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SUSTAINABLE TOURISM: DEVELOPMENT MODELS AND NATURAL RESOURCE MANAGEMENT

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СТАЛИЙ ТУРИЗМ: МОДЕЛІ РОЗВИТКУ ТА УПРАВЛІННЯ ПРИРОДНИМИ РЕСУРСАМИ

In contemporary global environmental challenges, climate change, and increasing anthropogenic pressure on the environment, sustainable development is becoming increasingly relevant, with sustainable tourism being a key component. Tourism activities, while having significant economic potential, can also pose a serious threat to the natural environment if resource management is not effectively implemented. This article aims to analyze existing sustainable tourism models and their effectiveness in the context of natural resource conservation. The study concludes that a range of sustainable development models are applied in contemporary tourism practices, with their efficacy varying depending on regional characteristics and the level of implementation of environmentally oriented strategies. Among the most effective models for achieving sustainability in tourism are the following: the green tourism model, which ensures a high level of environmental protection through the use of eco-friendly practices; the carrying capacity model, which allows for controlling the anthropogenic load on natural sites by limiting the flow of tourists; and the sustainable destination management model, which focuses on balancing economic, social, and environmental interests through coordination among all participants in the tourism process. At the same time, the effectiveness of each model depends on several factors, among which the key ones are the level of environmental awareness of tourists, the quality of management decisions, the presence of monitoring systems, and the ability to implement long-term strategies. Therefore, the achievement of sustainable tourism development is possible only through an integrated approach, intersectoral cooperation, and continuous improvement of practices, taking into account the specific characteristics of each territory. The prospects for further research lie in studying the effectiveness of integrating various sustainable development models in the context of climate change, the growth of tourist flows, and the development of innovative natural resource management technologies.

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У сучасних умовах глобальних екологічних викликів, змін клімату та висхідного антропогенного навантаження на довкілля концепція сталого розвитку набуває особливої актуальності, і ключовим її складником є сталий туризм. Туристична діяльність, маючи значний економічний потенціал, водночас може становити серйозну загрозу для природного середовища в разі відсутності ефективного управління ресурсами. Метою цієї статті є аналіз чинних моделей сталого туризму та оцінка їх ефективності в контексті збереження природних ресурсів. У результаті проведеного дослідження встановлено, що в сучасній туристичній практиці застосовуються різні моделі сталого розвитку, ефективність яких змінюється залежно від регіональних особливостей та рівня впровадження екологічно орієнтованих стратегій. Серед найбільш дієвих моделей досягнення сталості в туризмі виокремлюють такі: модель зеленого туризму, яка забезпечує високий рівень захисту довкілля завдяки використанню екологічно чистих практик; модель вантажної місткості території, що дозволяє контролювати антропогенне навантаження на природні об'єкти через коригування потоку туристів; модель сталого управління дестинацією, яка орієнтується на збалансування економічних, соціальних і екологічних інтересів шляхом координації дій між усіма учасниками туристичного процесу. Водночас ефективність кожної з моделей залежить від низки чинників, серед яких ключовими є рівень екологічної свідомості туристів, якість управлінських рішень, наявність систем моніторингу та здатність впроваджувати довгострокові стратегії. Отже, успішне забезпечення сталого розвитку туризму можливе лише за умов інтегрованого підходу, міжсекторної співпраці та безперервного вдосконалення практик з урахуванням специфіки конкретної території. Перспективи подальших досліджень полягають у вивченні ефективності інтеграції різних моделей сталого розвитку в контексті змін клімату, зростання туристичних потоків та розвитку інноваційних технологій управління природними ресурсами.

Key words: destination management; tourism; carrying capacity model; green tourism model; biodiversity conservation.

Ключові слова: управління дестинацією; туризм; модель вантажної місткості території; модель зеленого туризму; підтримка біорізноманіття.

PROBLEM STATEMENT

In contemporary global environmental challenges, climate change, and increasing anthropogenic pressure on the environment, sustainable development is becoming more relevant, with sustainable tourism being a key component. While tourism activities have significant economic potential, they can also pose a serious threat to the natural environment in the absence of effective resource management. Specifically, mass tourism leads to the trampling of vegetation, soil erosion, coastal zone development, and the destruction of natural habitats. The uncontrolled increase in the number of tourists leads to a rise in household waste, strain on water supply systems, and the discharge of pollutants into water bodies. The development of ecotourism without proper control over tourist behavior, tourist flows, or human interaction with nature can result in stress for wildlife, disruption of seasonal migrations, and a decline in biodiversity. As a result, there is a need to develop tourism models that combine economic feasibility, social responsibility, and environmental safety.

ANALYSIS OF RESEARCH AND PUBLICATIONS

The analysis and systematic characterization of the features of sustainable tourism is an important topic that has been reflected in several scientific studies and publications by authors such as Lyubchenko V., Basyuk D. I., Prymak T. Yu., Pohuda N. V., and Omelchak H. These scholars study sustainable tourism as a complex phenomenon, which includes economic, social, and environmental aspects.

In their works, these scholars pay special attention to defining sustainable tourism as a form of tourism that ensures a balance between the development of the tourism industry and the preservation of natural resources and cultural heritage. At the same time, it is the models of sustainable tourism and the analysis of their effec-

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Table 1. Characteristics of Eco-friendly Practices that Form the Model of Green Tourism

Eco-friendly Practices	Features of applying eco-friendly practices	Benefits of using environmentally friendly practices
Use of local resources	In regions where green tourism is developing, tourists have the opportunity to purchase organic products grown locally. *	Helps preserve ecosystems, reduce the ecological footprint, and support the local economy.
Ban on landscape alteration	The areas visited by tourists are not subjected to significant changes. In such areas, tourism is limited to providing services through infrastructure that does not disrupt natural landscapes. **	Allows for the preservation of the natural beauty of regions and ensures their sustainable development. All tourism activities are focused on minimizing interference with ecosystems.
Support for biodiversity	In regions where tourism is developing, the conservation of various plant and animal species is supported. ***	Helps implement measures for the restoration of endangered species populations or the preservation of natural habitats.

Note

* For example, in the village of Yasinya (Zakarpattia region), local farmers offer tourists a variety of organic products such as honey, cheese, homemade butter, berries, and vegetables. The village of Sheshory (Ivano-Frankivsk region) is known for eco-friendly farms that provide organic products such as berries, mountain herbs for teas, honey, and natural cheesecakes.

** For example, in the Carpathian Biosphere Reserve, visitors can only travel along specially designated tourist routes, and the tourism services consider the need to minimize the environmental impact. In the Shatsky National Nature Park, there are restrictions on construction and activities that may harm the natural environment. The Sinevir National Nature Park is organized in such a way as to ensure minimal environmental impact. There is a limited number of tourist routes, and no construction or other landscape changes are allowed.

*** In particular, in Ukraine, such initiatives are actively supported in reserves and national parks, where tourists can observe rare species of flora and fauna without harming their natural habitat.

Source: compiled based on [1—3; 7].

tiveness in the context of resource conservation have not been sufficiently explored in the scientific literature.

FORMULATION OF THE ARTICLE'S OBJECTIVES

This article aims to analyze existing sustainable tourism models and their effectiveness in the context of natural resource conservation.

THE PAPER MAIN BODY

Within the scope of the research, the actors emphasize that several models for achieving tourism sustainability are currently being applied in tourism practice, each of which has varying levels of effectiveness in the context of natural resource conservation. In particular, among the most common models, it is worth highlighting green tourism, the carrying capacity model (territorial carrying capacity), and the sustainable destination management model [1; 4—5].

Green tourism is aimed at minimizing the negative impact of tourism activities on the environment through eco-friendly practices, such as:

— Use of local resources. This reduces the need for transporting goods from distant regions, lowers CO_2 emissions, and supports local farmers and producers.

— Ban on landscape alteration. This means that areas visited by tourists are not subjected to significant changes, such as the construction of large resorts or infrastructure projects that could harm the natural environment.

— Support for biodiversity. Green tourism promotes the conservation of various plant and animal species.

Considering the content of eco-friendly practices that form the model of green tourism (see Table 1), the effectiveness of this model is quite high, especially in regions with vulnerable ecosystems. However, it often requires significant investments in staff training and raising the awareness of tourists.

In particular, as a result of the implementation of the green tourism model, there has been a restoration or stabilization of populations of rare or endangered species. An example is the Carpathian Biosphere Reserve, where the active involvement of green tourism has helped stabilize the populations of rare plant species (such as yew (Taxus baccata)) and animals (including the Black Stork, Red Lizard, Common Chamois, and others). The introduction of practices such as recycling and reducing plastic

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Table 2. Characteristics of corrective practices that form the carrying capacity model of an Area

Corrective practices	Features of applying corrective practices	Benefits of applying corrective practices
Continuous monitoring of the state of natural resources	Based on the monitoring of animal populations, water resources, or soils, tourist routes may be promptly altered or access to certain areas of the territory may be restricted.	Allows for the adjustment of tourist flows before they cause harm to the environment. Helps reduce the risk of overloading areas and enables quick responses to changes in ecosystems.
Establishing quotas or limits on the number of tourists	Establishing daily or seasonal limits on the number of visitors to certain areas, which helps avoid overloading ecosystems. *	Helps reduce pressure on natural resources and prevents their depletion.
Implementation of «temporary restriction» zones	Zoning the area with temporary restrictions for tourists is another important aspect for distributing tourist flows and reducing the negative impact on sensitive ecosystems. **	Allows, when necessary, to restrict access to the most vulnerable areas during certain times of the year so they can recover. This is especially important for areas with high biodiversity, where certain species require peace for breeding or other natural cycles.
Ensuring the development of ecologically sustainable infrastructure	The creation and improvement of infrastructure that minimizes the impact on nature. For example, the use of energy-efficient technologies, water conservation, and waste management.	Ensures the sustainable development of the area, helps reduce the negative impact of tourism infrastructure on the environment, and allows for the maintenance of ecological stability even with an increase in tourist traffic.

Note

* For example, in national parks such as the Carpathian Biosphere Reserve, the introduction of visitor limits helps preserve natural landscapes and biodiversity. During certain periods when resources are most vulnerable (such as animal breeding seasons or the blooming of rare plants), limiting the number of tourists is particularly important.

** An example of applying zoning with temporary restrictions for tourists is the Synevyr National Nature Park in Ukraine. In this park, to preserve the ecosystem and ensure the restoration of natural resources, temporary restrictions on tourist access have been introduced for areas significant for the breeding of certain animal species. Additionally, during certain seasons, particularly in the autumn period, access to areas with high ecological sensitivity, such as the Synevyr Lake area, is restricted to minimize the impact on water resources and preserve biodiversity.

Source: compiled based on [1—5].

usage also serves as an indicator of high effectiveness. In green tourist zones, the amount of waste is reduced, as tourists are offered eco-friendly services (for example, the use of reusable bottles and containers).

The carrying capacity model involves establishing a limit on the number of visitors that can be present in a particular area without causing harm to its natural environment. It aims to determine the maximum number of visitors that can stay in a specific area without causing damage to the surrounding environment. This can include the impact on natural resources, flora and fauna, as well as on infrastructure and the social structures of local communities. The following practices are applied to adjust the carrying capacity of an area [3—5]:

— Continuous monitoring of natural resources, such as water resources, soils, vegetation, and animal populations helps determine when the area's load becomes critical.

— Establishment of quotas or limits on the number of tourists who can stay in the area over a certain period. These may include daily or seasonal limits that help avoid overloading the ecosystems.

— Introduction of "temporary restriction" zones, where certain areas are inaccessible to tourists during specific seasons or times of day, allowing for a more even distribution of visitors and reducing pressure on specific areas.

— Development of ecologically sustainable infrastructure that takes into account the carrying capacity limits of the area.

Considering the content of eco-corrective practices that form the carrying capacity model (see Table 2), their effectiveness varies in terms of environmental conservation. The measurement of the model's effectiveness is carried out through various indicators and evaluation methods, which allow for the assessment of tourism's impact on the natural environment and social structures. For

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Table 3. Characteristics of practices for enhancing flexibility and adaptability that form the sustainable destination management model

Practices for enhancing flexibility and adaptability	Features of applying the practice of enhancing flexibility and adaptability	Advantages of applying flexibility and adaptability practices
Integration of efforts and interests from all stakeholders	Creating joint platforms for dialogue and partnerships between communities, businesses, authorities, and environmental organizations*	Improved management decisions, strengthened social cohesion, and reduced conflicts
Development of adaptive tourist routes	Flexible route planning depending on seasonality, ecosystem load, or social context**	Reduced environmental impact, enhanced tourist experience, and promotion of an even distribution of tourists
Development and maintenance of infrastructure that meets sustainability requirements	Investing in energy-efficient buildings, water purification systems, waste management, and eco-friendly transport***	Reduced negative environmental impact, resource conservation, and increased attractiveness of the destination for eco-tourists
Management of tourist flows through information technologies	Using mobile applications, online maps, booking systems, and monitoring tourist flows****	Optimized tourist distribution, reduced pressure on popular sites, and preservation of the natural environment.

Note:
*For example, the creation of local tourist councils or advisory bodies that bring together community representatives, hoteliers, tour operators, and ecologists for joint destination planning (e.g., the Tourism Council of the Carpathian Region).
** For example, the implementation of seasonal routes within the Synevyr National Nature Park, which change depending on weather conditions or the state of forest ecosystems to avoid overloading certain areas.
*** For example, the construction of eco-hotels using renewable energy sources and a rainwater collection system in the resort town of Slavs'ke, or the introduction of electric buses in Lviv for servicing tourist routes.
**** For example, the launch of a mobile app for tourists in the city of Kamianets-Podilskyi, which shows real-time visitor traffic at tourist sites, recommends less crowded locations, and allows booking visits.
Source: compiled based on [5—6].

example, a common practice is the monitoring of water resources or soils for pollution, degradation, or changes in their structure that could be the result of tourism activities.

It should be noted that the effectiveness of the model is not straightforward, as it requires investments in research, infrastructure development, and staff training. At the same time, many natural areas in Ukraine, including national parks and biosphere reserves, have extremely limited financial resources.

The destination management model focuses on balancing the economic, socio-cultural, and environmental aspects of tourism through the integration of interests from local communities, businesses, and the public sector. The following practices are applied to enhance flexibility and adaptability to specific conditions [5]:

— Integration of efforts from all stakeholders, including local communities, businesses, government authorities, and environmental organizations.

— Development of adaptive tourist routes that depend on current ecological, social, or economic conditions.

— Development and maintenance of infrastructure that meets sustainability requirements, such as energy-efficient hotels, sustainable water and waste management, and eco-friendly transportation.

— Managing tourist flows through information technologies, such as mobile apps and online platforms, to control tourist traffic.

Considering the content of the practices aimed at enhancing flexibility and adaptability to specific conditions that form the destination management model (see Table 3), their effectiveness is varied in terms of preserving the natural environment.

It should be noted that this model is like a "smart tourism management system" that takes into account the interests of all stakeholders and protects nature. However, for it to truly work, all parties must work in harmony, and the leadership must make thoughtful decisions.

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CONCLUSIONS

As a result of the conducted research, it has been established that several sustainable development models are applied in modern tourism practice, the effectiveness of which varies depending on regional characteristics and the level of implementation of environmentally oriented strategies. Among the most effective models for achieving sustainability in tourism are:

— The green tourism model ensures a high level of environmental protection through the use of eco-friendly practices.

— The carrying capacity model allows for controlling the anthropogenic load on natural sites by limiting the flow of tourists.

— The sustainable destination management model focuses on balancing economic, social, and environmental interests through coordination among all stakeholders in the tourism process.

At the same time, the effectiveness of each model depends on a range of factors, with key ones being the level of environmental awareness among tourists, the quality of management decisions, the availability of monitoring systems, and the ability to implement long-term strategies.

Therefore, the achievement of sustainable tourism development is possible only through an integrated approach, intersection cooperation, and continuous improvement of practices, taking into account the specific characteristics of each area.

The prospects for further research lie in studying the effectiveness of integrating various sustainable development models in the context of climate change, increasing tourist flows, and the development of innovative technologies for managing natural resources.

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