

BIOECONOMY-BASED TOURISM: SUPPORTING SUSTAINABLE DEVELOPMENT

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Abstract: The bioeconomy is emerging as a transformative force for sustainable development, uniting economic sectors, integrating the digital achievements of biotechnology with the principles of the circular economy. New concepts and models are being developed for the need for bioeconomy-based tourism, which combines the sustainable use of natural resources, environmental and economic goals. The bioeconomy offers solutions that not only reduce environmental impact, but also promote economic growth. The concept of bioeconomy implies the development of the tourism sector in a way that maximizes the use of renewable biological resources and the regeneration of the environment. The presented paper aims to analyze the tourism sector in the context of bioeconomy, as an economic system based on natural resources, a form of creative tourism, where the emphasis is not only on sightseeing, but also on acquiring new skills and self-expression. In the article, we discussed the bioeconomy strategies of Georgia and countries in the European region, the perception of bioeconomy-based tourism by stakeholders, and the barriers and enabling conditions affecting the development of the concept.

Keywords: sustainable; tourism; bioeconomy; concept; challenges.

Introduction. Tourism is undergoing a constant transformation, with interactive tourism emerging not only as an innovative technology but also as a strategic tool that can shape more responsible, regenerative models that will lead to a sustainable future in 2026 and beyond. The mandate of the World Tourism Organization considers the promotion of responsible, sustainable and universally accessible tourism. Trends observed in 2025-2026 indicate a growing interest in new travel formats that reduce their ecological footprint while supporting local bioeconomies. These include conservation-related holidays, community-led tourism programs, and accommodations certified under recognized sustainable development frameworks. The transition to this model helps countries adapt to climate change and combat poverty, especially in agricultural regions. This model creates "green jobs" and promotes innovation in tourism services.

As attention to the bioeconomy has grown, different understandings and interpretations of the concept have emerged. The terms "bio-based economy", "bio-based tourism", "knowledge-based bioeconomy" (KBBE) have been used. Ultimately, all of these terms essentially describe the same concept. In addition, the United Nations World Tourism Organization (UNWTO) promotes the need to increase responsible tourism, as the tourism industry is currently at the core of global development policies, especially in rural areas, where the creation of jobs and opportunities contributes to economic growth and the preservation of natural and cultural heritage.

Several strategies have been developed in European countries from different perspectives, reflecting principles and recommendations for the transition to a bioeconomy. The bioeconomy can be defined as an economy based on the sustainable production of renewable biomass and its transformation into bio-based products, chemicals and energy (De Besi, McCormick, 2015). The bioeconomy in the EU is estimated to be worth €2.7 trillion, including goods and services. The EU biotechnology sector is growing at an annual rate of

18%, with a value of over €720 billion. For every job created in the bioeconomy in the EU, 2.9 additional jobs are created. (EU Bioeconomy Strategy, 2025).

In this paper, we have discussed tourism as part of the bioeconomy, an economic system based on natural resources that takes into account the principles of the use of renewable resources and the effective management of ecosystem services. Bioeconomy-based tourism is perceived as the sustainable use of renewable biological resources to create tourism products and services that reduce environmental impact and contribute to local economic development. The field of sustainable tourism and hospitality industry is closely related to the concept of bioeconomy and offers practices such as: minimizing water and energy consumption, reducing pollution, using renewable and local resources and products, reducing solid waste, etc. Corporate social responsibility practices of tourism companies can play an important role in achieving the goals of sustainable development and bioeconomy. Especially large hotels, due to market pressure, are increasingly supporting bioeconomy concepts in order to gain a green approach from stakeholders (Baros, Dávid, 2007). Most authors consider tourism in conjunction with other concepts. e.g. the concept of forest-based well-being. Some authors (Stegmann, 2020; Holden, 2022) also mention the circular bioeconomy as an expandable concept and its connection to the bioeconomy concept (Viaggi, Zavalloni, 2021).

We will highlight forms of tourism that are consistent with the principles of bioeconomy: sustainable tourism - an ecologically, economically and socially responsible model; ecotourism - the unity of nature conservation and educational goals; rural tourism - small-scale, agro-based activities; agritourism, which is a direct expression of the development of the bioeconomy. Also, several areas of tourism are closely related to the concept of bioeconomy:

- Eco-gastrotourism: the emphasis is on sustainable culinary experiences, where tourists are directly involved in the production of the product (e.g. wine roads, farms).
- Agritourism: visits to farms where the principles of regenerative agriculture are implemented.
- Forest-based tourism: the sustainable use of forest resources for rest and recreation, which contributes to the preservation of biodiversity.

Methods: In the paper, we use qualitative research methods, which include, on the one hand, the processing of analytical material presented in open sources, and on the other hand, discussing issues with various parties in the tourism value chain. Within the framework of the desk research, we analyzed relevant literature, publications, reports, strategies, concepts, etc. Using a comparative method, we identified the similarities and differences between the models of Georgia and European countries.

Discussion: The sustainable tourism market is projected to be worth \$2.3 trillion in 2026 and is expected to reach \$17.8 trillion by 2036, representing a CAGR (Compound Annual Growth Rate) of 22.6%. According to Future Market Insights, this expansion is driven by a broad shift in traveler behavior towards travel patterns that place greater emphasis on environmental responsibility, social contribution, and long-term destination management. Sustainability is increasingly becoming a primary criterion for travel decisions, rather than an additional factor, influencing accommodation, transportation, tours, and destination experiences (Market Forecasts and Trends, 2026-2036).

The role of tourism in the bioeconomy strategies of European countries is particularly important. The Finnish tourism strategy is part of the national concept of the bioeconomy strategy. In Finland, tourism is considered as part of the forest ecosystem service and relies on wellness and nature-based activities. Ecosystem services encompass the tourism sector and create potential for further development. Finland sees opportunities for new business models in the combination of nature (land, forests and air) and natural products and considers tourism in new forms (e.g. health tourism). The Italian concept of nature tourism is based on sustainability and responsible travel, which implies minimal impact on the environment and the

preservation of natural and cultural heritage. Such an approach combines ecological protection, economic support for local communities and the involvement of tourists in traditional rural life. Tourists have the opportunity to live on working farms, learn about agriculture and get ecologically clean products. Local production - the emphasis is on the principle of "zero kilometers", which serves to reduce emissions caused by food transportation. Italy has developed unique concepts to avoid new construction and damage to the natural landscape. Among the bioeconomic opportunities, the development of ecotourism and natural resource-based activities related to ecosystems, the coast, etc. is considered.

The Slovenian bioeconomy concept is reflected in several country strategies, which focus on sustainable tourism and ecotourism, which touch on many areas of life (food, forest-based value chains, cycling, etc.). An interesting focus is placed on sustainable tourism, where IT-based marketing and network connections help to increase the quality of the services provided. In the Slovak sense, tourism is perceived as part of regional development. It is based on the natural and cultural-historical conditions of Slovakia. It emphasizes nature-related concepts (forestry, nature protection, environmental education), the cultural-historical dimension and the concept of tourism as a significant contributor to GDP growth (Rinn, Kalábová, Jarský, 2023).

Germany's tourism concept is based on sustainability, biodiversity protection and regional development, where tourism is considered not only as an economic sector, but also as a tool for nature conservation. The country's strategy aims to achieve climate neutrality by 2045 and the rational use of natural resources. Germany's national tourism strategy focuses on three main goals: Economic growth: increasing local added value, especially in structurally weak rural regions. Quality of life: ensuring high standards of leisure and recreation for the population. Ecological responsibility: protecting nature and the climate, which means saving resources and preserving biodiversity (Making Tourism More Sustainable, Progress Report, 2023).

As for other countries, for example, China, the value of the bioeconomy here will be 3.3 trillion US dollars by the end of 2025. This country is focused on high-tech bioindustry. In 2024, Brazil, as part of the G20 (the most important international forum of the world's leading developed and emerging economies, consisting of 19 countries, the European Union and the African Union), launched a global bioeconomy initiative, which is based on high-level principles of knowledge and new paradigms of production, combining nature, where the role of tourism is significant (World Economic Forum, 2025).

In the modern world, for two decades, the correlation of economic growth with environmental pollution and depletion of natural resource reserves, as well as the negative impact on the environment caused by climate change, which in the near future will no longer ensure the existence of future generations in healthy natural conditions, has become a subject of special attention. Therefore, maintaining sustainable economic development is associated with the rational use of natural resources, stimulating the bioeconomy, and introducing green taxes. Developing a state policy supporting the bioeconomy and introducing green taxes in the country will contribute to stimulating the development of the agricultural sector, slowing down the degradation of the environment and biodiversity, achieving food security, effective management of natural resources, and reducing dependence on non-renewable resources (Verulidze, 2021).

The main idea of bioeconomy is to abandon the consumerist attitude towards nature. The main object of bioeconomy should be the ecological-economic system and the material balance between its economic and ecological subsystems. Thanks to bioeconomy, macroeconomics can be integrated into the economy of the Earth's nature. As a result of the awareness of growing ecological problems, the term "green economy" emerged in Western science. According to UNEP, bioeconomy should primarily be aimed at increasing human well-being and ensuring social justice, while being characterized by reducing environmental risks and preventing the depletion of natural resources (Berishvili, 2013).

Georgia's natural resources are the most important component of national wealth and the basis for the country's sustainable development. Unfortunately, we use them irrationally and inefficiently. A significant part of the resources has remained beyond competent state regulation (Chitanava, 2023).

Against the backdrop of the challenges facing the economies of developed and developing countries of the world, the expected consequences of environmental pollution and depletion of natural resource reserves have not been adequately assessed in Georgia, which may hinder or ultimately stop the further development of the economy, therefore, the current tax system does not take into account the country's environmental interests. In addition, the existing environmental policy in Georgia cannot respond to modern challenges, as confirmed by the World Environmental Performance Index. According to the 2024 data, it is in 77th position in the classification presented with 47.3 points (Environmental Performance Index, 2024). As for the achievement of SDGs, according to the latest data, Georgia took 43rd place out of 166 assessed countries with 74.91 points in terms of overall progress towards achieving 17 SDGs. Also, according to the country's socio-economic and environmental impact assessment, Georgia ranked 96th out of 166 countries in the international ranking with a score of 88.16 (SDG Transformation Center, 2024). In various respects, achieving the Sustainable Development Goals (SDGs) in Georgia remains a challenge. A new concept of tourism based on bioeconomy can become a catalyst for an effective way to solve the economic, social and environmental challenges of the Sustainable Development Goals, as well as current problems.

Currently, there is no single, independent document "Bioeconomy Concept" in Georgia, although the principles of bioeconomy are integrated into several state strategies (Horizon Europe). It is worth noting that Georgia is involved in European initiatives aimed at developing bioeconomy strategies in associated countries. In the Circular Economy Strategy and Roadmap of Georgia, we have a note: Georgia aims to become a regional leader in circular innovations by 2050. The Agriculture and Rural Development Strategy (2021–2027) focuses on sustainable agriculture, which can be said to be one of the main pillars of the bioeconomy. Efficient use of resources, biodiversity-based tourism, are included in the strategies of ecotourism and sustainable development.

We believe that tourism should be considered in a holistic way, combining the best of a region, its people, nature and products, with bioeconomy-based tourism through new business models and value chains. Clusters, as a group of businesses, can play an important role in fostering innovative partnerships between the tourism sector and the bioeconomy by creating new value chains, as they are sustainable partners and ensure the modernization of the tourism industry. In this regard, changes in practice and policy will lead to a reduction in negative environmental impacts and greater economic strength.

The concept of bioeconomy is related to ecotourism, which is most often used in relation to nature and its resources. Ecotourism is no longer a niche segment - today it is already a global market. According to the international research company Fortune Business Insights, the global market for ecotourism is growing rapidly, in 2025 its volume reached approximately 295 billion US dollars. The forecast is even more ambitious: by 2034 the market may exceed 1 trillion dollars, with an average annual growth rate of about 16%. Demand for nature-based experiences is growing, investors and tour operators see steady growth, Europe remains the leading region, although the Asia-Pacific market is developing rapidly in this regard. Ecotourism is becoming not only a vacation, but also a choice based on values. Global trends show that travelers are looking for: authentic connection with nature, active experiences, environmental responsibility, in-depth acquaintance with local culture. If today the ecotourism market is reaching such a scale globally, the main question is: can Georgia structure its ecotourism products in such a way as to occupy a competitive place in this growing global market. Georgia has unique natural and cultural resources.

In modern times, bioeconomy-based tourism goes beyond traditional ecotourism and includes aspects such as: the use of biomaterials, such as the construction of hotels and infrastructure with renewable materials. Circular approach: composting food waste, reusing water and using bioenergy (biogas, solar energy) in tourist facilities. Local bioresources: offering tourists local, environmentally friendly products, which strengthens the regional economy and reduces the carbon footprint of transportation.

In the new strategy, based on the objectives of the European Forest Strategy, it was considered necessary for our country to set such important tasks as the assessment of forest resources and ecosystem services and the promotion of the development of a bioeconomy based on non-timber forest products, including ecotourism; promotion of the production and processing of value-added forest products for the development of a sustainable bioeconomy; deepening the relevant skills and knowledge for the development of a bioeconomy based on sustainable forest management; slowing down the process of reducing forest biodiversity, ensuring sustainable and multifunctional forest ecosystems, etc. The implementation of the above at the national level provides an opportunity to implement the bioeconomy concept. (Safeguarding forest resources in Georgia, Green Economy in Eastern Partner Countries, 2025).

The modern phenomenon of sustainable tourism is found in the strategies of many organizations. Sustainable tourism is characterized by ecological sustainability, is economically profitable, ethically and socially acceptable to the population. Sustainable tourism provides opportunities for the restoration of natural resources and the benefits of this form of tourism for the population are significant. Sustainable tourism is a path that, under certain conditions, can combine most forms of tourism. The Global Sustainable Tourism Council (GSTC) has established sustainability standards in tourism and considers four main pillars: sustainable management; socio-economic impact; cultural impact; and environmental impact. Green tourism (Law, Delacy, McGrath, 2017) is also considered, which refers to small-scale tourism, i.e. travel to natural places with minimal environmental impact.

Conclusions: We can conclude that bioeconomy-based tourism is an innovative concept of tourism that maximizes economic benefits through the long-term sustainable use of renewable and biological resources, using practices that respect the natural environment and limiting the waste of these resources. The pursuit of sustainable tourism is not a passing trend, but a global strategic priority. The study revealed that bioeconomy is a priority direction in various European tourism strategies. In Georgia, we currently do not have a “bioeconomy concept”, however, the principles of bioeconomy are integrated into various documents, it is desirable to understand and integrate them into the tourism sector. It is noteworthy that the International Tourism Organization (FITUR) has included sustainability as one of the central themes in the agenda of the 2026 exhibition, thus emphasizing the need to move towards more efficient, sustainable and sustainable tourism practices that generate long-term environmental and social benefits. Due to the contribution and growing impact of tourism on the economy, tourism can play an important role in advancing the universal 2030 Agenda for Sustainable Development, including the application of the principles of the bioeconomy. The transition to a sustainable future depends increasingly on the further development of the bioeconomy. We believe that both the public and private sectors have an important role to play in this. At the same time, private sector actors, including tourism industry interest groups and companies, have an important role to play in safeguarding these conditions and fostering the growth of the bioeconomy through active engagement, strategic business decisions, capital investments and the introduction of bio-based innovations to the market. Addressing contemporary challenges such as climate change, natural resource scarcity and unsustainable environmental consumption requires transformative change that involves long-term sustainable approaches and interactions at all levels of society. “We have lent ‘ecological capital’ to future generations, but unfortunately we can no longer repay the debt.” Excerpt from the Brundtland Report of the World

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