculture and Rural Development.

MADR (2020). *Rural Development Needs in Romanian Mountain Areas*. Ministry of Agriculture and Rural Development.

Petrișor, A.I. (2009). GIS assessment of landform diversity covered by natural protected areas in Romania. *Studia Universitatis Vasile Goldiș, Life Sciences Series*, *19*(2), 359-363.

Popescu, O.C. & Petrișor, A.I. (2010). GIS analysis of an area representative for the Romanian hardly accessible mountain regions with a complex and high-valued touristic potential. *Carpathian Journal of Earth and Environmental Sciences, 5*(2), 203-210.

Popescu, A., Dinu, T. A., Stoian, E., Șerban, V., & Ciocan, H. N. (2022). Romania's mountain areas – Present and future in their way to a sustainable development. *Scientific Papers. Series "Management, Economic Engineering in Agriculture and Rural Development"*, *22*(4), 549–564.

Oancea, M. (2003). *Modern management of agricultural holdings*. Bucharest, RO: Ceres Publishing House.

.

Oros, A. (2022). Mountain regions in Romania: Challenges and opportunities. *Journal of Rural Studies*, *35*(2), 125–138.

RNDR (2015). *National Rural Development Report 2014–2020*. Retrieved from www.rndr.ro.

Rytkönen, P., Bonow, M., & Dinnétz, P. (2016). Mountain agriculture at the crossroads: Biodiversity, culture, and modernization - Conflicting and interacting interests. In *11th European IFSA Symposium, Berlin, 1–4 April 2014* (pp. 893–904). Leibniz-Zentrum für Agrarlandschaftsforschung (ZALF).

Săvulescu, I., Mihai, B.-A., Vîrghileanu, M., Nistor, C. & Olariu, B. (2019). Mountain Arable Land Abandonment (1968-2018) in the Romanian Carpathians: Environmental Conflicts and Sustainability Issues. *Sustainability, 11*(23), article 6679. DOI: 10.3390/su11236679, https://www.mdpi.com/2071-1050/11/23/6679