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BIODIVERSITY CONSERVATION IN BROD-POSAVINA COUNTY AND ITS ROLE IN REGIONAL ECONOMIC DEVELOPMENT

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Abstract: Developing a modern, open, and economically competitive region, distinguished by its cultural and natural heritage and a high social standard within the framework of balanced and sustainable development, should be a strategic objective of every county. To achieve this objective, emphasis should be placed on strengthening the local economy and creating value added, thereby establishing the preconditions for the involvement of all relevant stakeholders in regional development.A favourable geographical position, a largely preserved natural environment, landscape diversity, rich flora and fauna, and existing infrastructure represent important resources for the development of rural tourism, organic agricultural production, livestock farming, and other economic activities. In addition to being a key element of recognisability, regional identity in a globalised world is also shaped by the level of economic development and therefore represents an important development resource.At present, the identity of Brod-Posavina County is not sufficiently recognisable. Including the recognisability of identity among strategic development objectives therefore requires its further awareness, strengthening, and development. Through strategic planning, the implementation of innovations, and the development of new products and services, the region can improve its visibility and competitiveness.The aim of this paper is to examine the biodiversity potential of Brod-Posavina County, assess the possibilities for its sustainability, and explore how these resources can be placed in the function of regional economic development.

Keywords: economic development, value added, biodiversity, regional development, rural tourism

1. INTRODUCTION

This study examines the potential of existing natural resources in Brod-Posavina County, with a focus on preserving biodiversity and landscape diversity while utilising these assets for regional economic development. Tourism development in Croatia is largely based on

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a well-preserved and diverse natural landscape, as well as on natural resources, among which protected areas represent one of the key components.

According to Mlađenović and Rudan (2024), tourism significantly contributes to the transformation of rural areas by generating multiple effects, including additional income for the local population, increased investment, and higher employment levels. In doing so, it stimulates and strengthens local economic development. At the same time, rural tourism supports the preservation of traditional ways of life, customs, and cultural heritage. Precisely for these reasons, tourism is often viewed as a mechanism for revitalising rural areas and improving the quality of life in such environments (Smolčić Jurdana et al., 2018). Brod-Posavina County includes seven protected areas managed by the public institution Natura Slavonica. This institution is responsible, among other tasks, for promoting the value of protected natural heritage and for developing visitor infrastructure that supports both individual and organised visits. The protected areas fall into several categories, including special forest reserves, ornithological reserves, and protected landscapes. They are characterised by a high level of natural diversity, reflected in a variety of habitats, rich flora and fauna, and rare ecological systems.

Table 1. Overview of Protected Landscape Areas in Brod-Posavina County, Including the Year of Designation

Protected Areas	Year of Designation
Prašnik Forest Vegetation Reserve	1965
Muški Bunar Forest Vegetation Reserve	1963
Jelas Fishponds Ornithological Reserve	1987
Bara Dvorina Ornithological Reserve	1987
Jelas Polje Protected Landscape	1995
Gajna Protected Landscape	1990
Pašnjak Iva Protected Landscape	2010

Rural tourism is an important factor in the activation and sustainable development of rural areas. It contributes to the preservation of local identity, traditions, and customs, while also supporting environmental protection and strengthening indigenous, traditional, and ecological forms of production.The following section provides an overview of the protected landscape areas in Brod-Posavina County and the potentials that could be placed in the function of economic development. The most favourable conditions for the development of rural tourism are found in the Gajna Protected Landscape, which already has partially developed infrastructure, including a visitor centre, an educational trail, and a traditional watchtower viewpoint known as a *čardak*. Certain development potential is also present in the Pašnjak Iva Protected Landscape and the Bara Dvorina Ornithological Reserve, both of which include viewpoints.

In terms of visitor infrastructure, several such *čardak* watchtowers have been constructed along the Sava River as part of the cycling route that follows the river.

1.1. Protected Natural Habitats and Development Potential

Natural habitats in the area are rich in numerous rare plant species, such as the aquatic fern Marsilea quadrifolia, which is rare in Europe, as well as in valuable fauna, with bird diversity being particularly prominent. These species find refuge within two Special Protection Areas (SPAs), Donja Posavina and Jelas Polje, which includes fishponds and floodplain pastures along the Sava River, within the National Ecological Network. In addition, they are

present in two Special Ornithological Reserves and in the internationally important bird area (IBA) of Jelas Polje.

Jelas Polje, with its carp fishponds, is of particular importance as a feeding and resting site for migratory birds, especially cranes (*Grus grus*), and also serves as a significant breeding ground for various wetland bird species. Within these floodplain areas, the rare Eurasian spoonbill (*Platalea leucorodia*) nests in greater numbers than at any other location in Croatia. The richness of wetland bird species is especially reflected in the abundance of rare and endangered wading birds.In recent years, however, these species have been exposed to increasing pressures. These include reduced fishpond production, intensified traffic, drainage of wetlands, poaching, destruction of natural habitats due to settlement expansion, and disruption of ecosystem balance caused by the introduction of non-native species and the removal of young individuals from their natural environment. Migration routes are also becoming increasingly obstructed. Furthermore, the decline and abandonment of pasture use, along with a reduction in cattle numbers, has led to the spread of *Amorpha fruticosa*, an invasive species that rapidly encroaches upon pasture areas.

1.2. Grasslands as Reservoirs of Biodiversity and Development Potential

Grasslands (meadows and pastures) are important semi-natural habitats that play a significant role in maintaining landscape structure and biodiversity. At present, they represent one of the most endangered ecosystems in Croatia. Intensive use of mineral fertilisers and plant protection products, together with a reduction in the genetic pool caused by narrow crop rotations and the use of a limited number of species and breeds, has had a negative impact on biodiversity.In addition, the drainage of wetlands and their conversion into agricultural land, as well as the removal of hedgerows and trees, have further contributed to biodiversity loss. Although Croatia possesses numerous indigenous breeds and traditional crop varieties, these have largely been replaced by more productive alternatives that better meet the economic requirements of modern markets. As a result, landscapes have become increasingly homogeneous, accompanied by a decline in genetic, species, and habitat diversity.

Brod-Posavina County has so far managed to preserve three such habitats from further overgrowth and succession, within the ornithological reserves of Pašnjak Iva, Bara Dvorina, and Gajna, while similar habitats have been lost at other locations. Due to a decline in livestock numbers, both grassland biodiversity and soil organic matter are decreasing. Livestock density per hectare is particularly low in areas of high biodiversity. This has led to the encroachment of species-rich grasslands by shrubs and forests, resulting in the loss of open landscapes that are essential for migratory birds and other mobile species.Following extensive land reclamation over the past five decades, a considerable portion of lowland grasslands has been converted into arable land. Today, these areas are used only occasionally for grazing and mowing, or have been completely abandoned. Measures that could support the preservation of biodiversity include, above all, reducing the use of artificial fertilisers and herbicides. Such practices would help maintain a greater diversity of plant species, butterflies, insects, and birds in grasslands and wet meadows.

1.3. Conservation of Biodiversity through Traditional Livestock Farming: Development Potential

The distinctive components of biodiversity in the floodplain areas of the Sava River are closely linked to traditional land-use practices, particularly grazing, which has shaped the characteristic landscape over time. Extensively managed grasslands are among the most

threatened habitats in both Croatia and Europe. In some areas, they are endangered by agricultural intensification, including fertilisation, more frequent mowing, drainage, and conversion into arable land. In others, the primary threat is land abandonment and subsequent overgrowth by shrubs.Without grazing, mowing, and similar management practices, grasslands and meadows gradually undergo succession, first transforming into shrubland and eventually into forest. For this reason, the preservation of distinctive landscapes and biodiversity along the Sava River requires the continued maintenance of extensive livestock farming. This approach enables local communities to sustain traditional agricultural practices, particularly the grazing of domestic animals.

1.4. Pljuskara Canyons – Natura 2000 Ecological Network: Development Potential

The Pljuskara Canyons Nature Monument is located within the Natura 2000 ecological network, designated as a Site of Community Importance for species and habitat types, POVS Južni Dilj (HR2000488). The site lies within the municipality of Podcrkavlje, below the peak of Vidovo Brdo (380 m above sea level), and consists of three canyons and four ridges.

The exposed stratigraphic sequence reveals a diverse range of sedimentary rocks, dating back up to 18 million years. The Pljuskara Canyons geosite is of particular significance from a nature conservation perspective due to the numerous findings of Middle Miocene fossil organisms. Among the most notable are fossil sea urchins with well-preserved shells and stone cores, along with frequent discoveries of molluscs (large bivalves and gastropods), corals, and fragments of marine vertebrate skeletons, including shark and dolphin teeth.These fossils originate from the Pannonian Sea, which existed in this area approximately 15 million years ago. The site also contains some of the best-exposed deposits of the oldest geological formations of Dilj Gora.

2. LITERATURE REVIEW

Mlađenović and Rudan (2024) analyse bibliographic sources on rural tourism that are relevant to this study. According to their findings, the growing scientific interest in rural tourism has led to an increasing number of studies providing comprehensive literature reviews on this topic. They refer to the work of Rosalina et al. (2021), who examined articles published between 1989 and 2020, focusing on how rural tourism is defined in the literature and identifying key challenges arising in both developed and developing contexts. The authors also highlight the study by Kumar and Shekhar (2020), which explores the impact of technology on the tourism sector and its application in rural tourism research for socio-economic development. In addition, this work provides a concise overview of current research trends in rural tourism, while identifying key themes and areas that the tourism industry could further develop. Mlađenović and Rudan (2024) further emphasise the importance of systematically catalogued and synthesised literature on entrepreneurship in rural hospitality and tourism, referring to the work of Madanaguli et al. (2021), which covers the period from 2000 to 2020. Moreover, numerous authors have contributed to systematic reviews examining the importance of rural development. Silva and Ferreira (2023) provide an overview of research methods used in this field and highlight leading journals in which relevant studies were published between 2016 and 2020. Through a systematic literature review, this study aims to synthesise current knowledge and provide a clearer understanding of the topic under consideration.

3. DATA AND METHODOLOGY

This study employs a combination of qualitative and quantitative research methods. The analysis is based on a systematic review of relevant scientific and professional literature, supported by descriptive statistical analysis of secondary data. Data obtained from the Croatian Bureau of Statistics were used to examine the economic structure of Brod-Posavina County, with particular emphasis on the contribution of tourism to gross value added and trends in tourism supply. In addition, the study incorporates survey-based evidence on residents' perceptions of tourism and its impact on quality of life.

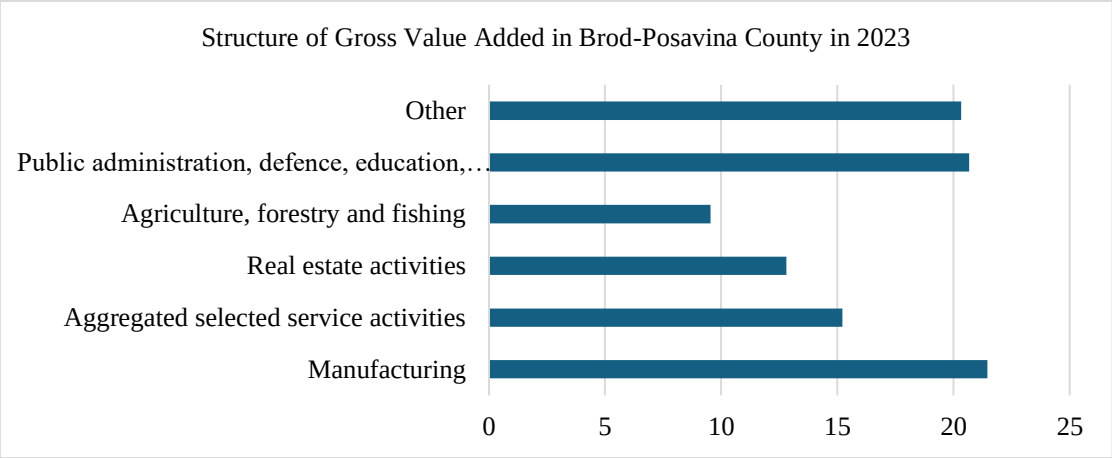


Figure 1. Economy (Institute for Tourism, 2025)

According to data from the Croatian Bureau of Statistics on the total gross value added generated by all business entities in Brod-Posavina County, the manufacturing sector is dominant. It is followed by trade and tourism, then agriculture, forestry and fishing, and finally real estate activities.

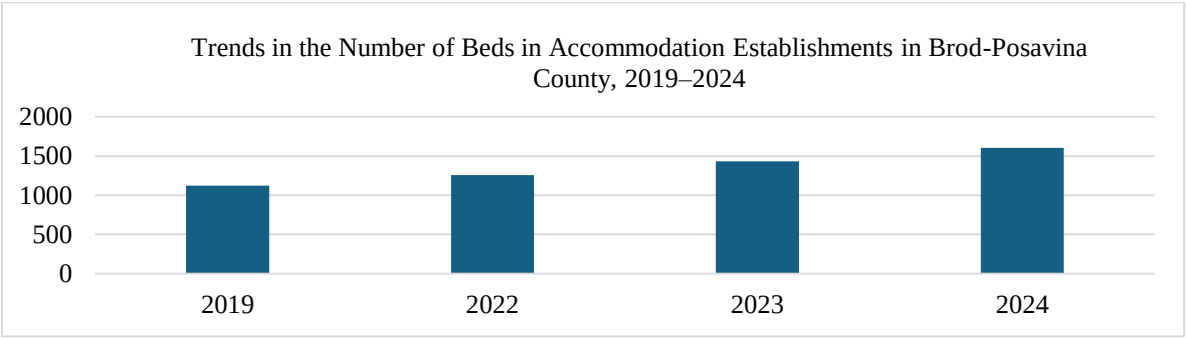


Figure 2. Tourism Supply (Institute for Tourism, 2025)

In Brod-Posavina County, a total of 2,090 beds are available across all types of accommodation facilities, according to the eVisitor system. Over the past five years, a continuous increase in accommodation capacity has been observed. In 2024, the number of beds increased by 42.9% compared to 2019. In terms of accommodation structure, the largest share consists of private accommodation facilities (142),followed by hotels (12) and rental rooms (10).

For the purpose of preparing the document *Destination Management Plan for Brod-Posavina County 2025–2028*, the Institute for Tourism, Zagreb, conducted a survey in 2025

examining local residents' satisfaction with tourism in the county. The research was based on a methodological framework defined by guidelines for assessing residents' attitudes toward tourism and its impact on quality of life. The survey was conducted on a sample of 353 completed questionnaires.

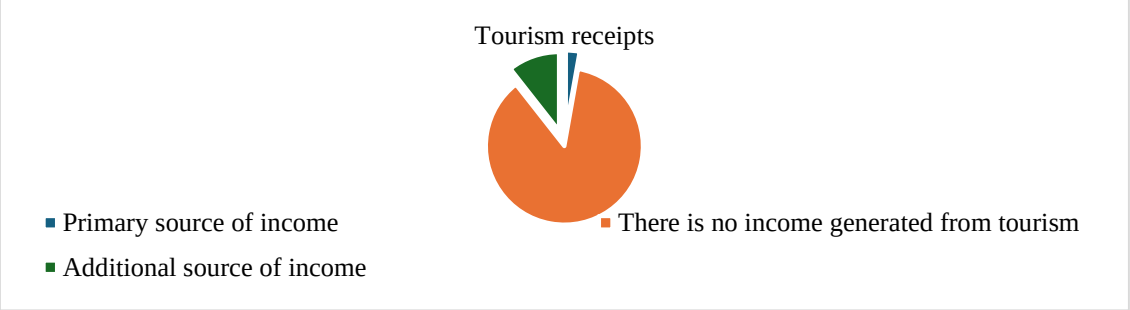


Figure 3. Basic Sociodemographic Characteristics of Respondents (Institute for Tourism, 2025.)

In terms of income, the largest share of respondents reported household earnings between EUR 2,000 and 3,000. In addition, 86.7% of respondents indicated that they do not generate any income from tourism, while 10.6% reported tourism as a supplementary source of income.

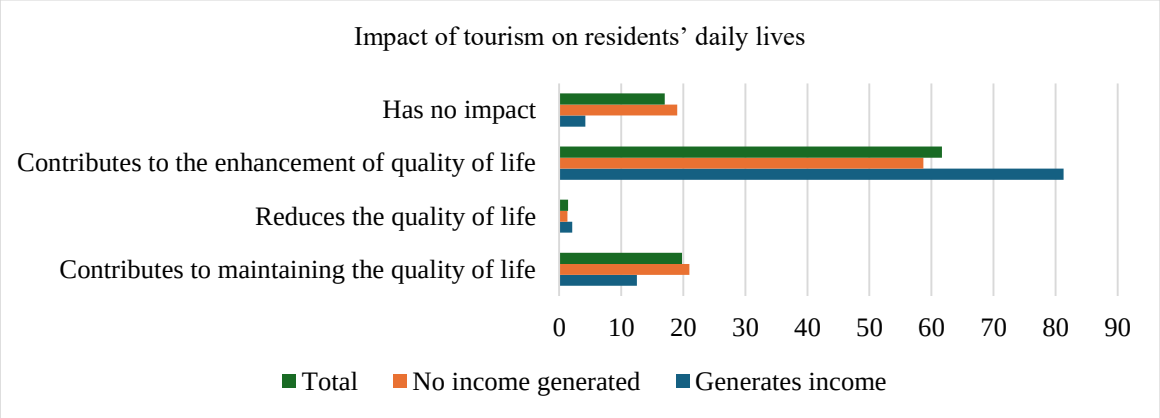


Figure 4. Satisfaction of the Local Population (Institute for Tourism, 2025)

It is evident that the largest share of responses falls within the categories "Helps maintain quality of life" and "Helps improve quality of life."

The findings indicate a significant role of tourism within the overall economy of Brod-Posavina County, as well as a growing trend in tourism supply. This creates opportunities to further enhance the quality of tourism offerings through the introduction of additional content and services. The survey of residents' attitudes toward the impact of tourism on quality of life also shows that a substantial proportion of the population perceives tourism as contributing positively to their well-being. This suggests considerable potential for further development, particularly through the diverse opportunities offered by rural tourism.

4. RESULTS AND DISCUSSION

The conducted research has identified the development potential of protected natural heritage areas in Brod-Posavina County, highlighting their capacity to generate value added,

while also confirming the need to further improve tourism activities at the county level. In addition, the study defines key opportunities for the development of rural settlements.

The expansion of rural tourism supply, particularly when it is attractive to investors and based on unique local resources, can have a significant impact on both GDP growth and employment (Demonja et al., 2016). Rural tourism may also serve as part of the solution for rural areas facing depopulation and low income levels (Grgić et al., 2017). Importantly, the local population perceives rural development in protected areas as an opportunity rather than a threat, which creates favourable conditions for their active involvement. Contemporary rural landscapes have been shaped through the interaction between humans and nature, especially in the floodplain pastures along the Sava River. Livestock breeding in areas protected under the Nature Protection Act, where chemical inputs are not used, enables production in accordance with the highest environmental standards. At the same time, it supports the development of a recognisable brand of organic products while preserving natural resources in the Republic of Croatia.

There is also a growing interest in destinations that offer outdoor, nature-based activities, which rural tourism is well positioned to provide (Gluvačević et al., 2022). Indigenous breeds, due to their genetic adaptation to open environments, are more resilient to climate change and emerging diseases, thereby contributing to more stable and secure production of healthy food. They represent living evidence of traditional human selection and environmental adaptation, and as genetic resources, they constitute one of the most valuable reserves of the Republic of Croatia.

The economic dimension of indigenous breed farming should not be overlooked. Due to extensive outdoor rearing systems, such production does not require costly investments in large-scale facilities. At the same time, the quality of meat and products derived from organic farming opens opportunities for accessing both domestic and international markets, where demand for safe and healthy food continues to grow.

A key prerequisite for the successful development of rural tourism is the recognisability of the destination. Evidence from practice shows that tourists primarily choose destinations based on their attractiveness, which subsequently shapes both the direction and forms of tourism development in a given area (Svržnjak et al., 2014). A meaningful contribution to improving the quality of tourism services would involve the development of structured visitor management systems, as well as interpretation and educational activities implemented in cooperation with the local community and relevant stakeholders. Such initiatives can strengthen awareness of the importance of preserving protected natural heritage. Tourists are particularly attracted by the authentic way of life and work of the local population, their creativity, traditions, cultural expressions, and historical heritage. Rural tourism offers visitors unique natural and cultural experiences and therefore represents a key foundation for destination branding (Zovko, 2023).

Drpić and Rudan (2019) emphasise that the development of tourism products in rural areas is possible only through the provision of high-quality tourism services, respect for the specific characteristics of the destination, and the assurance of sustainable development. A well-designed and effectively marketed integrated tourism product on the international market could attract a greater number of foreign visitors, provided that a high standard of services is maintained.

Mlađenović and Rudan (2024) highlight that rural tourism in Croatia is a significant driver of activation and sustainable development in rural areas. It contributes to preserving local identity, traditions, and customs, while also protecting the environment and strengthening indigenous, traditional, and ecological production. The authors further point out that Croatian rural tourism holds considerable untapped potential and could become one of the main drivers of development in areas that have so far been marginalised. Finally, the development of rural

tourism can be viewed from both social and political perspectives, given its role in fostering intercultural understanding, promoting different ways of life, and enhancing mutual understanding among communities (Njegovan et al., 2015).

5. CONCLUSION

It can be concluded that, through the analysis of biodiversity factors in the protected areas of Brod-Posavina County, as well as the assessment of the current economic conditions and needs, this study has identified opportunities to place natural heritage resources in the function of regional economic development. With a strategic and well-considered approach, nature protection and sustainable rural development should not be viewed solely as a cost to the community. Rather, they can represent an opportunity to generate additional income for the local population through economically viable activities within protected areas. Such income can be realised through tourism, livestock farming, the marketing of agricultural products and homemade goods, the valorisation of women's work, and the employment of currently inactive population groups. Altogether, these activities can stimulate agricultural and broader economic development, thereby contributing positively to the growth of gross domestic product and national income. Maintaining extensive livestock farming while ensuring adequate income for farmers remains one of the key challenges for local communities, as well as for the relevant governmental authorities responsible for safeguarding the natural, cultural, and traditional heritage of the Republic of Croatia. Achieving this balance would support the continued presence of the rural population and, through sustainable development, ensure the preservation of natural and landscape values. The issue of preserving and reintroducing indigenous breeds to abandoned pastures and meadows has become increasingly important. Due to ongoing depopulation trends and the decline of agricultural activities, large pasture areas are increasingly being left to natural succession processes, gradually transforming into forest habitats that are less diverse than grasslands and meadows. At the same time, the loss of indigenous breeds poses a significant risk of losing valuable genetic resources adapted to specific ecosystem conditions, which in turn may increase risks related to future food production.

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