

10.2478/nispa-2026-0008



Biosphere Reserve as a Model Territory for Sustainable Development: The Value of Nature and Culture from a Community Perspective

*Mária Reháková¹, Katarína Vitálišová²,
Vladimíra Fabriciusová³*

Abstract:

Biosphere reserves are distinctive landscapes where the relationship between ecological integrity and cultural heritage provides a basis for sustainable living. By applying principles of endogenous and place-based regional development, this paper evaluates the potential of biosphere reserves as model territories for sustainable development and examines the role of nature and culture as key elements shaping community life. The study explores the main factors influencing quality of life within biosphere reserves, identifies the importance of local community involvement and participation in sustainable development processes, and considers the limitations of these efforts. This comprehensive analysis helps test the research assumption that biosphere reserves offer an effective framework for implementing sustainable development principles with the support of local communities.

A mixed-methods approach was applied, integrating secondary data analysis with primary data collected through surveys and interviews with local residents and stakeholders. The findings indicate that nature and culture are viewed by the local population as the primary assets of the Poľana Biosphere Reserve, with a strong

¹ Matej Bel University, Banská Bystrica, Slovakia.

² Matej Bel University, Banská Bystrica, Slovakia.

³ The State Nature Conservancy of the Slovak Republic, Zvolen, Slovakia.

appreciation for preserved traditions, crafts, folklore, and the natural landscape. Factor analysis further confirmed that the potential for natural and cultural development, along with participation and partnerships, represent the most significant dimensions influencing the perceived quality of life in the area.

The results confirm that biosphere reserves function as learning environments where environmental, socio-cultural, and economic dimensions are closely interconnected. Local residents perceive the biosphere reserve designation as an opportunity for development, particularly in the areas of sustainable tourism and agrotourism. At the same time, the findings highlight that environmental and cultural aspects of life within biosphere reserves are evaluated very positively by the local population.

The study concludes that biosphere reserves managed through participatory governance and active community involvement can serve as model territories for integrating environmental protection, socio-cultural values, and locally rooted economic development. Such territories can effectively support the implementation of sustainable development goals, although certain limitations remain. Community participation, traditional knowledge, and a strong place-based identity play a crucial role in ensuring long-term sustainability and resilience.

Overall, the research contributes to broadening the discussion on biosphere reserves by extending it beyond ecological perspectives to also include socio-economic and spatial planning dimensions.

Keywords:

biosphere reserve, sustainable development, nature and culture, local community and engagement, quality of life

1. Introduction

Growing global challenges highlight the increasing need for the efficient and responsible use of limited resources to support the sustainable development of regions. Biosphere reserves represent a distinctive type of territory that integrates biodiversity conservation with sustainable human living, aiming to achieve a balanced and mutually beneficial relationship between people and the natural environment. Their significance is strongly connected to the *2030 Agenda for Sustainable Development*, as the synergy between human activities and the biosphere contributes to achieving several Sustainable Development Goals (Ibragimova, 2024; Nautiyal et al., 2001; Reed & Price, 2020; Ferreira et al., 2020).

The significance of biosphere reserves is determined by the quality of their potential, which is shaped by both social and ecological systems (Axelsson et al., 2011). This potential is developed through the three core functions of biosphere reserves. The

first function focuses on the conservation of biodiversity, ecosystems, and landscapes, which has a major influence on maintaining ecological balance. The second function relates to the social and cultural sphere and aims to support the sustainable economic and socio-economic development of the local population. The third function involves the promotion of science, research, and education, with a strong emphasis on building partnerships at local, regional, and international levels. These partnerships help foster knowledge exchange and support sustainable development within the territory (ŠOPSR, 2022). Furthermore, the most recent UNESCO Man and the Biosphere (MAB) Strategy for 2021–2025 introduces a fourth function of biosphere reserves, which focuses on supporting climate change mitigation and adaptation, as well as addressing other aspects of global environmental change (Špulerová et al., 2023).

Together, these functions position biosphere reserves as multifunctional territories where sustainable development can be effectively implemented through place-based governance approaches.

Although biosphere reserves have been extensively examined in the fields of ecology, biodiversity conservation, and landscape planning, evidence from academic databases such as Web of Science (WoS) and Scopus shows that far less attention has been devoted to their role as models of sustainable development from the perspectives of regional development, public policy, and strategic planning. Most existing studies primarily focus on the total economic value of protected areas and the assessment of ecosystem services. Therefore, this study aims to contribute to a deeper exploration of this relatively under-researched area. We emphasise that climate change and other global challenges increase the need to identify approaches to territorial management that integrate socio-economic development with biodiversity conservation and community cohesion. This represents a notable gap in current research on biosphere reserve development. As model territories, biosphere reserves should not focus solely on ecological aspects; rather, their development should integrate ecological integrity with sustainable local livelihoods, active community participation, and the resilience of the territory.

The paper aims to assess the potential of biosphere reserves as model territories for sustainable development and to examine the role of nature, culture, and local community involvement as key drivers of development. It emphasises the importance of biosphere reserves as spaces for sustainable living, resulting from the unique relationship between natural and cultural elements. This relationship shapes the structure of socio-economic activities within the territory, which must reflect and respect the specific characteristics of the natural environment. At the same time, it creates favourable conditions for the lives of local inhabitants, whose identity is shaped by distinctive culture, traditions, and customs. These factors foster a sense of local patriotism and encourage strong social engagement among residents toward the territory in which they live.

The focus of this study is the Poľana Biosphere Reserve in the Slovak Republic, which is recognised as one of the best-managed biosphere reserves and has been

awarded by UNESCO. The main data sources include a questionnaire survey conducted among local residents of the Połana Biosphere Reserve, structured interviews with local stakeholders, and statistical information and data obtained from strategic documents, municipal websites, and the websites of stakeholders operating within the biosphere reserve. Based on the research findings, the study aims to identify the key factors influencing life in the Połana Biosphere Reserve and to assess the role of nature and culture for the local community.

The article is structured as follows: Section 2 presents the theoretical background, focusing on the interconnections between biosphere reserves, sustainable development, and theories of endogenous regional development. Section 3 introduces the study area, outlines the main research questions, and describes the research methodology. Section 4 presents the research results and evaluates the significance of the various components of biosphere reserve potential from the perspective of the local community, comparing these findings with the theoretical framework. Section 5 discusses the results in relation to the theoretical concepts and formulates relevant policy implications.

Finally, the conclusion addresses the research questions and summarises the main findings regarding the quality of life in biosphere reserves, highlighting the crucial role of local communities in the sustainable development of such territories.

2. Theoretical framework

2.1. Biosphere reserve as an object of sustainable development

A biosphere reserve is a territory where social and ecological systems are closely interconnected, offering a framework for understanding and managing change while strengthening the interactions between these systems. It can also be viewed as a territorially based governance arrangement in which sustainable development is implemented by balancing ecological, social, cultural, and economic objectives. This concept aims to reconcile nature conservation with sustainable development (Ishwaran et al., 2008; Axelsson et al., 2011) by fostering a balanced relationship between these goals, with particular emphasis on community well-being. Through the harmonious coexistence of humans and nature, biosphere reserves align with the objectives of the 2030 Agenda for Sustainable Development and contribute to achieving its goals (UNESCO, 2022b; Bridgewater, 2002; Van Cuong et al., 2016).

Several researchers have pointed out that biosphere reserves function as practical platforms for implementing the 2030 Agenda, as they promote the principles of sustainable development and participatory governance that actively involve local communities (Heinrup & Shultz, 2017; Maldonado-Briegas et al., 2025; Sandström et al., 2025; Rockström & Sukhdev, 2016; Pool-Stanvliet & Coetzer, 2020; Stoll-Kleemann & O'Riordan, 2017; UNESCO, 2015; UNESCO, 2017).

This perspective supports the view that biosphere reserves should not be considered solely as protected ecological areas, but also as territories where the outcomes of sustainable development can be generated, experienced, and assessed by local communities.

A fundamental prerequisite for a territory to be designated as a biosphere reserve is its significant natural value, reflected in ecological diversity, the presence of rare or endangered species, valuable habitats, or distinctive landscape features. From the perspective of regional development theory, the key resources for sustainable development within a biosphere reserve include its natural assets and the local community, along with their knowledge, traditions, and cultural practices (Blažek & Uhlíř, 2020).

This implies that the developmental impact of a biosphere reserve does not stem solely from its ecological significance, but also from the ability of local actors to utilise this value in combination with cultural heritage, place-based identity, and social cooperation. In other words, the development of biosphere reserves is grounded in the use of the area's endogenous potential.

According to Tödtling (2010), this can be more precisely described as indigenous potential, meaning locally rooted assets and natural resources—such as wood, water, and land—that are strongly embedded within the territory and therefore have a greater capacity to generate long-term benefits for local and regional development. This potential interacts with other spatial factors and actors, including policymakers, infrastructure, the education system, and civil society, and together they support a bottom-up development strategy. In this approach, development initiatives are driven by local actors and reflect the needs, priorities, and development goals of the local and regional population. Recent studies (e.g. Rodríguez-Pose, 2013; Boschma, 2015; Grillitsch & Sotarauta, 2019; Rodríguez-Pose et al., 2024) have highlighted the importance of endogenous factors—such as regional resilience, the capacity of regions to adapt to global megatrends, and the presence of agents of change—as key determinants of regional economic development. These factors also influence the development strategies of territories that adopt place-based and place-sensitive approaches (Iammarino et al., 2018; Rodríguez-Pose et al., 2024).

In the context of biosphere reserves, these approaches are especially relevant, as their ability to promote sustainable development depends on the effective integration of natural resources, cultural values, and local institutional capacities.

These principles are also reflected in the UNESCO Technical Guidelines for Biosphere Reserves (UNESCO, 2022a), which outline the key principles for the management and operation of biosphere reserves worldwide. The guidelines emphasise the importance of inclusive and participatory processes throughout all stages of a biosphere reserve's lifecycle, from its initial designation to implementation and ongoing management. A central component of the bottom-up approach is the recognition and incorporation of traditional knowledge systems alongside scientific expertise in the

development of management strategies. This ensures that the strategies are sensitive to the local context and culturally appropriate, while also reinforcing the significance of local identity and heritage.

Particular emphasis is placed on capacity-building initiatives that empower local actors to participate actively in governance processes and to develop sustainable livelihood opportunities through community-based economic activities (Turečková & Nevima, 2018). In addition, within bottom-up planning and adaptive management frameworks, local stakeholders play an important role in monitoring and evaluating ecological and socio-economic indicators. This involvement supports evidence-based decision-making and ensures that management practices can adapt to changing conditions and feedback from the community.

For the purposes of this study, this perspective is particularly relevant, as it indicates that the developmental role of a biosphere reserve should be evaluated not only through ecological indicators but also through how local residents perceive its impact on their quality of life, local development opportunities, and the level of community participation.

In addition to the endogenous theory of regional development, biosphere reserves can also be understood through the concept of learning regions, where knowledge, learning capacity, and innovation play a crucial role in driving development (Borseková et al., 2021; Turečková et al., 2023). These processes are strongly shaped by the relationships among local actors and the environment in which they operate. This perspective also highlights the sociological and cultural dimensions that are essential components of biosphere reserves.

What matters is not only which resources or types of information are available in the area and what resources local actors are able to mobilise, but also the meanings attributed to them and the ways in which they are interpreted and applied in practice (Blažek & Uhlíř, 2020). In this context, biosphere reserves create spaces for learning about change and for managing the interactions between social and ecological systems, thereby functioning as learning regions (Lepeška, 2012; Schultz & Lundholm, 2013; Schultz et al., 2018).

From the perspective of sustainable development, this learning function enables territories to adapt their development strategies to local conditions while maintaining ecological integrity and cultural uniqueness.

The concept of biosphere reserves as territories of endogenous regional and sustainable development can produce several important effects. The most frequently highlighted effect is the promotion of sustainable development (Vitálišová et al., 2023; Kratzer et al., 2022; Vaňová et al., 2023; Price et al., 2024; Benhsain & Salhi, 2022; Ibrahimov & Sadullayev, 2023). In line with recent developments in regional development theory, many authors emphasise the role of biosphere reserves in strengthening the resilience, empowerment, and capacities of local communities, as well as their connection to the territory (e.g. Schüttler et al., 2023; Thao et al., 2023;

Ibrahimov & Sadullayev, 2023; Azadi et al., 2021).

At the same time, biosphere reserves contribute to the protection of biodiversity and support ecological and climate resilience (Ferreira et al., 2020; Auliz-Ortiz et al., 2024; Schüttler et al., 2023; Benhsain & Salhi, 2022; Thao et al., 2023; Ibrahimov & Sadullayev, 2023; Azadi et al., 2021). They also generate socio-economic benefits, such as strengthening economic resilience, encouraging innovation, increasing employment opportunities, and improving overall quality of life (Thao et al., 2023; Kedward et al., 2022; Cheng et al., 2023; Ferreira et al., 2020; Bires & Raj, 2020; Wang et al., 2019; Kratzer et al., 2022; Kratzer & Ammering, 2019; Benhsain & Salhi, 2022).

Importantly, these expected effects are not only objective or institutional in nature but are also strongly rooted in the perceptions of the local community. If residents view the biosphere reserve as beneficial for nature conservation, the preservation of culture and traditions, the strengthening of local cooperation, and the creation of development opportunities, it can be regarded as a socially legitimised model territory for sustainable development. Conversely, if such perceptions are absent, the development potential of the biosphere reserve remains constrained. For this reason, the present study focuses specifically on how nature, culture, and community participation are perceived in relation to the sustainable development of the Poľana Biosphere Reserve.

2.2. Potential of biosphere reserve

Sustainable development within biosphere reserves should focus on meeting the needs of current generations without limiting the ability of future generations to meet their own needs, and without causing harm to other nations (Maier, 2012). In this context, sustainable development represents a balanced interaction of environmental, social, cultural, and economic processes within a given territory. Its objective is to achieve consensus between biodiversity conservation, the social needs of local communities, political priorities, and development opportunities, while respecting the principles of equality, justice, participation, and territorial autonomy (Vaňová, 2006; Vitálišová et al., 2022).

The functioning of biosphere reserves is typically shaped by a combination of economic, social, and political factors. Therefore, their development should be approached in an integrated manner that gives equal importance to economic growth, social well-being, and environmental protection (Wheeler, 2009; Brandon et al., 2005; Kearney et al., 2006; Eizenberg & Jabareen, 2017; Schädler et al., 2010; Lyon et al., 2017; Riensche et al., 2015; Deveci et al., 2022; Donald, 2008; Reyer et al., 2012; Wiber et al., 2003; Orenstein & Shach-Pinsley, 2017).

Consequently, development strategies in biosphere reserves should rely primarily on location-specific and non-destructive resources, including environmental quality, cultural heritage, traditional knowledge, social capital, and sustainable economic activities (Vitálišová et al., 2022).

Examples from different parts of the world indicate that biosphere reserves possess

significant potential to support social, economic, and environmental development; however, this potential is often not fully utilised (Makenzi, 2013; Nautiyal et al., 2001; Carius, 2016; Grossmann, 2006). Within the framework of spatial economics, the sustainable development potential of biosphere reserves can be understood as consisting of four key components: natural-geographical potential, socio-economic potential, socio-demographic potential, and innovative potential (Vaňová, 2006).

Natural-geographical potential represents the environmental identity of a biosphere reserve and includes the abiotic and biotic characteristics of the territory as well as its secondary landscape structure (Urban, 2016). This component plays an essential role in biodiversity conservation and in enhancing ecological and climate resilience. It contributes through the protection of sensitive plant and animal species, as well as through ecosystem functions such as water, air, and soil purification, regulation of natural hazards, water flow control, erosion prevention, soil fertility maintenance, pollination support, and the control of pests and diseases (Schüttler et al., 2023; Benhsain & Salhi, 2022; Thao et al., 2023; Ibrahimov & Sadullayev, 2023; Azadi et al., 2021). At the same time, this component forms the foundation of the perceived natural value of a biosphere reserve, which may significantly influence whether local residents regard the reserve as a resource that supports sustainable living.

The socio-economic potential of a biosphere reserve reflects the socio-economic conditions of the area, shaped by its unique geographical position, territorial characteristics, specific local products, and the level of social capital within the community. This component contributes to strengthening economic resilience by supporting sustainable economic development within the territory. It creates additional income and employment opportunities across various economic sectors, enhances territorial infrastructure, promotes traditional products connected to natural and cultural heritage, and highlights the aesthetic value of the landscape (Kedward et al., 2022; Kettunen & Ten Brink, 2013; Ibrahimov & Sadullayev, 2023; Makenzi, 2013; Nautiyal et al., 2001; Carius, 2016). Within biosphere reserves, socio-economic potential also plays a key role in linking conservation objectives with development goals by incorporating natural and cultural resources into sustainable livelihoods, locally based products, tourism initiatives, and other place-based economic activities. A socio-economic potential of the biosphere reserve represents the socio-economic conditions of the area, given its unique location and territory, its specific products, but also the social capital in the area. It strengthens the resilience of the economy, supporting the sustainable economic development of the territory by generating additional income and employment opportunities linked to different economic sectors, supporting the infrastructure of the territory, strengthening the traditional products of the natural and cultural heritage and promoting the aesthetic value of the territory (Kedward et al., 2022; Kettunen & ten Brink, 2013; Ibrahimov & Sadullayev, 2023; Makenzi, 2013; Nautiyal et al., 2001; Carius, 2016). In biosphere reserves, it connects conservation with development by integrating natural and cultural assets into sustainable livelihoods, local products, tourism opportunities, and place-based economic activities.

The literature review suggests that biosphere reserves represent appropriate territories for the application of sustainable development principles, provided that environmental, social, cultural, and economic activities are addressed in an integrated manner and supported by the active involvement of local communities. At the same time, existing research indicates that the development of biosphere reserves has been predominantly studied from the perspective of environmental issues or landscape planning. A comprehensive approach to strategic planning that simultaneously considers all components of territorial potential and their perceived importance for local communities remains limited. Therefore, the following section of the paper presents a comprehensive analysis of the sustainable development potential of a biosphere reserve and identifies the key factors influencing quality of life from the perspective of the local population, using the example of the Poľana Biosphere Reserve.

3. Methodology

The paper seeks to assess the potential of the biosphere reserve as a model area for sustainable development and to explore the role of nature and culture as key factors shaping community life. Based on the literature review and the main objective of the study, the following research assumption is formulated: *A biosphere reserve provides an appropriate framework for implementing the principles of sustainable development with the support of the local community.*

This hypothesis will be examined by addressing three research questions.

RQ1: What are the key factors of quality of life in the biosphere reserve?

RQ2: What is the role of the local community and their participation in the sustainable development of a biosphere reserve?

RQ3: What are the current limits of the sustainable development of biosphere reserve?

The issue is examined using the case of the Poľana Biosphere Reserve in the Slovak Republic. To answer the formulated research questions, the study employs a mixed-methods research design that integrates both quantitative and qualitative data sources.

3.1. Object of the research – the Poľana Biosphere Reserve

The Poľana Biosphere Reserve is located in central Slovakia and was established in 1990. It is considered one of the best-managed biosphere reserves in the world. The reserve overlaps with the *Protected Landscape Area Poľana*, which was declared in 1981 to protect inanimate nature, plant and animal communities, as well as the distinctive character of the landscape.

The area covers 24,158.23 hectares and represents the highest volcanic mountain range in Slovakia, characterised by unique geological and geomorphological features

resulting from volcanic activity that occurred approximately 13–15 million years ago.

From an administrative perspective, the territory partly extends into the districts of Banská Bystrica District, Zvolen District, Brezno District, and Detva District.

The territory of the Poľana Biosphere Reserve includes 13 cadastral areas belonging to several municipalities across different districts. These include the municipalities of *Detva*, *Dúbravy*, and *Hriňová* in the Detva District; the municipality of *Očová* in the Zvolen District; the municipalities of *Hrochot*, *Lubietová*, *Poníky*, and *Povrazník* in the Banská Bystrica District; and *Čierny Balog*, *Hronec*, *Sihla*, *Strelníky*, and *Valaská* in the Brezno District.

Forests strongly dominate the landscape of the Poľana Biosphere Reserve, covering approximately 85% of its total area.

The flora of the Poľana Biosphere Reserve is characterised by the frequent occurrence of both thermophilous and montane plant species (Urban, 2016; Vitálišová & Vavrušová, 2023).

The total population of all municipalities within the biosphere reserve is 39,316 inhabitants, with an average population density of 42.47 inhabitants per km². In recent decades, the territory has experienced a significant outmigration of young people, mainly due to the limited diversification of employment opportunities. As a result, population ageing has become increasingly evident in the region.

Economically, the territory of Poľana is primarily oriented toward agriculture and forestry. Agricultural activities are mainly carried out by self-employed farmers engaged in both crop production and livestock breeding. A large proportion of the agricultural land they use consists of permanent grasslands. Farmers often rely on horses and traditional agricultural tools in their production practices, while agricultural cooperatives primarily focus on livestock farming.

The Poľana Biosphere Reserve and its surrounding *Podpoľanie* area are well known for their rich tradition of local handicrafts and a variety of traditional food products, including dairy products, pork, beef, honey, and bakery goods. Many local producers are certified with the Podpoľanie regional brand, which guarantees the originality and quality of locally produced goods.

Other economic activities in the area include manufacturing, mainly concentrated in larger municipalities, as well as service-related sectors such as accommodation, administrative, and financial services. In terms of educational infrastructure, the territory of the biosphere reserve includes 9 kindergartens, 15 primary schools, 4 art schools, and 3 secondary schools.

The surrounding region also hosts several important higher education and research institutions, including Matej Bel University, Technical University in Zvolen, Academy of Arts in Banská Bystrica, and the Slovak Medical University through its Faculty of Health in Banská Bystrica. Scientific research in the area is also supported by

institutions of the Slovak Academy of Sciences, including the Institute of Earth Sciences SAS and the Institute of Forest Ecology SAS.

From a cultural perspective, the Podpoľanie region is considered one of the most important centres of folklore and traditional culture in Slovakia. The distinctive character of the area is reflected in traditional wooden houses, haylofts, potato cellars, painted crosses, and well-preserved forms of folk art and craftsmanship. The cultural heritage is further expressed through traditional costumes, folklore groups, and local customs, which remain an important part of community life and regional identity.

3.2. Material and methods

The main sources of secondary data used in the research and in mapping the situation in the Poľana Biosphere Reserve include studies, programmes, regulations, statutes, plans, strategies, and projects related to the biosphere reserve, as well as methodological materials from UNESCO. Additional data were obtained from the Statistical Office of the Slovak Republic, official information published on the website of the Poľana Biosphere Reserve, and publicly available information from the municipalities belonging to the biosphere reserve.

Primary research was conducted in the form of a questionnaire survey among residents of the Poľana Biosphere Reserve. The survey aimed to capture residents' perceptions of the biosphere reserve and its perceived role in local development and quality of life. Data were collected through field questionnaires distributed directly within the territory as well as online questionnaires shared via the websites of municipalities located within the biosphere reserve.

Additional primary data were obtained through personal interviews with representatives of the biosphere reserve (the manager and coordinator of the reserve) and with local stakeholders, including local entrepreneurs, representatives of the Coordination Council of the Biosphere Reserve Poľana, and members of the local action group.

Data collection was carried out between November 2022 and August 2023. The research sample consisted of 101 respondents and was structured using two quota variables: gender and age (four age categories). The representativeness of the research sample was tested using the Chi-square test. The results indicate that the sample is representative by gender (Chi-square test – Asymp. Sig. = 0.136) and by age (Chi-square test – Asymp. Sig. = 0.051).

The composition of the research sample is presented in table 1.

Table 1:

The research sample of the questionnaire survey

19 - 29 years	18	17.80%	women	59	58.42%
30 - 49 years	44	43.60%			
50 - 59 years	20	19.80%	men	42	41.58%
more than 60 years	19	18.80%			
total number of respondents	101	100.00%	total	101	100.00%

Source: Authors' own elaboration, 2026

- Closed-ended questions:
 1. *Are you aware that you live in the Połana Biosphere Reserve? (Yes / No)*
 2. *Are you aware that the Połana Biosphere Reserve is designated as a UNESCO site? (Yes / No)*
 3. *Do you consider living in the Połana Biosphere Reserve to be an advantage, a disadvantage, or are you unsure?*
-
- Open-ended questions:
 4. *What is the first thing that comes to your mind when you hear the term Połana Biosphere Reserve?*
 5. *What do you perceive as the biggest problem in the development of the Połana Biosphere Reserve?*
 6. *What do you perceive as the biggest advantage of living in the Połana Biosphere Reserve?*
- Scaling question:
 7. *How do you rate the different areas of life in the Połana Biosphere Reserve?*

The scaling question used a five-point scale ranging from “very successful” to “very unsuccessful”. Respondents evaluated 38 different aspects of life in the Połana Biosphere Reserve. These aspects included: job opportunities; business opportunities; shopping opportunities; preservation of traditions, crafts and folklore; cultural activities; catering services; sports facilities; social services; health services; educational opportunities; environmental and nature conservation programmes; availability of pharmacies and ATMs; public spaces and greenery; interpersonal relations; waste separation; relations between long-term residents and newcomers; residents’ involvement in public life; housing opportunities (house construction and apartments); opportunities for nature exploration (nature trails, information boards, etc.); opportunities for agro-tourism; use of renewable energy sources; protection of cultural and historical monuments; the work of elected representatives of towns and municipalities; access to local information; cooperation among actors in the territory; security; quality of roads and pavements; quality of internet coverage; frequency of transport connections between villages and

towns; accessibility of the territory by bus and by train; environmental quality; environmental and nature protection measures; organisation of traditional events (e.g. Christmas, carnival, welcoming spring); organisation of new events; promotion of the region; and the availability of information about the natural and cultural-historical values of the area.

- Multiple choice question:

8. *What do you perceive as priorities for development in the Poľana Biosphere Reserve?*

Respondents were asked to select three of the most important development priorities from the following options: reconstruction of roads and pavements; reconstruction of water supply and sewerage systems; housing construction with regard to the carrying capacity of the area; development of health services; development of education and training; development of social services; support for social and cultural life; construction of sports facilities; environmental protection; promotion of employment in agriculture; promotion of employment in traditional crafts characteristic of the region; development of tourism; construction of cycling routes; or another priority specified by the respondent.

Interviews with stakeholders of the biosphere reserve were conducted primarily to contextualise the survey findings and to provide deeper insight into development-related issues that could not be adequately captured through closed-ended survey questions alone.

For data analysis and hypothesis testing, SPSS software and MS Excel were used. For a deeper analysis of the data, several statistical methods were applied, including the Friedman test, Wilcoxon test, and factor analysis. The factor analysis showed a sampling adequacy of 0.746 according to the Kaiser–Meyer–Olkin (KMO) measure, and Bartlett’s test of sphericity was significant (Sig. < 0.001), confirming the suitability of the dataset for this type of analysis.

The Principal Component Analysis (PCA) extraction method was used, followed by Varimax rotation with Kaiser normalisation. Initially, SPSS generated 11 factors, but based on the scree plot, the number of factors was reduced to six.

These methods enabled the identification of broader latent dimensions underlying the perceived quality of life in the Poľana Biosphere Reserve. They also helped interpret how residents perceive the relationship between nature, culture, and local development, while providing a basis for answering the formulated research questions.

4. Results

The empirical findings offer detailed insight into how local residents perceive the Poľana Biosphere Reserve and how they evaluate selected aspects of quality of life within the

area. A large majority of respondents (95.05%) reported that they are aware they live within the Poľana Biosphere Reserve. Furthermore, 78.22% of participants know that the reserve holds designation as a UNESCO site under UNESCO. These results suggest a relatively high level of awareness of the biosphere reserve among local inhabitants, which represents an important prerequisite for evaluating development opportunities in the region. The issue of public awareness of the Poľana Biosphere Reserve was further explored through questions examining residents’ perceptions of living within the reserve. A total of 77.23% of respondents view living in the biosphere reserve positively or consider it an advantage. To provide a deeper analysis of the first three questions, the results are presented in contingency Tables 2 and 3. The findings show that the majority of respondents (76.24%) are aware that they live in the Poľana Biosphere Reserve and simultaneously know that it holds the status of a UNESCO site, while 18.81% of respondents do not possess this awareness.

Table 2:

Awareness of the biosphere reserve and living in it

Are you aware that the Poľana Biosphere Reserve is a UNESCO site?	Do you know that you live in the Poľana Biosphere Reserve?		
	no	yes	total
No	2.97%	18.81%	21.78%
Yes	1.98%	76.24%	78.22%
Total	4.95%	95.05%	100.00%

Source: Authors’ own elaboration, 2026

Table 3 indicates that approximately three quarters of respondents (75.25%) who are aware that they live in a biosphere reserve perceive this fact as an advantage and view it positively. Only a very small proportion of respondents consider it to be a negative aspect.

Table 3:

Living in the Poľana Biosphere Reserve

Do you consider the fact that you live in a Poľana Biosphere Reserve:	Do you know that you live in the Poľana Biosphere Reserve?		
	no	yes	total
a negative issue	0.00%	0.99%	0.99%
an asset and a positive issue	1.98%	75.25%	77.23%
don't know	2.97%	18.81%	21.78%
Total	4.95%	95.05%	100.00%

Source: Authors’ own elaboration, 2026

In the first of the three open-ended questions, respondents were asked what first comes to mind when they think of the Poľana Biosphere Reserve. The most frequent response (23.03%) was beautiful, untouched nature. Another 21.84% of respondents

mentioned the term “protected landscape area” and related ideas such as nature conservation and ecological protection. Other associations included the extinct volcano, the coexistence of humans and nature in symbiosis, bears, forests, opportunities for various leisure activities, a healthy and clean environment, waterfalls, development potential, and the presence of many rare animal species. Overall, the responses suggest that the biosphere reserve is primarily connected in the minds of respondents with environmental quality and natural heritage.

The second question showed that respondents consider the overpopulation of bears and wolves to be the most significant problem affecting the development of the area, as it contributes to a lower sense of safety and increasing fear among residents (24.42% of respondents). A further 14.77% identified threats to nature and forests as the main issue, particularly those related to inappropriate logging, hunting activities, or tourism. Meanwhile, 10.47% of respondents stated that they do not perceive any major problems in the area.

Other responses highlighted a variety of concerns, including criticism of conservationists and what some respondents see as excessive environmental regulations, the attitudes and decisions of public officials, inaction and lack of cooperation, and poor decision-making. Additional issues mentioned included insufficient services, a lack of interest and initiative among local residents, limited support and subsidies, inadequate promotion of the area, the absence of proper land-use planning documentation, the decline of traditional management practices, and the lack of a clear development strategy.

Responses to the third open-ended question indicate that the greatest advantage of living in the Poľana Biosphere Reserve is its beautiful natural environment and close proximity to nature (34.20%). This is followed by the presence of a healthy, high-quality, and clean environment (18.41%) and the silence, peace, and tranquillity associated with traditional rural life (12.94%).

Other responses highlighted additional benefits, such as the preservation and protection of nature and its sustainable use, opportunities for leisure activities, the harmonious coexistence of humans and nature, and various social and personal reasons for living in the area. Respondents also mentioned independence and freedom, opportunities for development and promotion of the region, and a peaceful environment with either minimal tourism or potential for its development. Further advantages included the presence of local farmers and regional products, as well as the preservation of traditions and customs. Overall, these responses once again suggest that natural values and cultural identity are perceived as the key assets of the territory.

The scaling questions examined how residents evaluate their satisfaction with different aspects of quality of life in the Poľana Biosphere Reserve. To analyse the collected data, the Friedman test was applied in order to determine whether respondents rated the individual areas of quality of life similarly or whether significant differences existed among them. The aspects of quality of life that received the highest and lowest

rankings from respondents are presented in Table 4.

Table 4:

Friedman test analysis of citizens' evaluation of quality-of-life areas in the Połana Biosphere Reserve

Ranks TOP	Mean rank	Ranks BOTTOM	Mean rank
Preservation of traditions, crafts, folklore	12.31	Healthcare	25.47
Pharmacy	14.56	Involvement of residents in public life	26.50
Organisation of traditional events	14.58	Accessibility of the area by train	28.22

Source: Authors' own elaboration, 2026

According to Table 4, respondents reported the highest level of satisfaction with the preservation of traditions, crafts and folklore, as well as with pharmacy services and the organisation of traditional events. In contrast, the lowest levels of satisfaction were associated with the accessibility of the area by train, the involvement of residents in public life, and the availability of healthcare services. This pattern indicates that while the cultural and environmental aspects of life in the biosphere reserve are perceived positively, several infrastructural and service-related areas represent weaknesses within the territory.

Differences in the evaluation of selected areas according to gender and age groups are presented in Table 5. The Wilcoxon test was applied to determine whether statistically significant differences exist in the assessment of quality-of-life dimensions among the selected groups of respondents. The results indicate that no statistically significant differences were identified in most areas, as all p-values exceeded the significance level of $p = 0.05$.

Table 5:

Friedman test analysis of citizens' assessment of quality-of-life areas in the Połana Biosphere Reserve by sex and age group

Ranks women	Mean rank	Ranks men	Mean rank
Preservation of traditions, crafts, folklore	9.99	Preservation of traditions, crafts, folklore	12.46
Pharmacy	12.06	Pharmacy	13.15
Organisation of traditional events	12.50	Opportunities for sport activity	13.75
⋮	⋮	⋮	⋮
Business opportunities	24.93	Healthcare	24.14
Use of renewable energy sources	25.03	Involvement of residents in public life	24.57
Accessibility of the area by train	28.47	Accessibility of the area by train	30.82
Ranks citizens 19-29	Mean rank	Ranks citizens 30-49	Mean rank
Preservation of traditions, crafts, folklore	10.22	Pharmacy	9.81

Opportunities for learning about nature	13.39	Preservation of traditions, crafts, folklore	11.57
Opportunities for sport activity	14.75	Organisation of traditional events	12.67
⋮	⋮	⋮	⋮
Involvement of residents in public life	25.42	Frequency of connections between municipalities	25.10
Quality of roads and pavements	26.83	Environmental programmes and nature protection	25.11
Accessibility of the area by train	30.92	Accessibility of the area by train	28.61
Ranks citizens 50-59	Mean rank	Ranks citizens 60+	Mean rank
Preservation of traditions, crafts, folklore	11.00	Pharmacy	10.11
Public spaces and greenery	13.38	Preservation of traditions, crafts, folklore	10.53
Quality of the environment	14.28	Organisation of traditional events	11.66
⋮	⋮	⋮	⋮
Use of renewable energy sources	25.85	Business opportunities	26.97
ATM	27.58	Use of renewable energy sources	27.00
Accessibility of the area by train	29.98	Accessibility of the area by train	29.42

Source: Authors' own elaboration, 2026

Statistically significant differences were observed only in the evaluation of the preservation of traditions, crafts, and folklore among women, and in the assessment of the accessibility of the area by train among women, men, and respondents aged 19 to 49. After statistical generalisation, these areas provide an indication of the levels of satisfaction or dissatisfaction of residents of the Połana Biosphere Reserve.

Overall, the findings confirm that inhabitants perceive culture and traditions as key elements of life in the region, forming a distinctive added value of the territory and supporting its qualification for recognition as a biosphere reserve.

As part of the analysis of quality-of-life dimensions, factor analysis was also applied. Six factors were identified, as presented in Table 6. The most significant factor, containing the highest number of components, represents the potential for natural and cultural development, which forms the core of the biosphere reserve. The second most significant factor influencing quality of life in the Połana Biosphere Reserve is participation and partnership development, which is also recognised in the literature as a key prerequisite for biosphere reserve development.

The research results indicate that the local community perceives these two factors as the most important determinants of quality of life. In other words, the balanced use of natural and cultural potential can be achieved only through the active involvement of local residents and stakeholders in the governance of the territory, guided by biosphere territory managers and the mayors of municipalities within the territory.

Table 6:
Factor analysis of quality-of-life areas in the Poľana Biosphere Reserve

Factor	Areas of quality of life in the Poľana Biosphere Reserve as assessed by local inhabitants	Rotated Component result
Potential for natural-cultural development	Opportunities for learning about nature	0.717
	Protection of cultural and historical monuments	0.687
	Information about events in the territory	0.665
	Agrotourism opportunities	0.648
	Promotion of the region	0.609
	Use of renewable energy sources	0.604
	Organisation of traditional events	0.597
	Information on the natural-cultural-historical values of the area	0.578
	Environmental and nature protection measures	0.565
	Environmental programmes and nature protection	0.553
	Preservation of traditions, crafts, folklore	0.543
	Cooperation between actors in the territory	0.518
	Organisation of new events	0.507
	Waste separation	0.483
	Public spaces and greenery	0.471
	Cultural activities	0.448
Participation and partnership	Involvement of residents in public life	0.624
	Relations between old settlers and new settlers	0.569
	Possibilities for housing, construction of houses, apartments	0.565
	Interpersonal relationships	0.489
	The work of elected representatives of municipalities	0.431
Services	Pharmacy	0.693
	Accessibility of the area by train	0.675
	ATM	0.663
	Public catering	0.542
	Healthcare	0.431
Socio-economic potential and innovation	Job opportunities	0.768
	Business opportunities	0.756
	Shopping possibilities	0.553
	Social services	0.454
Accessibility of the area	Accessibility of the area by bus	0.843
	Frequency of connections between municipalities	0.840
	Quality of roads and pavements	0.416
	Quality of internet coverage	0.414
Social capital	Safety	0.675
	Quality of the environment	0.485
	Opportunities for sport activity	0.447
	Opportunities for education	0.426

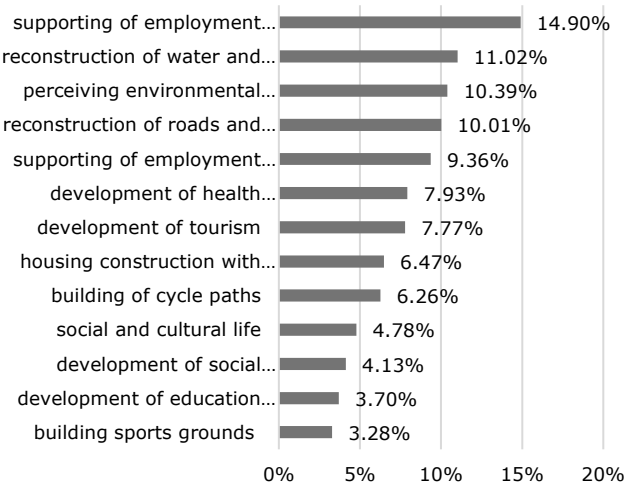
Source: Authors' own elaboration, 2026

The final area of the research focused on identifying development priorities for the Połana Biosphere Reserve from the perspective of the local community. A summary of the respondents' answers is presented in Figure 1.

Figure 1:

Priorities in the development of the Połana Biosphere Reserve by local citizens

Source: own elaboration



Source: Authors' own elaboration, 2026

In addition to the priorities for the development of the Połana Biosphere Reserve identified in Figure 1, respondents also highlighted several other important areas. These included the development of tourism in a sustainable manner, with an emphasis on preserving traditional land use and the traditional way of life in the region. According to respondents, without the protection of natural and cultural values, the area would lose its attractiveness for both tourism and residential living.

Participants also mentioned the potential for developing agrotourism and nature trails, as well as the overall development of the territory and its infrastructure. Other frequently noted priorities included the creation of employment opportunities, increasing interest in the area as an attractive territory with a recognised “quality label”, and greater emphasis on the care, protection, and promotion of the region’s unique natural and cultural heritage. Respondents further stressed the importance of education and of strengthening the connection between education and nature.

5. Discussion

Referring to the theoretical review (e.g. UNESCO, 2022b; Schultz et al., 2018; Price et al., 2024 and others), biosphere reserves can be interpreted as territorial frameworks suitable for implementing the principles of sustainable and endogenous regional development, which also constituted the main research assumption of this paper. Biosphere reserves represent a synergy of ecological, social, and economic processes based on the active participation of local communities. In such a context, environmental protection, socio-cultural identity, and economic development may function as mutually reinforcing elements rather than as conflicting objectives.

This perspective is consistent with the concepts of “learning regions” and the place-based development paradigm, which emphasise the importance of local identity, cultural heritage, participatory governance, and innovation in territorial development (Axelsson et al., 2011; Blažek & Uhlíř, 2020; Rodríguez-Pose et al., 2024).

The empirical findings from the Pořana Biosphere Reserve provide evidence that supports this theoretical assumption. An overwhelming majority of respondents (over 77%) perceive living in the biosphere reserve as a benefit, confirming the theoretical proposition that local populations tend to value territories that combine natural assets with cultural identity.

Furthermore, the highest-rated aspects of life—such as the preservation of traditions, crafts, folklore, and the organisation of traditional events—correspond closely with the socio-demographic and cultural potential emphasised in theoretical models (Kedward et al., 2022; Ibrahimov & Sadullayev, 2023; Vitálišová et al., 2022; Urban, 2016).

These findings also provide an answer to RQ1, which focuses on identifying the key factors influencing quality of life in the biosphere reserve. The results indicate that the most positively evaluated dimensions are primarily related to environmental quality, cultural traditions, and community life.

Factor analysis further confirmed this alignment by identifying the potential for natural–cultural development as the most influential component of quality of life in the area. This finding supports the concept of biosphere reserves as “spaces of learning”, where relationships between humans and nature are strengthened through dynamic interactions and shared knowledge (Schultz et al., 2018).

The second most significant factor, participation and partnership, further reinforces the theoretical emphasis on community empowerment and bottom-up governance, as highlighted in the technical guidelines of UNESCO (UNESCO, 2022b) and in the theory of participatory governance (Špulerová et al., 2023; Donevska, 2020; Walk et al., 2019; Schultz et al., 2010). These findings also provide an answer to RQ2, which examines the role of the local community and participation in the sustainable development of a biosphere reserve. The results indicate that active involvement of local stakeholders is a key factor supporting sustainable territorial development.

The answer to RQ3, which examines the current limits of sustainable development in the Połana Biosphere Reserve, is closely related to the lower level of satisfaction expressed by residents regarding aspects of socio-economic potential, particularly accessibility, business opportunities, and certain personal services. These findings highlight the presence of structural challenges within the socio-economic and infrastructural domains. At the same time, they reflect concerns raised in the literature about the underutilisation of innovation capacity and economic potential in biosphere reserves (Grossmann, 2006; Ferreira et al., 2020). On the one hand, opportunities for economic development are constrained by the specific characteristics of a biosphere reserve, particularly the presence of partially protected areas with a high level of environmental protection. On the other hand, these conditions also create new development opportunities that correspond with changing lifestyles in contemporary fast-paced societies, such as the growing demand for peaceful environments, a return to roots and traditions, crafts, slow tourism, and agrotourism.

From the perspective of endogenous development, the effective use of competitive advantages stemming from the existence of the biosphere reserve—perceived by residents more as an opportunity than as a barrier—depends largely on the diversified local community, which acts as a co-creator of the territory.

However, given the international significance of biosphere reserve territories, support and investment in the development of adequate socio-economic infrastructure at the supra-regional level are highly desirable. In the case of biosphere reserves, it is not appropriate to apply a one-size-fits-all approach. Instead, development strategies should reflect the specific characteristics of the indigenous territorial potential and integrate place-based and place-sensitive development approaches (Bridgewater, 2002; Reed & Price, 2020; Tödtling, 2010; Rodríguez-Pose, 2013; Boschma, 2015; Grillitsch & Sotarauta, 2019; Rodríguez-Pose et al., 2024).

The findings also have several implications for the policy and governance of biosphere reserves. First, biosphere reserve management and key stakeholders in the territory should place greater emphasis on linking environmental protection with local economic and social development opportunities, particularly those based on nature, cultural heritage, and traditional economic activities.

Second, strengthening participatory governance mechanisms appears to be essential, as residents identified participation and partnership as important dimensions of quality of life in the territory. This suggests that the effective implementation of sustainable development in biosphere reserves requires the active involvement of local communities in decision-making processes, planning activities, and development initiatives.

Third, addressing infrastructural and service-related challenges could further enhance the perceived benefits of living in biosphere reserves and support their long-term socio-economic sustainability.

Overall, the empirical evidence from the Połana Biosphere Reserve suggests that

biosphere reserves can indeed function as model territories for implementing the principles of sustainable development when supported by active participation of the local community. The results indicate that such implementation is feasible when natural and cultural assets are effectively connected with participatory governance, locally embedded economic activities, and inclusive territorial management.

Key conditions for achieving this include a strong local identity, the effective activation of natural and cultural potential, and meaningful civic participation. In this sense, the case of the Poľana Biosphere Reserve demonstrates how environmental assets, cultural heritage, and community engagement can jointly contribute to the environmental, social, and economic dimensions of sustainable development.

The primary challenge for the future lies in utilising the reserve's innovation and economic potential while maintaining a balance between infrastructure development and the preservation of ecological integrity.

6. Conclusions

The findings of the study confirm that biosphere reserves, as exemplified by the Poľana Biosphere Reserve, possess significant potential to serve as model territories for the implementation of sustainable development. The theoretical framework highlights the crucial role of endogenous development, local identity, cultural heritage, participatory governance, and ecological preservation as key components of sustainable development in biosphere reserves. The empirical evidence obtained from a representative sample of the local community strongly supports these theoretical assumptions.

Regarding RQ1, which examined the key factors influencing quality of life, the results indicate that the most important dimensions are environmental quality, cultural traditions, and community life. Residents particularly value the preservation of traditions, crafts, folklore, and traditional events, reflecting the strong cultural identity of the area. These findings were further supported by factor analysis.

Concerning RQ2, the results highlight the important role of the local community and participation in the sustainable development of the Poľana Biosphere Reserve. Active involvement of the local community, the development of partnerships, and the application of bottom-up governance approaches significantly contribute to development processes and reinforce the concept of biosphere reserves as "learning spaces", where knowledge sharing and interactions between people and nature support sustainable territorial development.

Finally, RQ3 addressed the current limits of sustainable development in the Poľana Biosphere Reserve. The results indicate that the main challenges are related to lower satisfaction with socio-economic conditions, particularly regarding accessibility, business opportunities, and certain personal services. While environmental protection

may limit some forms of economic activity, it simultaneously creates opportunities for alternative development pathways, such as slow tourism, agrotourism, and the revitalisation of traditional crafts.

Overall, sustainable development in biosphere reserves requires improvements in socio-economic infrastructure together with the application of place-based development approaches that reflect the specific territorial potential of the region.

The study also has several practical implications. Strengthening participatory governance mechanisms and involving local communities in decision-making processes appear to be essential for the successful implementation of sustainable development in biosphere reserves. In addition, supporting economic activities based on natural and cultural heritage—such as sustainable tourism, agrotourism, and traditional products—may further enhance the developmental potential of biosphere reserves while maintaining ecological integrity.

Although the study has certain limitations—particularly the fact that the research focuses on a single biosphere reserve—it can be considered a pioneering case study that may be replicated in other similar territories in order to verify the findings more broadly. Nevertheless, the concept of biosphere reserves and the development requirements associated with them are consistent with the current shift in regional development theories toward place-based and place-sensitive approaches. Biosphere reserves should therefore be managed through inclusive, bottom-up governance mechanisms that apply the principles of sustainable development in a balanced and context-sensitive manner.

Ensuring the continued empowerment of local communities, strengthening local governance mechanisms, and fostering innovation will be essential for unlocking the full developmental potential of such territories. Future research should therefore examine similar biosphere reserves in different geographical contexts and further explore the role of local communities as co-creators of territorial development. Particular attention should be given to their strong attachment to place, cultural continuity, and openness to participatory governance, all of which may significantly influence the future sustainable development of these territories.

Acknowledgements

This paper presents partial results of the research project APVV-24-0101 Biosphere reserves as living lab and a project APVV-20-0108 Implementation of Agenda 2030 through biosphere reserves in the Slovak Republic, project UGA-05-DS-2024 funded by the EU NextGenerationEU through the Recovery and Resilience Plan for Slovakia under the project No. 09I03-03-V05-00009.

Disclosure statement

No potential conflict of interest was reported by the author(s).

References

- Auliz-Ortiz, D. M., Benítez-Malvido, J., Arroyo-Rodríguez, V., Dirzo, R., Pérez-Farrera, M. Á., Luna-Reyes, R., Mendoza, E., Álvarez-Añorve, M. Y., Álvarez-Sánchez, J., Arias-Ataide, D. M., Ávila-Cabadilla, L. D., Botello, F., Braasch, M., Casas, A., Campos-Villanueva, D. Á., Cedeño-Vázquez, J. R., Chávez-Tovar, J. C., Coates, R., Dechnik-Vázquez, Y., . . . Martínez-Ramos, M. (2024). Underlying and proximate drivers of biodiversity changes in Mesoamerican biosphere reserves. *Proceedings of the National Academy of Sciences*, 121(6), e2305944121. <https://doi.org/10.1073/pnas.2305944121>
- Axelsson, R., Angelstam, P., Elbakidze, M., Stryamets, N., & Johansson, K. (2011). Sustainable Development and Sustainability: Landscape Approach as a practical interpretation of principles and implementation concepts. *Journal of Landscape Ecology*, 4(3), 5–30. <https://doi.org/10.2478/v10285-012-0040-1>
- Azadi, H., Van Passel, S., & Cools, J. (2021). Rapid economic valuation of ecosystem services in man and biosphere reserves in Africa: A review. *Global Ecology and Conservation*, 28, e01697. <https://doi.org/10.1016/j.gecco.2021.e01697>
- Benhsain, W., & Salhi, S. (2022). UNESCO biosphere reserves and agroecological initiatives: What convergence for what sustainable development? The case of the “Arganeraie” biosphere reserve in Morocco. *SPIRE - Sciences Po Institutional REpository*. <https://doi.org/10.34874/imist.prsm/tesd-v2i2.36358>
- Bires, Z., & Raj, S. (2020). Tourism as a pathway to livelihood diversification: Evidence from biosphere reserves, Ethiopia. *Tourism Management*, 81, 104159. <https://doi.org/10.1016/j.tourman.2020.104159>
- Blažek, J., & Uhlíř, D. (2020). *Teorie regionálního rozvoje: Nástin, kritika, implikace*. Charles University in Prague, Karolinum Press.
- Borseková, K., Vaňová, A., Šúrová, J., Král, P., Turečková, K., Nevima, J., & Martinát, S. (2021). The Nexus between Creative Actors and Regional Development. *Land*, 10(3), 276. <https://doi.org/10.3390/land10030276>
- Boschma, R. (2015). Towards an evolutionary perspective on regional resilience. *Regional Studies*, 49(5), 733–751. <https://doi.org/10.1080/00343404.2014.959481>
- Brandon, K., Gorenflo, L. J., Rodrigues, A. S., & Waller, R. W. (2005). Reconciling biodiversity conservation, people, protected areas, and agricultural suitability in Mexico. *World Development*, 33(9), 1403–1418. <https://doi.org/10.1016/j.worlddev.2004.10.005>

- Bridgewater, P. (2002). Biosphere reserves: Special places for people and nature. *Environmental Science & Policy*, 5(1), 9–12. [https://doi.org/10.1016/s1462-9011\(02\)00018-7](https://doi.org/10.1016/s1462-9011(02)00018-7)
- Carius, F. (2016). Tourism Revenue Sharing with Local Communities: A Case Study of Jozani—Chwaka Bay National Park and Biosphere Reserve, Zanzibar. [Master Thesis, University of Kaiserslautern].
- Cheng, A. T., Sims, K. R., & Yi, Y. (2023). Economic development and conservation impacts of China's nature reserves. *Journal of Environmental Economics and Management*, 121, 102848. <https://doi.org/10.1016/j.jeem.2023.102848>
- Coetzer, K. L., Witkowski, E. T. F., & Erasmus, B. F. N. (2013). Reviewing Biosphere Reserves globally: Effective conservation action or bureaucratic label? *Biological Reviews/Biological Reviews of the Cambridge Philosophical Society*, 89(1), 82–104. <https://doi.org/10.1111/brv.12044>
- Deveci, M., Pamucar, D., Gokasar, I., Isik, M., & Coffman, D. (2022). Fuzzy Einstein WASPAS approach for the economic and societal dynamics of the climate change mitigation strategies in urban mobility planning. *Structural Change and Economic Dynamics*, 61, 1–17. <https://doi.org/10.1016/j.strueco.2022.01.009>
- Donald, B. (2008). Food Systems Planning and Sustainable Cities and Regions: The role of the Firm in Sustainable Food Capitalism. *Regional Studies*, 42(9), 1251–1262. <https://doi.org/10.1080/00343400802360469>
- Donevska, N. (2020). *Participatory governance of UNESCO biosphere reserves in Canada and Israel*. Routledge. <https://doi.org/10.4324/9781003054177>
- Eizenberg, E., & Jabareen, Y. (2017). Social Sustainability: A new Conceptual framework. *Sustainability*, 9(1), 68. <https://doi.org/10.3390/su9010068>
- Ferreira, A. F., Zimmermann, H., Santos, R., & Von Wehrden, H. (2020). Biosphere Reserves' Management Effectiveness—A Systematic Literature Review and a Research Agenda. *Sustainability*, 12(14), 5497. <https://doi.org/10.3390/su12145497>
- Grillitsch, M., & Sotarauta, M. (2019). Trinity of change agency, regional development paths and opportunity spaces. *Progress in Human Geography*, 44(4), 704–723. <https://doi.org/10.1177/0309132519853870>
- Grossmann, I. (2006). Three scenarios for the greater Hamburg region. *Futures*, 38(1), 31–49. <https://doi.org/10.1016/j.futures.2005.04.002>
- Heinrup, M., & Schultz, L. (2017). Swedish Biosphere Reserves as Arenas for Implementing the 2030 Agenda: Analysis and practice. *KTH Publication Database DiVA (KTH Royal Institute of Technology)*. <https://naturvardsverket.diva-portal.org/smash/get/diva2:1084701/FULLTEXT01.pdf>

- Iammarino, S., Rodriguez-Pose, A., & Storper, M. (2018). Regional inequality in Europe: evidence, theory and policy implications. *Journal of Economic Geography*, 19(2), 273–298. <https://doi.org/10.1093/jeg/lby021>
- Ibragimova, Z. A. (2024). Theoretical study of regional potential, its essence and components. *Sibirskaya Finansovaya Shkola*, 1, 87–91. <https://doi.org/10.34020/1993-4386-2024-1-87-91>
- Ibrahimov, T. O., & Sadullayev, R. R. (2023). Crucial problems of the organization of biosphere reserves in Azerbaijan. *Journal of Geology Geography and Geoecology*, 31(4), 628–634. <https://doi.org/10.15421/112258>
- Ishwaran, N., Persic, A., & Tri, N. H. (2008). Concept and practice: The case of UNESCO biosphere reserves. *International Journal of Environment and Sustainable Development*, 7(2), 118. <https://doi.org/10.1504/ijesd.2008.018358>
- Kearney, J., Berkes, F., Charles, A., Pinkerton, E., & Wiber, M. (2006). The role of Participatory Governance and Community-Based Management in Integrated Coastal and Ocean Management in Canada. *Coastal Management*, 35(1), 79–104. <https://doi.org/10.1080/10.1080/08920750600970511>
- Kedward, K., Ermgassen, S. O. S. E. Z., Ryan-Collins, J., & Wunder, S. (2022). Nature as an asset class or public good? The economic case for increased public investment to achieve biodiversity targets. *SSRN Electronic Journal*. <https://doi.org/10.2139/ssrn.4306836>
- Kettunen, M., & Ten Brink, P. (Eds.). (2013). *Social and Economic Benefits of Protected Areas: An Assessment Guide* (1st ed.). Routledge.
- Kratzer, A., & Ammering, U. (2019). Rural innovations in biosphere reserves – A social network approach. *Journal of Rural Studies*, 71, 144–155. <https://doi.org/10.1016/j.jrurstud.2019.01.001>
- Kratzer, A., Mainetti, L. M., & Unthan, N. (2022). Geography of grassroots innovations in the Dublin Bay Biosphere Reserve. *Geoforum*, 136, 161–172. <https://doi.org/10.1016/j.geoforum.2022.09.016>
- Lepeška, T. (2012). Biosphere reserves as models for integrated watershed management. In IX. *Conference on Biosphere Reserves in Slovakia in Stakčín*.
- Lyon, A., Hunter-Jones, P., & Warnaby, G. (2017). Are we any closer to sustainable development? Listening to active stakeholder discourses of tourism development in the Waterberg Biosphere Reserve, South Africa. *Tourism Management*, 61, 234–247. <https://doi.org/10.1016/j.tourman.2017.01.010>

- Maier, K. (2012). The pursuit of balanced territorial development: The realities and complexities of the cohesion agenda. In *Territorial Development, Cohesion and Spatial Planning* (pp. 266-290). Routledge.
- Makenzi, P. M. (2013). The Biosphere Reserve Concept as a Tool for Sustainable Natural Resource Management in the Eastern Africa Region. In R. Pool-Stanvliet & M. Clüsener-Godt (Eds.), *AfriMAB. Biosphere Reserves in Sub-Saharan Africa: Showcasing Sustainable Development* (pp. 1-14). UNESCO. <https://unesdoc.unesco.org/ark:/48223/pf0000227308>
- Maldonado-Briegas, J. J., Sánchez-Hernández, M. I., & Corrales-Vázquez, J. M. (2025). Biosphere Reserves in Spain: a holistic commitment to environmental and cultural heritage within the 2030 agenda. *Heritage*, 8(8), 309. <https://doi.org/10.3390/heritage8080309>
- Nautiyal, S., Maikhuri, R. K., Rao, K. S., & Saxena, K. G. (2001). Medicinal plant resources in Nanda Devi Biosphere Reserve in the Central Himalayas. *Journal of Herbs Spices & Medicinal Plants*, 8(4), 47-64. https://doi.org/10.1300/j044v08n04_06
- Orenstein, D. E., & Shach-Pinsley, D. (2017). A comparative framework for assessing sustainability initiatives at the regional scale. *World Development*, 98, 245-256. <https://doi.org/10.1016/j.worlddev.2017.04.030>
- Pool-Stanvliet, R., & Coetzer, K. (2020). The scientific value of UNESCO biosphere reserves. *South African Journal of Science*, 116(1/2). <https://doi.org/10.17159/sajs.2020/7432>
- Price, M. F., Schaaf, T., Cárdenas, M., Pisa, P. F., & Köck, G. (2024). The World Network of Mountain Biosphere Reserves. In S. Schneiderbauer, P. F. Pisa, J. F. Shroder, & J. Szarzynski (Eds.), *Safeguarding Mountain Social-Ecological Systems: A Global Challenge: Facing Emerging Risks, Adapting to Changing Environments and Building Transformative Resilience in Mountain Regions Worldwide* (pp. 169-174). Elsevier. <https://doi.org/10.1016/b978-0-12-822095-5.00025-5>
- Reed, M. G., & Price, M. F. (Eds.). (2020). *UNESCO Biosphere Reserves: Supporting Biocultural Diversity, Sustainability and Society*. Routledge.
- Reyer, C., Bachinger, J., Bloch, R., Hattermann, F. F., Ibisch, P. L., Kreft, S., Lasch, P., Lucht, W., Nowicki, C., Spathelf, P., Stock, M., & Welp, M. (2012). Climate change adaptation and sustainable regional development: A case study for the Federal State of Brandenburg, Germany. *Regional Environmental Change*, 12(3), 523-542. <https://doi.org/10.1007/s10113-011-0269-y>
- Riensche, M., Castillo, A., Flores-Díaz, A., & Maass, M. (2015). Tourism at Costalegre, Mexico: An ecosystem services-based exploration of current challenges and

- alternative futures. *Futures*, 66, 70–84. <https://doi.org/10.1016/j.futures.2014.12.012>
- Rockström, J., & Sukhdev, P. (2016). *The SDGs wedding cake. A new way of viewing the Sustainable Development Goals and how they are all linked to food*. Stockholm Resilience Centre. <https://www.stockholmresilience.org/research/research-news/2016-06-14-the-sdgs-wedding-cake.html>
- Rodríguez-Pose, A. (2013). Do institutions matter for regional development? *Regional Studies*, 47(7), 1034–1047. <https://doi.org/10.1080/00343404.2012.748978>
- Rodríguez-Pose, A., Bartalucci, F., Lozano-Gracia, N., & Dávalos, M. (2024). Overcoming left-behindedness. Moving beyond the efficiency versus equity debate in territorial development. *Regional Science Policy & Practice*, 16(12), 100144. <https://doi.org/10.1016/j.rspp.2024.100144>
- Sandström, C., Mancheva, I., & Laudon, H. (2025). Unlocking the potential of biosphere reserves: A review of structural, institutional, and ideational challenges to transformational learning. *Current Opinion in Environmental Sustainability*, 75, 101543. <https://doi.org/10.1016/j.cosust.2025.101543>
- Schädler, S., Morio, M., Bartke, S., Rohr-Zänker, R., & Finkel, M. (2010). Designing sustainable and economically attractive brownfield revitalization options using an integrated assessment model. *Journal of Environmental Management*, 92(3), 827–837. <https://doi.org/10.1016/j.jenvman.2010.10.026>
- Schultz, L., Duit, A., & Folke, C. (2010). Participation, adaptive co-management, and management performance in the World Network of Biosphere Reserves. *World Development*, 39(4), 662–671. <https://doi.org/10.1016/j.worlddev.2010.09.014>
- Schultz, L., & Lundholm, C. (2013). Learning for Resilience? Exploring learning opportunities in biosphere reserves. In *Resilience in Social-Ecological Systems* (pp. 169–187). Routledge.
- Schultz, L., West, S., Bourke, A. J., D’Armengol, L., Torrents, P., Hardardottir, H., Jansson, A., & Roldán, A. M. (2018). Learning to live with social-ecological complexity: An interpretive analysis of learning in 11 UNESCO Biosphere Reserves. *Global Environmental Change*, 50, 75–87. <https://doi.org/10.1016/j.gloenvcha.2018.03.001>
- Schüttler, E., Mackenzie, R., & Muñoz-Petersen, L. (2023). Biocultural conservation in biosphere reserves in temperate regions of Chile, Estonia, Germany, and Sweden. In *Ecology and ethics* (pp. 483–502). https://doi.org/10.1007/978-3-031-23368-5_29

- ŠOPSR. (2022). *Biosférické rezervácie*. Štátna Ochrana Prírody Slovenskej Republiky. <https://www.sopsr.sk/web/?cl=1600>
- Špulerová, J., Piscová, V., & Matušicová, N. (2023). The contribution of scientists to the research in biosphere reserves in Slovakia. *Land*, 12(3), 537. <https://doi.org/10.3390/land12030537>
- Stoll-Kleeman, S., & O'Riordan, T. (2017). The Challenges of the Anthropocene for Biosphere Reserves. *PARKS*, 23(1), 89–100. <https://doi.org/10.2305/IUCN.CH.2017.PARKS-23-1SS-K.en>
- Thao, N. P., Eales, J., Lam, D. M., Hien, V. T., & Garside, R. (2023). What are the impacts of activities undertaken in UNESCO biosphere reserves on socio-economic wellbeing in Southeast Asia? A systematic review. *Environmental Evidence*, 12(1), 30. <https://doi.org/10.1186/s13750-023-00322-1>
- Tödtling, F. (2010). Endogenous approaches to local and regional development policy. In A. Pike, A. Rodríguez-Pose, & J. Tomaney (Eds.), *Handbook of Local and Regional Development* (pp. 333–343). Routledge. <https://doi.org/10.4324/9780203842393.ch28>
- Turečková, K., & Nevima, J. (2018). Smart Approach in Regional Development. In *16th International Scientific Conference "Economic Policy in the European Union Member Countries."* https://www.researchgate.net/profile/Andrzej-Cwynar-2/publication/332496435_FINANCIAL_EDUCATION_DEBT_LITERACY_AND_CREDIT_MARKET_PARTICIPATION_THE_CASE_OF_POLAND/links/5cbee854a6fdcc1d49a89664/FINANCIAL-EDUCATION-DEBT-LITERACY-AND-CREDIT-MARKET-PARTICIPATION-THE-CASE-OF-POLAND.pdf#page=394
- Turečková, K., Nevima, J., Varadzin, F., Trojan, J., Vanova, A., Rojikova, D., & Martinat, S. (2023). Deployment of creative actors and varieties of their impact on the quaternary sector and regional growth: A case study of NUTS2 regions of the Czech Republic. *Eastern Journal of European Studies*, 14(1), 181–197. <https://doi.org/10.47743/ejes-2023-0109>
- UNESCO. (2015). *Man and the Biosphere (MAB) Programme strategy for the period 2015–2025*. UNESCO Digital Library. <https://unesdoc.unesco.org/ark:/48223/pf0000234624>
- UNESCO. (2017). *A new Roadmap for the Man and the Biosphere (MAB) programme and its World Network of Biosphere Reserves*. UNESCO Digital Library. <https://unesdoc.unesco.org/ark:/48223/pf0000247418>

- UNESCO. (2022a). *Technical Guidelines for Biosphere Reserves*. UNESCO Digital Library. Retrieved April 9, 2025, from <https://unesdoc.unesco.org/ark:/48223/pf0000375692>
- UNESCO. (2022b). *What are biosphere reserves?* <https://www.unesco.org/en/mab/wnbr/about>
- Urban, P. (2016). História ochrany prírody na Poľane (stredné Slovensko) – 2.časť (od roku 1990 po súčasnosť). In *Quaestiones rerum naturalium* (Vol. 3, pp. 42–123). <https://www.fpv.umb.sk/app/cmsSiteBoxAttachment.php?ID=3234&cmsDataID=0>
- Van Cuong, C., Dart, P., & Hockings, M. (2016). Biosphere reserves: Attributes for success. *Journal of Environmental Management*, 188, 9–17. <https://doi.org/10.1016/j.jenvman.2016.11.069>
- Vaňová, A. (2006). *Strategické marketingové plánovanie rozvoja územia* (31st ed.). Studia oeconomica. https://sekarl.euba.sk/arl-eu/sk/detail/?&idx=eu_un_cat-1*0062909
- Vaňová, A., Vitálišová, K., Rojčíková, D., & Škvareninová, D. (2023). Promotion of biosphere reserves: How to build awareness of their importance for sustainable development? *Environmental & Socio-economic Studies*, 11(4), 49–61. <https://doi.org/10.2478/environ-2023-0023>
- Vitálišová, K., Miňová, L., & Vaňová, A. (2022). Súčasný problém rozvoja biosférických rezervácií v Slovenskej republike. *Ekonomika a Spoločnosť*, 22(2), 51–66. <https://doi.org/10.24040/eas.2021.22.2.51-66>
- Vitálišová, K., & Vavrušová, M. (2023). Ecotourism and promotion as a key to development of biosphere reserves. *Responsibility and Sustainability. Socioeconomic, Political and Legal Issues*, 8(1). <https://doi.org/10.5281/zenodo.7544102>
- Vitálišová, K., Vavrušová, M., & Piscová, V. (2023). Possibilities of ecotourism development in the Biosphere Reserve Poľana. In *EUMMAS A2S Conference, Dubai2023*. https://www.researchgate.net/profile/Vanina-Trifan/publication/371753847_Role_of_Climate_Change_in_Environmental_Terrorism_and_its_impact_on_National_Security/links/649321bd8de7ed28ba42ad24/Role-of-Climat-Change-in-Environmental-Terrorism-and-its-impact-on-National-Security.pdf#page=9
- Walk, H., Luthard, V., & Nölting, B. (2019). Participatory learning for transdisciplinary science in Biosphere Reserves: A modified role for universities. In M. G. Reed & M. F. Martin (Eds.), *UNESCO Biosphere Reserves* (1st ed., pp. 297–308). Routledge. <https://doi.org/10.4324/9780429428746>

- Wang, W., Liu, J., & Innes, J. L. (2019). Conservation equity for local communities in the process of tourism development in protected areas: A study of Jiuzhaigou Biosphere Reserve, China. *World Development*, 124, 104637. <https://doi.org/10.1016/j.worlddev.2019.104637>
- Wheeler, S. (2009). Regions, megaregions, and sustainability. *Regional Studies*, 43(6), 863–876. <https://doi.org/10.1080/00343400701861344>
- Wiber, M., Berkes, F., Charles, A., & Kearney, J. (2003). Participatory research supporting community-based fishery management. *Marine Policy*, 28(6), 459–468. <https://doi.org/10.1016/j.marpol.2003.10.020>