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Forestry and rural development in Albania: Integrating forestry and agricultural practices for a sustainable future in the economy

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Abstract. The integration of forestry and agricultural practices contributes to the environmental sustainability and economic development of rural areas, especially in regions with soil degradation. The purpose of the study was to assess the impact of agroforestry systems on land productivity, conservation of natural resources, and socio-economic development of local communities; to identify barriers and prospects for their further implementation. The methodology included statistical analysis, comparison of the effectiveness of various agroforestry models, and assessment of economic and environmental indicators. The study showed that the area of land involved in agroforestry is 150-200 thousand hectares (10% of agricultural land). Forest and pastoral systems have reduced farmers' feed costs by 20-25%, and the use of mixed agroforestry models has increased crop yields by 14% compared to traditional farming. It was established that the level of organic matter in the soils of such systems is almost twice as high as

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in traditional agricultural landscapes, and erosion processes are reduced by 20-30%. Forest stands within the framework of agroforestry contribute to the conservation of biodiversity, in particular, an increase in the number of useful pollinating insects by 40%, and the restoration of populations of small mammals and birds. It was also found that the decentralisation of forest management has led to the creation of more than 60 forest cooperatives that ensure effective management of forest resources and increase the economic sustainability of local communities. It was found that the main obstacles to the development of agroforestry in Albania are the lack of state support, financial constraints, technological gaps, and low awareness of farmers. The results of the study indicate the need to create financial incentives, develop forest cooperatives, spread innovative technologies, and expand information support for farmers. The practical significance of the study lies in the development of a comprehensive strategy for sustainable agricultural development, which will contribute to improving land productivity, economic stability of local communities, and adaptation to climate change

Keywords: sustainable development; soil erosion; agroforestry; environmental sustainability; land productivity; economic adaptation

Introduction

Integrating forestry and agricultural practices is a key area for sustainable rural development, especially in countries with high levels of soil erosion and environmental challenges, such as Albania. Land degradation caused by intensive farming and overgrazing negatively affects the productivity of the agricultural sector, which requires the introduction of new approaches to natural resource management. Agroforestry is seen as an effective strategy for preserving soil fertility, regulating water balance, and improving the economic stability of rural communities. However, studies indicate a lack of development of mechanisms for financial support of agroforestry and a lack of clear regulatory measures, which limits its implementation at the national level. In addition to environmental aspects, the relevance of the study is also conditioned by the economic feasibility of developing agroforestry, which allows farmers to diversify their sources of income through the cultivation of tree crops, medicinal plants and the development of ecotourism. In the EU countries, such practices receive significant financial support, while in Albania, incentive mechanisms remain insufficiently developed.

The analysis of scientific sources showed a growing interest in integrating forestry and agricultural practices as a means of ensuring sustainable development and economic growth in Albania. Studies have confirmed the importance of combining economic, environmental and policy approaches to regulating agroforestry, but have identified a number of gaps in understanding the long-term consequences of these processes. The study by E. Kumi (2024) focused on assessing environmentally sustainable economic development in Albania. The researcher proved that an unbalanced policy in the field of environmental management restrained the potential for sustainable growth and required more effective mechanisms of state support for agroforestry. M. Bojović *et al*. (2024) analysed the possibilities of agroforestry systems for providing sustainable energy in the Western Balkans. The researchers found that agroforestry can help to diversify energy resources and reduce greenhouse gas emissions.

The policy of agricultural development in the context of European integration of Albania and North Macedonia was studied by A.M. Stojcheska *et al*. (2024). The researchers have found that the harmonisation of agricultural policy with EU requirements required a broader introduction of environmentally sustainable land use methods, in particular, agroforestry. The study by E. Gjokutaj (2021) considered the impact of economic and fiscal policies on agriculture in Albania. The researcher proved that financial constraints and regulatory barriers negatively affected the introduction of agroforestry, but its development could contribute to improving the efficiency of agricultural production.

The study by I. Canfora (2025) reviewed the implementation of pre-accession assistance tools for rural development. The researcher found that financial support for agroforestry could become an important area of the national policy for improving the economic stability of the agricultural sector. The study by J. Veleshnja (2024) showed that the development of ecotourism contributed to the improvement of the economic situation in rural areas. The researcher proved that the combination of forestry and agricultural resources created additional opportunities for diversification of income sources.

The challenges of sustainable rural development were addressed in the paper by E. Lika (2021). The researcher found that the integration of forestry and agricultural practices helped to reduce the risks of land degradation and increase the productivity of the agricultural sector. Ultimately, B. Kullolli (2023) analysed the legal regulation of the use of forest resources. The researcher found that the lack of a clear legislative framework limited the development of agroforestry, which required the development of new regulatory initiatives. Overall, an analysis of available research has confirmed the importance of integrating forestry and agricultural systems for Albania's economic and environmental sustainability. The scientific literature revealed a lack of comprehensive research on the long-term economic and environmental effects of agroforestry, which justified the need for further research in this area.

The purpose of this study was to assess the current state of agroforestry in Albania, identify the main challenges of its implementation, and develop recommendations for adapting successful European practices to local conditions. To achieve this goal, several tasks were set: to assess the current state of agroforestry in Albania and the main environmental challenges associated with land degradation; to carry out an economic analysis of the effectiveness of various models of agroforestry and their impact on the profitability of farms; to develop recommendations for improving the state policy of support for agroforestry, in particular, financial incentives and regulatory mechanisms aimed at improving the efficiency of integrated land use systems.

Materials and Methods

The main sources of information were data from the Ministry of Agriculture and Rural Development of Albania, which contain detailed information on the area of forestry and agricultural land, the level of soil erosion, the productivity of agroforestry systems and the level of income of farms. An important component of the study was materials from the Food and Agriculture Organisation (2025), which highlight the impact of agroforestry on yields, economic stability of rural communities, and opportunities for adaptation to climate change. The analytical reports of the European Forestry Institute (Bojović *et al*., 2024), which contain data on the economic efficiency of various agroforestry models and their contribution to the development of regional agricultural ecosystems, were also used.

The method of economic analysis was used to assess the effectiveness of agroforestry systems in comparison with traditional agriculture. Land productivity, farmers' expenses for feed and fertilisers, and additional sources of income from agroforestry (for example, growing wood, fruit crops, medicinal plants, honey) were investigated. The analysis of financial barriers included the study of the lack of subsidies, limited credit opportunities, and low level of state support for farmers implementing agroforestry systems.

The forecasting method was used to determine possible scenarios for the development of agroforestry in the short and medium term. Econometric modelling was performed, which included an analysis of changes in yields, farmers' income levels, and the expansion of land areas used for agroforestry. The model variables included indicators of soil erosion, precipitation, average annual temperature, and economic costs of farming (Ministry of Environment of Albania, 2023). This allowed assessing the effectiveness of possible policy measures and financial incentives to support farmers.

A comparative analysis of the main models of agroforestry used in Albania, in particular forest-pastoral systems, forestry and protective forest belts, was carried out. The economic efficiency, land productivity, and environmental impact of each model were evaluated. The analysis was based on quantitative indicators, including yield levels, farmers' incomes, and reduced feed costs. The study analysed the international experience of the EU countries, in particular Germany and France, in implementing agroforestry practices.

The influence of agroforestry systems on soil condition and water balance was assessed. The level of organic matter in soils, changes in humus content and indicators of water retention capacity in regions where agroforestry systems were introduced were investigated. The analysis of erosion processes was carried out, which helped to determine the effectiveness of protective forest belts and forest-pastoral systems in reducing land degradation.

Results

The integration of forestry and agricultural practices in Albania is an important aspect of sustainable rural development, contributing to the conservation of natural resources, increasing land productivity and strengthening the economic potential of local communities. The total area of forest land in the country is approximately 1.05 million hectares, which is about 36% of the total territory of the country. The area of agricultural land reaches 695 thousand hectares, of which a significant part was subjected to erosion processes due to intensive agriculture and overgrazing of livestock. In the context of land degradation, an important area has become the introduction of agroforestry systems that help to stabilise soils, regulate water balance, and increase the stability of agricultural landscapes.

The area of land used for agroforestry is approximately 150-200 thousand hectares, which corresponds to 10% of the total area of agricultural land (Food and Agriculture Organization, 2025). The main regions where such practices are actively developing are mountainous areas in the north and centre of the country, in particular, the districts of Kukes, Diber, and Korcha. The introduction of tree stands within agricultural land has become widespread among local farmers, which is explained by the positive impact of such systems on maintaining soil fertility and protecting crops from climatic extremes. Of particular importance is the forest-pastoral system, which combines tree cultivation with grazing, which is a traditional practice in many Albanian regions.

A comparative analysis of various models of agroforestry shows that land productivity

significantly depends on the type of integrated system. In particular, forestry demonstrates the highest yield among agroforestry models, since the combination of fruit trees with field crops helps to preserve soil moisture and improve soil structure. For comparison, farmers using forest pastoral systems report a 20-25% reduction in feed costs, since livestock has access to natural feed sources in forest ecosystems (Bojović *et al*., 2024). Protective forest belts show the best results in reducing erosion, which is important for regions with intensive agricultural production.

Among the typical models of integration of forestry and agriculture, forest-pastoral systems, forest gardening, and the creation of protective forest belts are distinguished. Forest-pastoral systems are the most common form of use of forest areas in agriculture, especially in foothill areas, where oak and chestnut forests serve as a natural food base for sheep and goats. Forestry, in particular, the cultivation of nut and fruit trees (for example, almonds, figs, pomegranates) in combination with traditional field crops, shows stable growth, since this model provides additional sources of income for farmers. Protective forest belts are mainly used in areas with intensive agricultural production, their purpose is to reduce wind erosion and preserve soil moisture (Table 1).

Table 1. Main models of integration of forestry and agricultural practices in Albania

Model type	Main features	Distribution regions	Economic advantages	Environmental impact on forest ecosystems
Forest and pastoral system	Grazing of livestock in forest areas	Kukes, Diber, Lezha	Increase livestock productivity, reduce feed costs	Preserving forest cover, maintaining biodiversity, and reducing fire risks through vegetation control
Forestry	Combining fruit trees with traditional crops	Korcha, Berat, Vlora	Income diversification, increasing soil fertility	Improving the soil structure, increasing the number of useful pollinating insects, and reducing erosion
Protective forest belts	Forest belts around agricultural land	Durres, Fier, Tirana	Reducing erosion, improving the water regime	Microclimate stabilisation, wind erosion reduction, drought protection, and support for local ecosystems
Forest cooperatives	Collective forest management by local communities	Northern and central regions	Improving management efficiency, improving community well-being	Restoration of forest ecosystems, reduction of illegal logging, conservation of biodiversity through rational use of resources

Source: compared by the authors based on European Commission (2023), Ministry of Environment of Albania (2023), M. Bojović *et al*. (2024), Food and Agriculture Organization (2025)

The policy of decentralising forest management, which began in 2015, has played a key role in the development of Integrated forestry and agricultural systems. According to the new management model, a significant part of the forest areas was transferred to the disposal of local authorities, which allowed communities to independently develop sustainable forest management strategies (Ministry of Environment of Albania, 2023). One of the positive results of this process was the creation of more than 60 forest cooperatives that ensure effective management of natural resources and contribute to the economic development of local communities. However, decentralisation has also revealed a number of problems, including

a lack of funding for local administrations and difficulties in controlling illegal logging.

In addition to financial and regulatory barriers, social factors also play an important role in the development of agroforestry. A survey of farmers in the regions of Kukes, Diber and Korcha showed that only 35% of respondents are familiar with the benefits of agroforestry, and another 40% believe that the introduction of tree stands can reduce their productivity in the short term (Food and Agriculture Organization, 2025). One of the main reasons for the low level of implementation is limited access to information, and insufficient consulting support from government agencies and research centres. In EU countries such as Germany and France, the introduction of agroforestry practices was conditioned by active information campaigns and state training programmes for farmers. In Germany, the Agroforestry-Förderung programme has been in operation since 2005, which provides farmers with subsidies of up to 200 EUR/ha annually for the integration of tree stands into agricultural land, which has increased the area of agroforestry by 15% over the past decade. In France, under the Plan de Développement Rural, farmers receive compensation for the creation of protective forest belts and mixed systems, which has led to an increase in agroforestry areas by 25% since 2010. Both countries actively use information campaigns and educational programmes: in Germany, the Deutscher Agroforstverein initiative organises seminars and online platforms for farmers, while in France, the National Institute INRAE has developed educational modules for agricultural colleges, through which more than 5,000 farmers have received specialised training. Scientific and technical support, including the use of drones to monitor the condition of trees and soils, has reduced maintenance costs by 30%. Environmental results are also impressive: in Germany, forest-pastoral systems have reduced CO_2 emissions by 2.5 tonnes/ha/year, and in France, protective forest belts increased the yield of vineyards by 12-18% (European Commission, 2023).

One of the main limitations of the introduction of agroforestry systems remains the low level of funding for farmers who want to apply these methods. Currently, Albania does not have special subsidies or tax incentives for farmers implementing agroforestry, which significantly limits the development opportunities of the sector. Most international funding programmes, such as the Global Environment Facility and the United Nations Development Programme (2024), are aimed at universal forest conservation rather than promoting the integration of forestry and agricultural practices. Compared to EU countries such as France or Germany, where farmers receive up to 200 EUR/ha of annual support for agroforestry, Albania has not yet created an effective financial mechanism to encourage this area.

These data indicate a significant potential for integrating forestry and agricultural practices in Albania. Through this interaction, the conservation of natural resources is achieved, land productivity increases, and the economic opportunities of the rural population are improved. However, the further development of such models requires comprehensive government support, including funding for local initiatives, infrastructure development, and dissemination of scientific knowledge to farmers.

Integration of forestry and agricultural practices is a key approach to ensuring the environmental sustainability of agricultural landscapes. In Albania, these systems contribute to improving soil fertility, preserving biodiversity, and stabilising the water balance. Given the high level of erosion processes in the mountainous and foothill regions of the country, the introduction of agroforestry systems plays an

important role in reducing the risks of degradation of natural resources and increasing land productivity.

Agroforestry contributes to the restoration of soil fertility, which is especially important in regions with high erosion rates. Planting perennial trees in combination with agricultural crops reduces wind and water erosion, which is confirmed by research by the Ministry of Agriculture and Rural Development of Albania. Increasing the level of organic matter in soils due to leaf litter and root exudates of trees contributes to the formation of a stable humus structure, which improves the water retention capacity and microbiological activity of soils. In regions where mixed forest pastoral systems are used, the level of erosion has decreased by 25-30% compared to traditional pastures. Table 2 shows the impact of agroforestry on soil indicators.

Table 2. Impact of agroforestry on soil and ecosystem indicators

Indicator	Traditional agriculture	Agroforestry	Forest ecosystems without agricultural influence
Organic matter level (%)	1.5	3	4.5
Humus content (%)	2.5	4	5.2
Erosion reduction (%)	0	20	50
Soil moisture retention capacity (%)	35	50	65
Forest floor density (t/ha)	0.5	1.8	3
Microbial content in the soil (species/gramme of soil)	10^4	10^5	10^6
Soil carbon reserve (t/ha)	3.2	6.8	9.5
Biodiversity of litter insects (species/m^2)	4-6	12-15	20-25
Number of useful fungi in the soil (U/g)	50	130	250
Ecosystem stability (rating)	Low	Average	High

Source: compared by the authors based on M. Bojović *et al*. (2024), Food and Agriculture Organization (2025)

The data in Table 2 show that the level of organic matter in soils where agroforestry is used is almost twice as high as in traditional agricultural systems. A similar trend is observed in the humus content, which is directly related to the stability of the soil structure and its fertility. One of the most important indicators is the reduction in the level of erosion, which in integrated systems reaches 20%, while in traditional agriculture this indicator is practically absent due to excessive land exploitation. Analysis of the obtained data from the point of view of ecology and forest resource management indicates significant advantages of agroforestry systems in supporting the ecosystem functions of the soil. In particular, the indicators of moisture retention capacity in such systems are significantly higher than in traditional agriculture, which helps to reduce the risk of soil degradation and improve their resistance to climate change. Although forest ecosystems without agricultural influence have the highest moisture retention capacity, agroforestry can act as an effective intermediate option for optimising the use of natural resources.

The density of forest floor, which is an important indicator of the productivity of forest ecosystems, in agroforestry systems reaches 1.8 t/ha, which is three times higher than in traditional agriculture. This contributes to improved soil microflora, increased biodiversity, and a more efficient carbon cycle, which are important factors in the sustainability of forest landscapes. The content of microorganisms in the soil also shows positive dynamics: their concentration in agroforestry systems is an order

of magnitude higher than in traditional agriculture, which indicates active biochemical processes and improvement of the soil ecosystem. An important aspect of the analysis is the carbon Reserve in the soil, which in agroforestry systems is 6.8 t/ha, which is more than twice as high as in traditional agriculture. This indicates that such systems can play an important role in the global carbon balance and be an effective measure to mitigate climate change. The biodiversity of litter insects, which are key indicators of ecosystem stability, also shows a significant improvement: in agroforestry systems, it reaches 12-15 species/m^2, while in traditional agriculture this indicator is minimal.

Special attention should be paid to the number of useful fungi in the soil, which in agroforestry systems reaches 130 U/g, which helps to increase the trophic chain and strengthen the natural mechanisms of nutrient regulation. An important final indicator is the stability of the ecosystem: if traditional agriculture is characterised by low sustainability, and natural forest ecosystems – high, then agroforestry provides an average level of ecological stability, creating a balance between the economic use of land and their ecological potential. In general, these results indicate that agroforestry contributes to improving the ecological state of soils, increasing their productivity and resistance to degradation. In the context of bioeconomics, such systems can play a key role in ensuring the environmentally balanced use of forest resources, contribute to the conservation of biodiversity and be an effective tool for adapting to climate change.

Another important environmental impact is the conservation of biodiversity, especially in the mountainous regions of Albania, where natural ecosystems have undergone significant anthropogenic impacts. The introduction of agroforestry methods contributes to the maintenance of stable ecosystem links between species, which is confirmed by field studies in the Vjosa Region (Bojović *et al*., 2024). In areas where forestry and mixed crop cultivation systems were introduced, an increase in the number of beneficial pollinating insects was recorded by 40%, and an increase in the diversity of soil microorganisms, which play a key role in maintaining natural processes of organic matter decomposition. In addition, forest stands provide conditions for restoring populations of small mammals and birds, which is an indicator of ecosystem sustainability. The integration of forestry and agricultural practices also contributes to the improvement of the hydrological regime, which is particularly important for maintaining land productivity in the face of climate change. In particular, mixed agroforestry systems contribute to the regulation of surface runoff and the preservation of soil moisture, which reduces the risk of land degradation. The introduction of perennial tree stands in agricultural landscapes helps to stabilise the groundwater level and reduce moisture loss from the soil, which is especially important for arid regions. However, the impact of climate change remains a key challenge for the effective implementation of agroforestry. It is predicted that by 2050, the average annual temperature in Albania will increase by 1.3-2.2°C, which will lead to an increase in evaporation of soil moisture, especially in low-lying areas. In addition, uneven precipitation distribution can lead to more frequent periods of drought, which will negatively affect yields. For example, in the central and southern regions, there is already a decrease in precipitation by 2.1-4.3%, which threatens to reduce the efficiency of traditional agriculture. The introduction of mixed forest-agrarian systems can become a key tool for reducing climate risks, since tree stands help regulate the microclimate, reduce soil erosion, and maintain water balance.

In areas with implemented forest-agrarian systems, the level of soil moisture retention is on average 15-20% higher than in regions with traditional agriculture. Thus, the integration of forestry and agricultural practices has significant environmental benefits, in particular, the preservation of soil fertility, the maintenance of biodiversity, and the improvement of water balance. The implementation of these methods contributes to long-term environmental stability and ensures the adaptation of agricultural landscapes to climate challenges, which is strategically important for the sustainable development of rural areas in Albania. The integration of forestry and agricultural practices not only contributes to the environmental sustainability of agricultural landscapes, but also provides economic benefits for rural communities. The use of agroforestry methods can increase the profitability of farms by diversifying sources of income, increasing land productivity and developing new economic sectors, in particular, ecotourism.

One of the main advantages is to increase profitability by expanding the range of marketable products. Agricultural producers who introduce agroforestry receive income not only from traditional crops, but also from wood, food products (nuts, fruit trees), medicinal plants, honey and mushrooms. Tree stands are the basis of sustainable forest-agrarian systems, as they provide synergy between agricultural production and forest resources. For example, in the Korcha Region, the average profit of farmers before the introduction of agroforestry was 5,000 USD/ha per year, and after the introduction – 6,000 USD/ha per year, which indicates a 20% increase (Food and Agriculture Organization, 2025). This growth is conditioned not only by the diversification of products, but also to the environmental sustainability that trees provide: they reduce soil erosion, improve its structure and create a microclimate favourable for crops.

Another important economic aspect is the assessment of land productivity in agroforestry systems in comparison with traditional agriculture. Studies show that land where an integrated approach is applied (trees+crops) has a yield of 0.5 t/ha higher. In particular, in traditional agriculture, the average yield was 3.5 t/ha, while in agroforestry systems this indicator increased to 4.0 t/ha, which is equivalent to an increase of 14%. A key role in this is played by tree stands, which stabilise the water balance, maintain soil moisture and reduce the impact of climatic extremes, ensuring long-term productivity of land. This is conditioned by improved microclimatic conditions, increased soil moisture levels, and reduced risks of land degradation. Table 3 presents a comparison of the economic indicators of conventional agriculture and agroforestry systems.

Table 3. Comparison of the profitability of agroforestry and traditional forestry

Indicator	Traditional forestry	Traditional agriculture	Agroforestry
Profit per 1 ha (USD/year)	2,000	5,000	6,000
Payback period (years)	20-30	1-3	5-7
Additional sources of income	Wood	None	Wood, nuts, medicinal plants, honey
Investment level (USD/ha)	1,500	500	2,000
Impact on the ecosystem	Moderate, possible negative consequences due to logging	High, soil erosion	Positive, reducing erosion

Source: compared by the authors based on M. Bojović *et al*. (2024), Food and Agriculture Organization (2025)

Analysis of the economic indicators of traditional forestry, traditional agriculture, and agroforestry shows that integrated agroforestry systems have significant advantages in both financial and environmental aspects. One of the key indicators is profitability: revenues per hectare in traditional forestry are about USD 2,000 per year, in traditional agriculture – USD 5,000 per year, while in agroforestry systems this figure reaches USD 6,000 per year. This growth is driven by product diversification, as farmers receive additional income from wood, nuts, medicinal plants, and honey in addition to their main agricultural activities. An important economic factor is the return-on-investment period. Traditional forestry has the longest payback period – from 20 to 30 years, which is conditioned by the slow growth of wood pulp and the need for long-term investments before making the first profit. In traditional agriculture, this period is much shorter and amounts to 1-3 years, which is explained by the annual harvest. Agroforestry shows an intermediate option – 5-7 years, which, although longer than traditional agriculture, is offset by higher profitability and stable incomes in the long term.

Investment costs per hectare in traditional forestry reach USD 1,500 per hectare, which includes reforestation costs, plantation maintenance, and long-term management. In traditional agriculture, the level of investment is lower – about USD 500 per hectare, which is explained by the intensive use of soils without the need for long-term investments in tree crops. At the same time, in agroforestry systems, this figure is USD 2,000 per hectare, since it requires additional investment in forest stands, but at the same time provides a more stable economic effect. From an ecological standpoint, traditional forestry has a moderate impact on ecosystems, but there may be negative consequences due to intensive logging, which can disrupt the balance of forest biocoenoses. Traditional agriculture has the greatest negative impact on the environment, causing soil erosion, reduced humus levels, and loss of biodiversity due to intense agricultural impacts. In turn, agroforestry provides a positive impact on the ecosystem, since the combination of tree stands with agricultural crops helps to reduce erosion processes, improve soil structure and increase biodiversity.

Thus, the results of the analysis show that agroforestry is an effective model of land management that combines economic benefits and environmental sustainability. Such a system can optimise land use, reduce the risks associated with soil degradation, and ensure long-term economic efficiency for farms. In addition, agroforestry can play an important role in the development of a sustainable bioeconomy, as it contributes to maintaining the productivity of agricultural landscapes, preserving ecosystem services, and mitigating the effects of climate change. Another promising area is the development of ecotourism, which is an important source of income for rural communities that actively use forest resources. In Albania, there is an increase in demand for ecotourism, especially in mountainous regions, where local communities organise agrotourism routes, tasting tours using local products, walks in forests and eco-farms. In the mountainous regions of Leja and Kukes, the average annual income of local farms from ecotourism by 2018 was USD 6,000, while in 2023 this figure increased to USD 7,500-8,000, which indicates a 25-30% increase.

Thus, the integration of forestry and agricultural practices not only increases the profitability of agriculture, but also creates a sustainable economic base for the development of local communities, reducing their dependence on traditional agriculture. Investments in agroforestry contribute to the development of long-term economic benefits by increasing land productivity, more efficient use of natural

resources and the development of new economic activities, in particular ecotourism. Despite significant environmental and economic benefits, the integration of forestry and agricultural practices in Albania faces a number of barriers that limit its widespread implementation. The main challenges are related to financial, legal, technological, and social factors that affect the effectiveness of agroforestry development.

One of the key constraints is financial instability and limited investment in forest agrarian systems. Despite international initiatives such as the United Nations Development Programme (2024) and the Global Environment Facility, which are aimed at supporting sustainable land use, the lack of government subsidies and low lending to farmers and forest enterprises make it difficult to adapt agroforestry methods. The high initial costs of creating mixed forest systems, the need for a long payback period, and limited financial incentives create significant barriers for small and medium-sized forest users. In addition, the lack of investment in the restoration of degraded forest areas limits the opportunities for the development of multifunctional forestry, which is important for improving the environmental sustainability of regions.

The second significant barrier is legal and regulatory restrictions. In the process of decentralising forest management, which began in 2015, local communities were granted the right to use forest land, but the legal status of many lands remains uncertain. The insufficient legislative framework for property rights and long-term use of natural resources makes it difficult to attract investment in forest restoration and the development of sustainable forest agrarian systems. In particular, the lack of clearly defined rules for the use of forests leads to their degradation due to poor use of resources, which reduces the ecosystem functions of forest areas.

Technological limitations also affect the pace of implementation of forest agrarian practices. The lack of scientifically based recommendations for adapting agroforestry to specific natural conditions in Albania, limited access to modern technologies for managing forest ecosystems, such as remote monitoring of the state of forest stands, the use of drones to assess biodiversity and analyse degradation processes, significantly reduce the effectiveness of these methods. The lack of specialised educational programmes and advisory support for forest users further complicates the integration of modern technologies into forestry.

A significant factor influencing the spread of agroforestry is the social perception and level of awareness of the local population about its advantages. Research shows that most forest owners and farmers prefer traditional farming methods because of a lack of understanding of the long-term environmental and economic benefits of implementing forest farming systems. The lack of organised cooperatives and support from local authorities contributes to the preservation of conservative approaches to forest management.

An additional challenge is the impact of climate change, which is already having significant implications for Albania's forest ecosystems. It is predicted that by 2050, the average annual temperature in the country will increase by 1.3-2.2°C, which will be accompanied by a decrease in precipitation by 2.1-4.3% and an increase in the frequency of extreme weather events, such as droughts and heavy downpours. These changes can lead to degradation of forest ecosystems, increased risk of forest fires, loss of biodiversity, and reduced productivity of tree stands. Mountain forests are particularly vulnerable, where a violation of the water regime and an increase in the average annual temperature can lead to changes in the species composition of trees, a decrease in the area of

moisture-loving forest ecosystems and an acceleration of soil erosion processes.

Increasing climate risks also affect forestry, increasing the need for adaptation strategies. In particular, it is necessary to develop reforestation programmes using drought-resistant and biodiversity-rich tree species, create protective forest belts to reduce the risk of erosion and land degradation, and introduce environmental monitoring systems to predict changes in forest ecosystems.

Thus, overcoming the challenges that hinder the integration of forestry and agricultural practices in Albania requires a comprehensive approach. The development of effective financial mechanisms for the restoration of forest resources, the improvement of the legal framework for rational forest management, the introduction of modern technologies for monitoring the state of forests and educational programmes for forest users and farmers are necessary steps to ensure the ecological sustainability of forest areas. Integrating these factors will help to reduce forest degradation, improve their ecosystem functions, and ensure long-term sustainable development in the region.

The integration of forestry and agriculture has significant potential for sustainable rural development in Albania. It is important not only to use agroforestry as a tool for increasing agricultural productivity, but also its role in preserving and restoring forest ecosystems. To achieve long-term efficiency, it is necessary to implement comprehensive measures aimed at forming a policy of integrated management of forests and agricultural landscapes, expanding financial support, introducing modern technologies in the forest sector, and improving the environmental sustainability of degraded territories.

In the future, the key task will be to develop a national strategy for the development of agroforestry, which will include measures to restore degraded forest landscapes and strengthen the ecosystem functions of forests. It is planned to create support programmes not only for farmers, but also for forest sector enterprises engaged in forest restoration, cultivation of multifunctional forest stands, and development of forest bioeconomics. Considering the experience of EU countries such as France and Germany, it is worth implementing financial mechanisms aimed at stimulating agroforestry in the context of forest conservation, in particular, through subsidies, tax incentives and, investments in expanding the area of mixed forests.

In addition to financial support, the development of the scientific and technological base for monitoring the state of forests, expanding the use of innovative forestry methods and improving the efficiency of forest ecosystem management will play a significant role. The creation of research centres to study the relationship between forestry and agroforestry will allow adapting forest models to the specific natural and climatic conditions of Albania. The use of the latest technologies, such as remote monitoring of forests, analysis of satellite data to assess the dynamics of changes in forest cover, development of water management systems in forest regions, will contribute to improving the ecological sustainability of forests.

The approach to integrated forest management and social responsibility of communities for the conservation of forest resources play a significant role in the development of agroforestry. The expansion of the network of forest cooperatives will contribute to the efficient use of natural resources and the creation of local economic initiatives in the forest sector. An important area will also be the involvement of the local population in forest restoration programmes and the development of multifunctional forest ecosystems, which will create additional employment opportunities and increase the income of forest communities.

Special attention should be paid to environmental aspects. It is expected that the introduction of agroforestry will contribute to the restoration of degraded forest ecosystems and improve their ecological functions. Restoration of forests in arid regions will help to stabilise the microclimate, reduce erosion processes, and increase the level of carbon conservation in soils. It is predicted that over the next decade, forest areas that have been partially degraded due to intensive farming and overgrazing can be restored by 15-20% due to the introduction of mixed agroforestry systems.

In addition to increasing farmers' incomes, the introduction of agroforestry will create economic benefits for the forest industry. In particular, the wood supply will increase due to the expansion of the area of multifunctional forest stands, which will contribute to the development of forest bioeconomics and the creation of new sources of income through the processing of wood raw materials. It is also possible to reduce the cost of reforestation through natural mechanisms of forest regeneration in mixed systems. As a result, the share of wood produced under sustainable forestry can grow by 10-15%, which will contribute to the development of the market for environmentally certified wood and reduce dependence on imports of forest products.

Due to these steps, the share of agroforestry can grow to 25% of the total area of agricultural land over the next decade, which will have a positive impact on the state of forests. It is expected to increase the area of restored forest ecosystems, which will help to reduce the level of forest degradation by 30-40% and improve biodiversity in regions that are currently under environmental pressure. The integrated implementation of these measures will contribute to economic growth and environmental stability, adaptation to climate change and sustainable development of Albania's forest areas.

Discussion

The results of the study confirm the importance of integrating forestry and agricultural practices for the sustainable development of rural areas in Albania. It was established that the use of agroforestry systems contributes to increasing land productivity, reducing erosion processes and improving the economic well-being of local communities. The findings are consistent with previous studies that focus on the need for an integrated approach to agricultural development in the face of current environmental challenges.

It was confirmed that rural development requires integrated strategies that cover environmental, social, and economic aspects. Analysis of sustainable rural development policies within the Smart Village concept presented in the study by M. Osmani (2023) emphasises the need for digital technologies and effective management of natural resources to improve the standard of living in rural communities. The introduction of agroforestry corresponds to these approaches, since it involves optimising land use, reducing the environmental burden and developing cost-effective management models. The study showed that financial support for farmers is a critical factor for the large-scale implementation of agroforestry systems. The lack of financial incentives, subsidies and public funding programmes remains one of the main obstacles to the development of this area. The study by P. Ymeri (2022) emphasises that insufficient state support and lack of financial incentives significantly slow down the transition to sustainable land use, especially in the countries of the Balkan region.

The issue of land consolidation also plays a significant role in improving the efficiency of agriculture and the use of natural resources (Zorin, 2024). According to the analysis by F. Sallaku *et al*. (2010), land consolidation contributes to the rational use of territories, which is especially important for the introduction of

agroforestry systems. Albania is experiencing significant land fragmentation, which makes it difficult to integrate forest practices into agricultural production. The results of the study confirm that combining land resources within cooperative management can help improve the efficiency of agroforestry systems. Social aspects of agroforestry development also remain an important factor. As indicated by D. Shehu *et al*. (2013), low awareness of local communities about the long-term economic and environmental benefits of agroforestry remains a significant barrier to its development. Similar trends can be seen in Albania, where a significant proportion of farmers adhere to traditional management methods, which limits the introduction of integrated approaches to natural resource management.

From the standpoint of environmental sustainability, the results of the study confirm the conclusions of S. Fatima *et al*. (2024) on the positive impact of sustainable forestry on soil health, biodiversity, and climate change adaptation. Agroforestry helps to increase the level of organic matter in soils, reduce wind and water erosion, and improve the water balance in agroecosystems (Muminova *et al*., 2023). It is important that the introduction of agroforestry systems can play a significant role in mitigating the effects of climate change already observed in the region. In an international context, the development of agroforestry can be linked to general trends in forest sector reform in developing countries (Belmega *et al*., 2024). The study by E.K. Nambiar (2021) on Vietnam demonstrates that integrating forestry into agricultural production can significantly increase productivity, ensure farmers' access to fair markets, and promote economic growth in rural communities. A similar approach can be applied in Albania through the introduction of cooperative models for forestry and agricultural resources management.

The results are consistent with conclusions of A. Raihan *et al*. (2024) on the importance of combining economic growth, energy innovation, and sustainable natural resource management to reduce greenhouse gas emissions. The introduction of agroforestry in Albania can help to reduce the carbon footprint of the agricultural sector, which meets European environmental standards. One of the key aspects of sustainable development is the integration of educational, managerial, and environmental strategies into rural development. As indicated by Y. Yu *et al*. (2024), education and competence development among the local population are important factors for the successful implementation of sustainable practices. Insufficient awareness and access to modern farming practices remains one of the main obstacles to the expansion of agroforestry. The results of this study confirm that increasing the level of knowledge of farmers through educational initiatives and information campaigns will contribute to more active implementation of agroforestry systems.

The development of agroforestry is also part of a broader process of restoring multifunctional cultural landscapes that combine traditional farming methods and modern innovative approaches (Drobitko & Alakbarov, 2023; Moroz, 2024). S. Wang (2004) emphasised that the concept of sustainable forest management can have different interpretations depending on the economic, social, and environmental context. The analysis carried out in this study confirmed that in the case of Albania, sustainable forest development largely depends on the integration of forestry and agricultural practices. In contrast to the general approach of S. Wang, the results obtained were aimed at specific mechanisms of adaptation of agroforestry to the natural and climatic conditions of the country. The study by J. Gupta *et al*. (2022) emphasises the importance of agroforestry waste management to improve the environmental

efficiency of agriculture. In Albania, the possibility of using biomass derived from agroforestry systems can contribute to the development of renewable energy and reduce carbon emissions (Shumka *et al*., 2021). From the standpoint of macroeconomic trends, the integration of forestry into agricultural production corresponds to global approaches to a green economy. The study by M. Riviere *et al*. (2020) considered the evolution of integrated economic models used in the forest sector and their adaptation to new environmental and market conditions. The study confirmed the need to develop economic models that consider the relationship between forestry and agricultural systems.

Agroforestry is also seen as part of a climate change adaptation strategy. The study by D. Ntawuruhunga *et al*. (2023) confirms that adaptive agroforestry systems can help to preserve soil moisture, reduce erosion, and increase the resilience of agricultural landscapes to climate change. In Albania, the expected increase in average temperatures and reduced precipitation by 2050 requires the development of effective water management methods, which can be achieved through the introduction of protective forest belts and the use of perennials in agricultural systems. The analysis of the regional policy of sustainable development confirms that the successful implementation of agroforestry is possible only under the conditions of an effective territorial policy. T. Schulz *et al*. (2023) analysed trade-offs and conflicts between economic development and sustainable forest management. The study also confirmed the existence of contradictions between economic interests and environmental priorities, in particular in the financing of forest restoration programmes. The lack of agreed financial mechanisms and land-use disputes identified in this study reflect the general trends described by the researcher, in particular, difficulties in implementing policies that combine economic growth with the conservation of natural resources.

Special attention should be paid to social factors affecting the development of agroforestry. As noted in the study by S. Gatama *et al*. (2024), issues of gender equality and the involvement of various social groups in the management of natural resources are important for ensuring sustainable development. In the case of Albania, the establishment of cooperative forms of forest management can help to increase social cohesion and involve local communities in decision-making on the use of forest resources. The study by P. Datta *et al*. (2024) demonstrates that the interaction between agroforestry, animal husbandry, and agriculture in Bangladesh can increase land productivity and promote sustainable management of natural resources. A similar approach can be applied in Albania, where the integration of animal husbandry and agroforestry, in particular, in the form of forest-pastoral systems, helps to reduce farmers' feed costs and maintain biodiversity.

The analysis showed a significant impact of agroforestry on the ecological sustainability of forest ecosystems and their economic prospects in Albania. M. Sotirov *et al*. (2015) considered the integration of forest policy in the European context, where special attention was paid to coordinating strategies for sustainable forest management and their multifunctional use. The problems identified in this study, in particular, the uncertainty of land status and the lack of financial support mechanisms, partially coincide with the conclusions of M. Sotirov *et al*. on barriers to the implementation of integrated forest management. However, the current study focused on local aspects, while the European study covered a broader regional scale.

The analysis of economic opportunities for forestry development in Albania has certain parallels with the conclusions of J. Arce (2019). The researcher emphasised the importance

of forests as a driver of sustainable economic growth and job creation. The study also confirmed that the development of forest cooperatives and the integration of forest land into regional economic processes contribute to increasing employment and income diversification in rural areas. The difference was that the global analysis by J. Arce considered the overall economic role of forests, while this study specified ways to implement financial mechanisms for the development of agroforestry.

Considerable attention in modern research is paid to the use of digital technologies for monitoring the state of forests. A. Kafy *et al*. (2023) proved that the use of satellite data and remote sensing allows more effectively assessing changes in forest cover and carbon storage. Although the technological aspects were considered in less detail in this study, it was found that the lack of monitoring systems makes it difficult to manage natural resources. The findings confirm the need to implement digital solutions in the field of forestry, which is consistent with the opinion of A. Kafy *et al*. on the importance of geoinformation technologies in the conservation of forest ecosystems.

The importance of forests in combating climate change was a central issue in the study by A. Raihan (2023a). The researcher investigated the role of forest ecosystems in reducing greenhouse gas emissions and the impact of environmentally oriented practices on the carbon balance. The results of the analysis confirmed that agroforestry contributes to the accumulation of carbon in forest soils, and reduces the level of erosion, which is a critical factor in the context of climate change mitigation.

The economic aspects of forest management were the subject of a separate study by A. Raihan (2023b), where financial support mechanisms for sustainable forest management were considered. This study confirmed that the lack of subsidies and concessional lending creates significant obstacles to the expansion of agroforestry systems. The conclusions regarding economic constraints coincide with the results of A. Raihan, who stressed the need to use market mechanisms to finance forest conservation activities.

Thus, the results of the study confirm the need for an integrated approach to the development of agroforestry in Albania, including financial incentives, development of educational initiatives, effective land management, and adaptation to climate change. The alignment of these factors with international practices will contribute to the creation of a sustainable and cost-effective agricultural system that meets the current challenges of sustainable development.

Conclusions

The study confirmed that the development of agroforestry in Albania is a key area for improving the sustainability of forest ecosystems, their restoration, and improving forest resource management. The integration of forestry practices with agriculture contributes to the conservation of biodiversity, improving the microclimate, and reducing the risks of degradation of natural landscapes. It was studied that the area of forest land in the country is approximately 1.05 million hectares, of which a significant part was negatively affected due to overgrazing, irrational land use, and climate change.

The results of the study show that the spread of mixed agroforestry systems can increase the ecological stability of forest ecosystems. In particular, the restoration of degraded woodlands through the combination of tree stands and grazing contributes to the natural restoration of forest floor and stabilisation of soil moisture levels. Forest-pastoral systems reduce fire hazards by controlling excess vegetation, and improve soil quality by accumulating organic matter. It was determined that protective forest belts play an important role in

preventing erosion processes and restoring forest landscapes. The analysis showed that the use of these systems helps to reduce soil erosion by 30-40% and stabilise the microclimate, which is critical for forest ecosystems in mountainous areas. Forestry and mixed forest systems have also been shown to improve soil quality and contribute to increased carbon reserves, which is important in the context of climate change mitigation.

It was predicted that by 2050, under the influence of climate change, forest ecosystems in Albania may undergo a significant transformation: an increase in the average annual temperature by 1.3-2.2°C and a decrease in precipitation by 2.1-4.3% may lead to degradation of mountain forests and a reduction in the area of moisture-loving forest formations. In this regard, the conservation of existing woodlands, the introduction of natural forest renewal programmes, and the integration of adaptive management methods, such as the use of drought-tolerant tree species and the creation of forest buffer zones to protect water resources, are important measures. The main limitation of agroforestry development remains the lack of financial mechanisms aimed at supporting sustainable forest management. The lack of government subsidies and limited access to credit make it difficult to restore forest ecosystems, especially in regions with high levels of degradation. The study also identified shortcomings in the legislative framework: uncertainty of ownership rights to forest land and poor efficiency of local management hinder long-term planning of forest restoration measures.

The results suggest the establishment of national forest restoration support programmes, which will include financial incentives for farmers and forest users implementing mixed forest systems. Important measures include the introduction of remote monitoring of the state of forests, the expansion of the network of forest cooperatives, and the creation of programmes for the protection of mountain forest regions. For further research, it is advisable to focus on assessing the impact of various agroforestry models on the productivity of forest ecosystems and the effectiveness of financial incentives for forest restoration. In particular, it is necessary to explore the possibilities of implementing environmental certification systems for wood and assess the potential for the development of forest bioeconomics as a mechanism for promoting sustainable forest management.

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Conflict of Interest

None.

References

[1] Arce, J.J. (2019). *Forests, inclusive and sustainable economic growth and employment*. Retrieved from https://www.un.org/esa/forests/wp-content/uploads/2019/04/UNFF14-BkgdStudy-SDG8-March2019.pdf.

[2] Belmega, I., Khrutba, V., Motruk, M., & Kravchynskyi, R. (2024). Climatogenic influence and prediction of seasonal rhythm changes in the main forest-forming species of the Northeastern Carpathians. *Scientific Reports of the National University of Life and Environmental Sciences of Ukraine*, 20(2), 1-15. doi: 10.31548/dopovidi.2(108).2024.002.

[3] Bojović, M., Mrkonjić, Z., & Vukelić, I. (2024). Agroforestry systems and forest resources as a potential for sustainable energy development in the western Balkan region. *Energy, Sustainability and Society*, 14(1), article number 68. doi: 10.1186/s13705-024-00502-y.

[4] Canfora, I. (2025). The implementation of instruments of pre-accession assistance for rural development (IPARD) face to the challenges of Albanian agricultural sector. *Euro-Balkan Law and Economics Review*, 1. doi: 10.15162/2612-6583/2106.

[5] Datta, P., Behera, B., & Timsina, J. (2024). Achieving sustainable development through agriculture-forestry-livestock nexus in Bangladesh: Synergies and trade-offs. *Agricultural Systems*, 215, article number 103854. doi: 10.1016/j.agsy.2024.103854.

[6] Drobitko, A., & Alakbarov, A. (2023). Soil restoration after mine clearance. *International Journal of Environmental Studies*, 80(2), 394-398. doi: 10.1080/00207233.2023.2177416.

[7] European Commission. (2023). *CAP strategic plans 2023-2027 on track for delivering on EU objectives. European Commission*. Retrieved from https://agriculture.ec.europa.eu/system/files/2023-11/factsheet-cap-strategic-plans-2023-27_en_0.pdf.

[8] Fatima, S., Abbas, S., Rebi, A., & Ying, Z. (2024). Sustainable forestry and environmental impacts: Assessing the economic, environmental, and social benefits of adopting sustainable agricultural practices. *Ecological Frontiers*, 44(6), 1119-1127. doi: 10.1016/j.ecofro.2024.05.009.

[9] Food and Agriculture Organization. (2025). *FAO country profiles: Albania*. Retrieved from https://www.fao.org/countryprofiles/index/en/?iso3=alb.

[10] Gatama, S., Ojunga, S.O., Omuono, M., Menda, M., Kagombe, J., & Etind, G. (2024). Gender-related dynamics and factors influencing transition to green economy among rural communities within the forestry sector. *East African Journal of Forestry and Agroforestry*, 7(1), 215-226. doi: 10.37284/eajfa.7.1.1982.

[11] Gjokutaj, E. (2021). Albania: The impact of economic and fiscal policy in the agricultural sector. *Economicus*, 20(1), 7-27. doi: 10.58944/lqik6104.

[12] Gupta, J., Kumari, M., Mishra, A., Akram, M., & Thakur, I.S. (2022). Agro-forestry waste management – a review. *Chemosphere*, 287, article number 132321. doi: 10.1016/j.chemosphere.2021.132321.

[13] Kafy, A.A., Saha, M., Fattah, M.A., Rahman, M.T., Duti, B.M., Rahaman, Z.A., Bakshi, A., Kalaivani, S., Rahaman, S.N., & Sattar, G.S. (2023). Integrating forest cover change and carbon storage dynamics: Leveraging Google Earth Engine and InVEST model to inform conservation in hilly regions. *Ecological Indicators*, 152, article number 110374. doi: 10.1016/j.ecolind.2023.110374.

[14] Kullolli, B. (2023). Contract law of Albania in the context of public-private partnerships. *Social and Legal Studios*, 6(4), 105-113. doi: 10.32518/sals4.2023.105.

[15] Kumi, E. (2024). Environmentally sustainable economic growth in Albania. *Academic Journal of Business, Administration Law and Social Sciences*, 10(3), 57-66. doi: 10.2478/ajbals-2024-0020.

[16] Lika, E. (2021). Sustainable rural development in albania through agriculture and livestock: Challenges in the European Union perspective. *Journal of Agronomy, Technology and Engineering Management*, 4(2), 577-582.

[17] Ministry of Environment of Albania. (2023). *Annual monitoring report 2023. Intersectoral strategy for decentralization and local governance*. Retrieved from https://qeverisjavendore.gov.al/wp-content/uploads/2024/09/Raporti-i-Monitorimit-Final-2024.pdf.

[18] Moroz, V. (2024). International experience and strategies for forest management in the context of growing forest pollution. *Scientific Reports of the National University of Life and Environmental Sciences of Ukraine*, 20(6), 33-49. doi: 10.31548/dopovidi/6.2024.33.

[19] Muminova, S.S., Bayadilova, G., Mukhametzhanova, O., Seilgazina, S.M., Zhumabayeva, R., & Rvaidarova, G. (2023). The effects of feeding with organic waste by terrestrial isopod Philoscia Muscorum on enzyme activities in an incubated soil. *Eurasian Journal of Soil Science*, 12(2), 122-126. doi: 10.18393/ejss.1211180.

[20] Nambiar, E.K. (2021). Strengthening Vietnam's forestry sectors and rural development: Higher productivity, value, and access to fairer markets are needed to support small forest growers. *Trees, Forests and People*, 3, article number 100052. doi: 10.1016/j.tfp.2020.100052.

[21] Ntawuruhunga, D., Ngowi, E.E., Mangi, H.O., Salanga, R.J., & Shikuku, K.M. (2023). Climate-smart agroforestry systems and practices: A systematic review of what works, what doesn't work, and why. *Forest Policy and Economics*, 150, article number 102937. doi: 10.1016/j.forpol.2023.102937.

[22] Osmani, M. (2023). The "smart village" as an approach for sustainable rural development of Albania. *Journal of Economy and Agribusiness*, 16(1), 85-110.

[23] Raihan, A. (2023a). The influences of renewable energy, globalization, technological innovations, and forests on emission reduction in Colombia. *Innovation and Green Development*, 2(4), article number 100071. doi: 10.1016/j.igd.2023.100071.

[24] Raihan, A. (2023b). A review on the integrative approach for economic valuation of forest ecosystem services. *Journal of Environmental Science and Economics*, 2(3), 1-18. doi: 10.56556/jescae.v2i3.554.

[25] Raihan, A., Hasan, M.A., Voumik, L.C., Pattak, D.C., Akter, S., & Ridwan, M. (2024). Sustainability in Vietnam: Examining economic growth, energy, innovation, agriculture, and forests' impact on CO_2 emissions. *World Development Sustainability*, 4, article number 100164. doi: 10.1016/j.wds.2024.100164.

[26] Riviere, M., Caurla, S., & Delacote, P. (2020). Evolving integrated models from narrower economic tools: The example of forest sector models. *Environmental Modeling & Assessment*, 25(4), 453-469. doi: 10.1007/s10666-020-09706-w.

[27] Sallaku, F., Jojiç, E., Tota, O., Huqi, B., & Fortuzi, S. (2010). The role of land consolidation activities in the sustainable rural development in Albania. *Research Journal of Agricultural Science*, 42(3), 825-832.

[28] Schulz, T., Ohmura, T., & Zabel, A. (2023). Sustainable economy trade-offs and conflicts in and with the forest (Research Trend). *Forest Policy and Economics*, 150, article number 102936. doi: 10.1016/j.forpol.2023.102936.

[29] Shehu, D., Osmani, E., Çollaku, N., & Shehu, A. (2013). Challenges of sustainable development in rural areas of Albania. *Journal of Food, Agriculture & Environment*, 11(2), 1349-1352. doi: 10.1234/4.2013.4557.

[30] Shumka, S., Sulçe, S., Brahushi, F., Shumka, L., & Hyso, H. (2021). Biomass energy for productive use in the olive oil and other agriculture sectors in Albania. *Proceedings on Engineering Sciences*, 3(1), 103-110. doi: 10.24874/PES03.01.010.

[31] Sotirov, M., *et al.* (2015). *Forest policy integration in Europe: Lessons learnt, challenges ahead, and strategies to support sustainable forest management and multifunctional forestry in the future*. Retrieved from http://aggestam.com/pubs/Aggestam_2015iii.pdf.

[32] Stojcheska, A.M., Zhllima, E., Kotevska, A., & Imami, D. (2024). Western Balkans agriculture and rural development policy in the context of EU integration – the case of Albania and North Macedonia. *Regional Science Policy & Practice*, 16(8), article number 100049. doi: 10.1016/j.rspp.2024.100049.

[33] United Nations Development Programme. (2024). *Human development report 2023-24*. Retrieved from https://hdr.undp.org/content/human-development-report-2023-24.

[34] Veleshnja, J. (2024). Ecotourism and rural sustainable development, Albania case, Blezënckë village. In J. Chica-Olmo, M. Vujičić, R.A. Castanho, U. Stankov & E. Martinelli (Eds.), *Sustainable tourism, culture and heritage promotion: Development, management and connectivity* (pp. 109-119). Cham: Springer. doi: 10.1007/978-3-031-49536-6_12.

[35] Wang, S. (2004). One hundred faces of sustainable forest management. *Forest Policy and Economics*, 6(3-4), 205-213. doi: 10.1016/j.forpol.2004.03.004.

[36] Ymeri, P. (2022). *Projecting circular economy in rural areas and its impact on sustainable development principles, a case study from Kosovo*. Gödöllő: Hungarian University of Agriculture and Life Sciences. doi: 10.54598/001800.

[37] Yu, Y., Appiah, D., Zulu, B., & Adu-Poku, K.A. (2024). Integrating rural development, education, and management: Challenges and strategies. *Sustainability*, 16(15), article number 6474. doi: 10.3390/su16156474.

[38] Zorin, D. (2024). Assessment of the ecological status of soil cover and design of environmental monitoring in the Ivano-Frankivsk urban community. *Ecological Safety and Balanced Use of Resources*, 15(1), 39-52. doi: 10.69628/esbur/1.2024.39.

Лісове господарство та розвиток сільських територій в Албанії: інтеграція лісового та сільського господарства для сталого майбутнього в економіці

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Анотація. Інтеграція лісогосподарських та сільськогосподарських практик сприяє екологічній стійкості та економічному розвитку сільських територій, особливо в регіонах з деградацією ґрунтів. Метою дослідження було оцінити вплив систем агролісомеліорації на продуктивність земель, збереження природних ресурсів та соціально-економічний розвиток місцевих громад; виявити бар'єри та перспективи їх подальшого впровадження.

Методологія дослідження включала статистичний аналіз, порівняння ефективності різних моделей агролісомеліорації, оцінку економічних та екологічних показників. Дослідження показало, що площа земель, залучених до агролісомеліорації, становить 150-200 тис. га (10 % сільськогосподарських угідь). Лісові та пасовищні системи зменшили витрати фермерів на корми на 20-25 %, а використання змішаних моделей агролісомеліорації підвищило врожайність сільськогосподарських культур на 14% порівняно з традиційним землеробством. Встановлено, що рівень органічної речовини в ґрунтах таких систем майже вдвічі вищий, ніж у традиційних сільськогосподарських ландшафтах, а ерозійні процеси зменшуються на 20-30 %. Лісові насадження в рамках агролісомеліорації сприяють збереженню біорізноманіття, зокрема, збільшенню кількості корисних комах-запилювачів на 40 %, відновленню популяцій дрібних ссавців і птахів. Також було виявлено, що децентралізація управління лісовим господарством призвела до створення понад 60 лісових кооперативів, які забезпечують ефективне управління лісовими ресурсами та підвищують економічну стійкість місцевих громад. Виявлено, що основними перешкодами для розвитку агролісомеліорації в Албанії є відсутність державної підтримки, фінансові обмеження, технологічні прогалини та низька обізнаність фермерів. Результати дослідження вказують на необхідність створення фінансових стимулів, розвитку лісових кооперативів, поширення інноваційних технологій та розширення інформаційної підтримки фермерів. Практичне значення дослідження полягає у розробці комплексної стратегії сталого розвитку сільського господарства, яка сприятиме підвищенню продуктивності земель, економічній стабільності місцевих громад та адаптації до зміни клімату

Ключові слова: сталий розвиток; ерозія ґрунтів; агролісомеліорація; екологічна стійкість; продуктивність земель; економічна адаптація