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Elena Petkova, Associate Professor, PhD in Economics and Management of Tourism, Department of Geography of Tourism, Faculty of Geology and Geography, Sofia University "St. Kliment Ohridski". Sofia, Bulgaria.
ORCHID: 0000-0003-3232-6104

A System of Indicators for Monitoring Sustainable Tourism Development of Tourism Destinations

Abstract: Tourism is influenced by a wide range of factors and have an impact on sustainable development of a destination. The indicators for sustainable tourism development have been used to assess the impact of tourism on economic, social, and ecological aspects of a destination. The study aims to develop a scientifically based and practically applicable system of indicators for monitoring the sustainable tourism development of destinations. To achieve the purpose, an identification and critical review of scientific literary sources has been performed. Publications, which present systems of indicators for monitoring sustainable tourism development have been selected. Requirements for the selection of the indicators have been specified. Specific criteria have been formulated, on which basis exemplary socio-economic and environmental indicators have been classified in groups. Thus, a system of indicators for monitoring sustainable tourism have been developed. The socio-economic indicators for sustainable tourism development of destinations are related to tourism supply and demand, revenues and costs. The environmental sustainability indicators are related to the types of and impacts on natural resources.

Keywords: sustainable tourism, monitoring, social, economic, environmental indicators.

Introduction

Tourism is a very complex system that is developing in time and space. During its development, on the one hand, tourism system is influenced by the factors of the surrounding environment, and on the other hand, it has positive and negative impacts on it. These basic characteristics of tourism system require efforts for its management at national, regional and local levels to be made; and any management depends on the availability of sufficient, detailed, quality, up-to-date, and timely information for making informed decisions. Data on tourism development of destinations should be complete and reliable. It should enable a complete picture of tourism development to be drawn. The information system should fully reflect the complex essence of tourism, and the information about the impacts on the environment where tourism develops should be complete and systemized. All that requires the consideration of economic, social and environmental importance of tourism, which would lead to sufficient attention to the sector, including in terms of destination marketing. It is necessary to collect, process, and analyze

information related to sustainable tourism development. The accumulated information and knowledge would represent a solid basis for a clear conceptualization and development of a working monitoring system of the tourism development of destinations. For the needs of providing information for forecasting and planning the sustainable tourism development of destinations, necessary and sufficient indicators should be selected. The system of indicators for monitoring sustainable tourism development should be based on considering the systematic nature and structure of tourism, the models of tourism development and the impacts of tourism through the prism of the concept of sustainable tourism development.

The study aims to develop a scientifically-based and practically-applicable system of indicators for monitoring the sustainable tourism development of destinations. The range of indicators in the system should include indicators of the state of tourism system and its elements, indicators of the conditions and factors of the surrounding environment and indicators of the impact of tourism on the environment. For the purpose of the study, an identification and critical review of scientific literary sources have been performed. Specifically, twenty-one publications, which present systems of indicators for monitoring the sustainable tourism development of destinations have been selected to derive indicators. In the publications, the scope of the study has been presented to clarify theoretical issues and in-depth comments on the most important models. Requirements for the indicators for monitoring sustainable tourism development presented in the publications have been specified with the emphasis on the possibility for providing the necessary information. Specific criteria have been identified on which basis exemplary socio-economic and environmental indicators have been classified in groups. As a result, a system of indicators for monitoring the sustainable tourism development of destinations has been developed and grounded.

Literature Review

Scopes of the studies described in the analyzed publications

For the present study, 21 publications have been selected that include social, economic, and environmental criteria and indicators for monitoring the sustainable tourism development of destinations. Each publication presents a system of indicators that is applied to the study of sustainable tourism development in a specific area or destination. Thus, the presented systems of social, economic and environmental indicators are suitable for monitoring the sustainable tourism development of a specific destination (e.g., mountain, sea, region, etc.) (*Table 1*).

Requirements for the indicators

According to their specifics, the destinations can choose the most relevant indicators they wish to adopt and monitor in order to meet the needs of the destinations, the interests of local stakeholders and the specific sustainability issues that the destination faces (*ETIS …, 2016*). The indicators for monitoring sustainable tourism development, which are presented in the analyzed publications were selected according to specific requirements. S. Guerreiro and P. Seguro (*2018*) intended to identify indicators that are considered the most relevant to the field, for which there is available data, and which allow measuring progress. S. Roberts and J. Tribe (*2008*) included indicators that are relevant to the unit of analysis and context and therefore able to promote actions. M. Durovic and S. Lovrentjev (*2014*) tried finding indicators that are sufficient for

measuring sustainability in the field and getting reliable data in order to measure and monitor the effects of tourism. According to K. Mearns (*2015*) indicators should summarize relevant information and deliver meaning; and they should provide in-time information to guide the sustainable development of a destination. According to S. Silvera et al. (*2021*) the indicators should be relevant in identifying critical sustainability factors for tourism. A. G. Asmelash and S. Kumar (*2019*) pointed that some of the indicators' selection requirements are relevance to tourism issues and availability of data or feasibility of obtaining and analyzing the needed information. According to M. Lozano-Oyola et al. (*2012*) the selected indicators should be relevant to sustainable tourism in the target region and to the specific characteristics of a given tourist destination. P. Sobhani et al. (*2022*) stated that indicators are worth selecting considering various requirements, including their relevance, scientific precision, measurability, transparency, adaptability, comparability, efficiency, territorial representation, etc. According to O. M. Ghoochani et al. (*2020*) the most relevant indicators should be selected related to the impact of tourist activities at the destination. M. S. Islam et al. (*2023*) confirm that the indicators should be relevant, feasible, credible, and clear; they should be relevant to the specific area of tourism initiatives. M. Chávez-Cortés and J. A. A. Maya (*2010*) stated that the indicators should provide information on the impact of tourism activities; they should be appropriate and relevant to sustainability. According to A. Gallagher and K. Pike (*2011*) one mechanism by which sustainability can be enabled is through the identification of relevant indicators such that information can be collected and communicated. S. Mutana and G. Mukwada (*2017*) pointed that identifying relevant indicators for a destination is essential; indicators should be useful for measuring and monitoring tourism sustainability. H. He at al. (*2023*) stated that indicators should measure the performance of tourism resources and tourism resource carrying capacity. According to I. Spilanis at al. (*2009*) indicators should be useful to users; they should also be reliable and based on sound scientific concepts; and they should be measurable with data that can be acquired and monitored with reliable procedures. G. Barzekar et al. (*2011*) claimed that indicators should be based on their relevance, analytical soundness, and measurability. A. Reihanian et al. (*2015*) stated that indicators should meet the condition of measurability over time; they need to be understandable and dependent on data that is easily available; they should address the requisites of data availability, credibility, simplicity, and the capacity to show trends over time. T. H. Lee et al. (*2021*) confirmed that indicators should measure the performance of sustainability; they should ensure the reliability of the results. T. Dimoska and B. Petrevska (*2012*) stated that to be useful indicators for sustainable tourism must fulfill the requirements: relevance, availability, meaning, reliability, comparability, etc.; data should be available for the indicators. D. Vagiona and G. Doxopoulos (*2014*) confirmed that for measuring indicators for monitoring sustainable tourism development of destinations, data should be available; indicators should produce desired, comparable results; they should be useful for measuring and monitoring tourism impacts. Thus, it could be summarized that some of the essential requirements for the indicators are their relevance and data ability for measuring sustainable development.

Criteria for the classification of indicators

Suitable criteria for classification of socio-economic and environmental indicators for measuring sustainable tourism development of destinations should be selected. The results of

literature review reveal that while some authors define criteria of economic, social, and environmental dimensions of sustainable tourism development, others define criteria for overall sustainable tourism development (*Table 2*). Thus, it could be concluded that the specific economic, social, and environmental indicators can be classified in groups according to certain criteria of sustainability.

Sample indicators for monitoring sustainable tourism development

The authors of the analyzed scientific publications have identified many indicators for monitoring sustainable tourism development. Below are only some examples of economic, social, and environmental indicators that are presented in the analyzed publications (*Table 3*). The analysis shows that in order a system of indicators for monitoring sustainable tourism to be developed appropriate socio-economic and environmental indicators should be selected and classified according to the chosen criteria. Thus, it could be concluded that on the one hand, the chosen indicators should adhere to specific requirements, such as availability and relevance of the information that they provide, and on the other hand, each indicator should be classified in an appropriate group in order correspondence between indicators and the given criteria to be assured.

Results

Development of a system of indicators for monitoring sustainable tourism development of destinations

Requirements to the indicators

Indicators for monitoring sustainable tourism development of destinations should reflect aspects such as the characteristics of tourism in general and the characteristics of the destination in particular. They also indicate the available capacity and load on resources. They are a measure of tourism demand and supply, too. Primarily they reveal the social, economic, and environmental benefits realized by the interested parties (visitors, local population, staff, etc.). Thus, it could be summarized that the system for monitoring sustainable tourism development of destinations should include indicators that reveal the key characteristics of tourism development and the specific tourist destinations, the state and sustainable utilization of tourism resources, various aspects of tourism supply and demand, as well as the costs and benefits for the main interested parties.

Below some essential criteria and indicators for monitoring sustainable tourism development of destinations, derived by the analysis of scientific literature are presented. The presented indicators are classified in groups according to the chosen criteria and thus a system of indicators for monitoring sustainable tourism development of destinations is formed. The criteria are selected based on literature review, the specifics of sustainability and the essential characteristics of economic, social, and environmental dimensions of sustainable tourism development, as well as the fundamental theories and statements of tourism studies. The requirements for selecting the indicators for monitoring sustainable tourism development are chosen on the basis of the analysis of the scientific publications that are presented above. The

specific requirements for selecting sustainable tourism indicators are relevance, reliance, measurability, availability, and objectivity of the provided information. The selected indicators are related to the economic, social, and environmental aspects of sustainability of tourism destinations. The values of the indicators can be measured regularly because information is available or can be easily obtained from statistical studies, data on the Internet, from social networks, from monitoring through new technologies, at tourism sites, etc. The obtained data is expected to be objective and gathered on a regular basis. Thus, it could be concluded that the appropriate system for measuring sustainable tourism development of destinations include suitable indicators that both adhere to certain requirement, such as measurability, availability of information, etc. and that correspond to preliminary selected criteria related to social, economic and environmental sustainability of tourism destinations.

Social and economic indicators

Social and economic indicators for monitoring sustainable tourism development in destinations are related to aspects, such as the number and satisfaction of visitors and local population, the safety of people in the respective territory, tourism enterprises and number and qualifications of staff, the infrastructure, activities and services that are provided for visitors, the capacity and load on resources, the type and quality of information materials and the content of information provided to tourists, as well as revenues, costs, wages, investments, etc. Socio-economic sustainability indicators should reflect both social and economic benefits and social and economic costs. They should indicate the social benefits for various social groups, especially tourists, local population, and staff, which are related to satisfying their various social needs. These indicators also reflect the economic benefits (revenues, income, etc.) and costs (for materials, wages, investment etc.) for people and especially for resident population and tourism companies and their staff. The social and economic benefits of various social groups are realized due to sustainable tourism development. Socio-economic indicators are closely related to environmental indicators, which reflect the quality of environment, mainly natural environment that is essential for the satisfaction of people and especially visitors. Most social and economic indicators can be used for monitoring the sustainable development of all forms of tourism. Other indicators are suitable for evaluating only some specific forms of tourism, e.g. mountain, sea, cultural and ecotourism, etc. Thus, it could be summarized that socio-economic indicators for sustainable tourism development of destinations reflect social and economic benefits and costs for interested parties (local people, tourists, personnel, etc.).

Below (*Table 4*) are examples of some essential socio-economic indicators that could be used for the assessment of sustainable tourism development of destinations. The indicators have been selected in such a way that, apart from being suitable for the evaluation of the social and economic sustainability of tourism of destinations, their values can be measured because information is available or can be easily obtained from statistical studies, data on the Internet and social networks, ranking of tourism sites, etc. The presented sample indicators have been classified in the following groups: (1) Indicators related to the number of local population and visitors, the ratio between them and the number and satisfaction of visitors and local people who participate in the different activities and use various services within the destinations. These indicators are related to local and tourism demand; (2) Indicators related to the availability,

access, quantity and quality of tourism enterprises, infrastructure, sites, activities, products, and services. These indicators are related to supply, including tourism supply; (3) Indicators related to employment and staff in tourism; (4) Indicators related to the information that is provided to visitors; (5) Indicators related to income, revenue, costs, investment, wages, etc. That group include indicators that are measured with currency values. They might be considered as financial indicators. Thus, five groups of socio-economic indicators for measuring social and economic sustainability of destinations have been distinguished. These indicators are related to tourism supply and demand, costs and revenues.

Environmental indicators

Environmental indicators for monitoring sustainable tourism development of destinations are related to the capacity and use of natural and physical resources. They indicate the state of natural environment. These indicators reflect the environmental benefits and costs for people that are realized due to sustainable tourism development at destinations. There are general environmental indicators that can be used for monitoring all types of tourism and specific environmental indicators that can be used for monitoring specific types of tourism that are based on natural resources, mainly, nature, mountain, forest, and eco-tourism, etc. Environmental indicators for monitoring sustainable tourism are related to the levels of conservation, protection, reduction of use, consumption, state, quality and pollution of nature and natural resources, such as air, water, energy, land, terrain, soils, flora, and fauna. Thus, it can be summarized that environmental indicators for sustainable tourism development of destinations reflect environmental costs and benefits for stakeholders, such as tourists, local people and the personnel of tourism enterprises.

Environmental indicators for monitoring sustainable tourism development of destinations can be classified in groups according to criteria related to the type and effects on natural resources. Thus, the following criteria for classifying the environmental indicators for monitoring sustainable tourism development are offered: (1) Indicators related to air quality and noise pollution; (2) Indicators related to water quality and consumption; (3) indicators related to energy consumption; (4) indicators related to (solid and liquid) waste management, terrain preservation and soil quality; (5) indicators related to levels and preservation of flora and fauna. Below (Table 5) are some examples of indicators for environmental sustainability of destinations. Thus, five groups of indicators for measuring environmental sustainability of tourism destinations have been distinguished. These indicators are related to the types of and impacts on natural resources.

Discussion

For further studies the following information about the indicators for sustainable tourism development of destinations should be provided. The source of information for each indicator should be specified. The territorial level for which the indicator should be measured should be determined (e.g., global, European, national, regional, local). The type of the destination where the indicator could be applied should be specified (e.g., urban, coastal, rural, mountain). The system of indicators for sustainable tourism development is worth testing at a specific destination. To be applied to that destination it is worth adopting according to the type,

size, resources and other characteristics of the destination. The target value of each indicator should be determined. The observation period should be specified. During the observation period monitoring of the achieved values of the indicators for sustainable tourism development of the destination should be performed. The trends in the variation in the values of the indicators should be measured and analyzed as the reasons for the observable trends should be outlined. On that basis, an assessment of the social, economic and environmental, as well as the overall sustainability of tourism development of the destination should be done. The assessment should be used for improving the system of the indicators for measuring sustainable tourism development of the destination in order to be utilized in the future. Thus, the improved system would be applied to certain destinations.

Conclusion

In that paper a scientifically based and practically applicable system of socio-economic, and ecological indicators for monitoring sustainable tourism development of destinations has been presented. The indicators have been selected based on their relevance to sustainable tourism development of destinations and their measurability due to available or easily obtainable objective, and reliable information. The selected indicators were classified according to developed criteria. The results of the study revealed that socio-economic indicators could be classified in groups according to the following criteria: (1) Indicators related to the number of local population and visitors, the ratio between them and the number and satisfaction of visitors and local people who participate in the various activities and use different services within the destinations. These indicators are related to local and tourism demand; (2) Indicators related to the availability, access, quantity and quality of tourism enterprises, infrastructure, sites, activities, products, and services. These indicators are related to supply, including tourism supply; (3) Indicators related to employment and staff in tourism; (4) Indicators related to the information provided to visitors; (5) Indicators related to income, revenue, costs, investment, wages, etc. That group include economic indicators that are measured with currency values. They might be considered as financial indicators. The environmental indicators could be classified in groups according to the following criteria: (1) Indicators related to air quality and noise pollution; (2) Indicators related to water quality and consumption; (3) indicators related to energy consumption; (4) indicators related to (solid and liquid) waste management, terrain preservation and soil quality; (5) indicators related to levels and preservation of flora and fauna. For each group of socio-cultural and environmental indicators sample indicators for monitoring sustainable tourism development of destinations have been presented, which were chosen based on the outlined requirements (measurability, etc.).

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Conflict of interest

The author declares that there is no conflict of interest.

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Appendix

Table 1. Scopes of the studies described in the analyzed publications

Authors, year	Scope or area of study
ETIS, EU, 2016	Involves indicators for sustainable destination management.
Guerreiro&Seguro, 2018	Identified core areas and indicators for monitoring sustainability in the Portuguese tourism industry.
Roberts&Tribe, 2008	Identified themes and indicators for monitoring the sustainability of small tourism enterprises.
Durovic&Lovrentjev, 2014	Formed a group of indicators according to the main aspects of the dimensions of sustainable tourism for measuring sustainability of cultural tourism.
Mearns, 2015	Applied sustainable tourism indicators to community-based ecotourism ventures in South Africa.
Silvera et al., 2021	Identified sustainability indicators for Portuguese hospitality SMEs.
Asmelash&Kumar, 2019	Developed and tested a set of indicators for assessment of the progress towards sustainable tourism development.
Lozano-Oyola et al., 2012	Presented indicator system to evaluate sustainable tourism at cultural destinations.
Sobhani et al., 2022	Evaluated indicators for protected areas in Tehran, Iran.
Ghoochani et al., 2020	Identified indicators for measuring sustainable tourism development in the wetland areas.
Islam et al., 2023	Developed and implemented a community operated tourism sustainability indicator system in Boga Lake, Bangladesh.
Chavez-Cortes&Maya, 2010	Identified sustainability indicators for tourism development at a local level in a Mexican community.
Gallagher&Pike, 2011	Developed a suite of indicators, which can be used by the events management industry to describe their sustainable practice.
Mutana&Mukwada, 2017	Assessed significant tourism sustainability indicators for a Montane-Based Rout in the Drakensberg Mountain, South Africa.
He at al., 2023	Used indicators to measure tourism resource carrying capacity performance in China.
Spilanis at al., 2009	Used indicators for estimation of the sustainability at the island level.
Barzekar et al., 2011	Generated indicators for monitoring ecotourism sustainability in Northern forests of Iran.
Reihanian et al., 2015	Developed and used sustainable tourism indicators in Boujagh National Park, Iran.
Lee et al., 2021	Developed an indicator framework for assessing sustainable tourism at a Taiwan ecological resort.
Dimoska&Petrevska, 2012	Estimated sustainable tourism development indicators in Macedonia.
Vagiona&Doxopoulos, 2014	Identified and implemented a set of tourism indicators for the Regional Unit of Northern Sporades in order to upgrade tourism development.

Table 2. Core criteria for classifying indicators for monitoring sustainable tourism development

Authors, year	Criteria
ETIS, EU, 2016	Economic dimension Tourism flow at destinations, tourism enterprises performance, quantity and quality of employment, tourism supply chain

	Social dimension Community/ social impact, health and safety, gender equality, inclusion/ accessibility, protecting and enhancing cultural heritage, local identity, and assets
	Environmental dimension Reducing transport impact, climate change, solid waste management, sewage treatment, water management, energy usage, landscape, and biodiversity protection
	Others-Destination management Sustainable tourism public policy, customer satisfaction
Guerreiro&Seguro, 2018 (following UNWTO guidelines, 2004,2016,2017)	Economic dimension Seasonality, economic benefits, employment
	Social dimension Tourist satisfaction, local satisfaction, pressure, accessibility
	Environmental dimension Environmental management, energy management, solid waste management
Roberts&Tribe, 2008 (largely drown form WTO Indicator Frameworks, 2000)	Economic dimension Business/ performance profitability, foreign exchange leakage and domestic leakages, employment, quality of employment, business motivation
	Social dimension Community involvement, resident access, host relations to tourists, crime and harassment, cultural promotion, ownership patterns
	Environmental dimension Environmental awareness and management, energy efficiency, water efficiency and monitoring, recycling and reuse, solid waste management, wastewater management, pollution effects management, visual pollution
	Others - Management/ institutional sustainability indicators Management and staff training, access to finance
Durovic&Lovrentjev, 2014	Economic dimension Economic benefits of cultural tourism for the host community and destination, sustaining tourist satisfaction, cultural facilities, institutional regulation, seasonality of tourism activity, tourism related transport, cultural routes
	Social dimension Socio-cultural effects of tourism on host community, local public safety, conservation of cultural heritage, social carrying capacity of the destination, safeguarding cultural identity and local community, quality of life in general
	Environmental dimension Protection of the natural ecosystem, energy management, water availability and management, wastewater treatment, waste management, atmospheric pollution, management of the visual impact of facilities and infrastructure, intensity of use, environmental management
Mearns, 2015 (WTO, 2004 and author's estimation)	Economic dimension Sustainable tourism satisfaction, tourism seasonality, economic benefits of tourism
	Social dimension Local satisfaction with tourism, effects with tourism on communities, education, community decision-making, community benefits, culture
	Environmental dimension Energy management, water availability and conservation, drinking water quality, sewage treatment, solid waste management, controlling use intensity, biodiversity, and conservation
	Others - Crosscutting issues Development controls, networking, and collaboration

Silvera et al., 2021 (ETIS, WTO)	Economic dimension Seasonality, transport, economic benefits, tourist satisfaction level, employment
	Social dimension Satisfaction, pressure, accessibility, effect of tourism on the community, conservation of cultural heritage, quality of life
	Environmental dimension Environmental management, energy management, solid waste management, water management, protection of the natural ecosystem, impact on the environment, conservation of biodiversity and landscapes, resource conservation
	Others - Management Management system, local planning
Asmelash&Kumar, 2019	Economic dimension Employment quality, economic viability, local prosperity
	Social dimension Social equity, visitor fulfillment, local control, community wellbeing, cultural richness
	Environmental dimension Physical integrity, biological diversity, resources efficiency, environmental purity
	Others - Institutional sustainability Local-oriented control policy, political participation, local planning policy, political support at different levels of governments
Lozano-Oyola et al., 2012	Economic dimension Economic benefits of tourism for the host community and destination, sustaining tourist satisfaction, development control, tourism facilities on offer – provision of a variety of experiences, seasonality of tourism activity, tourism employment, tourism-related transport, destination competitiveness, tourist routes, cultural investment, agglomeration
	Social dimension Socio-cultural effects of tourism on host community, local public safety, conservation of cultural heritage, effect on local population structure, social carrying capacity of the destination, effect on level of well-being of the local population, improvement of the urban landscape
	Environmental dimension Protection of the natural ecosystems, energy management, water availability and management, wastewater treatment, management of solid urban waste, atmospheric pollution, management of the visual impact of facilities and infrastructure, intensity of use, environmental management
Sobhani et al., 2022	Economic dimension Information and communication infrastructure, local prices, employment, governmental and non-governmental institutions, government investments, monitoring and control, institutional co-operation, quality of managerial functions, ecotourism costs, rules and regulations
	Social dimension Satisfaction, participation, feeling of security, population density, culture, justice
	Environmental dimension Environmental pollution, ecosystems, biodiversity, ecotourism carrying capacity, safety, ecotourism infrastructure and facilities
Ghoochani et al., 2020	Economic dimension Dependency of income of households around the wetland on tourism, gender equality, business enterprises related to tourism, hard tourism

	infrastructure, branding, investment volume, the diversity of income sources, willingness to pay
	Social dimension Social capital, psychological, local community participation in the development of wetland tourism, soft infrastructure related to tourism, cultural exchange, population, satisfaction of tourism development
	Environmental dimension Systematic introducing of wetlands, attitude toward environmental protection, ambient quality, biodiversity, environmental NGOs, tourism diversity, protective value of wetland, land-use change
Islam et al., 2023	Economic dimension Economic growth of tourism, contribution of household income and standard of living
	Social dimension Tourism satisfaction, social cohesion affected by tourism, local satisfaction about tourism, whether the culture being degraded or lost, potentials for preserving culture and traditions
	Environmental dimension Quality of the water of the Boga Lake, preservation of flora, preservation of fauna, preservation of natural beauty and minimizing visual pollution
	Others - Local government/ political dimension Supportive roles of local government, negative roles of local government, committee of the local community for community-based tourism development and maintenance
Chavez-Cortes&Maya, 2010	Economic dimension Jumpstart regional development, reposition the Integrally Planned Centers Bahias de Huatulco, improve agricultural activity
	Social dimension Improve life standards of the population, make easier the incorporation of local people in tourism activity, defend current agricultural land-use
	Environmental dimension Conserve ecosystem goods and services, prevent and control environmental impacts
	Political/ institutional Improve institutional response from the National Trust for Tourism Promotion of Mexico
Gallagher&Pike, 2011	Economic dimension Supporting sustainability
	Social dimension Community engagement and participation, education and awareness, procurement and employment, significance, and recognition
	Environmental dimension Energy, materials and waste, water and sewage, transport, environmental actions
Authors, year	Criteria
Mutana&Mukwada, 2017	Effective sustainable management, social and economic benefits to local community, benefits to cultural heritage, benefits to the environment
He at al., 2023	Tourism economic load, tourism social load, tourism ecological load, tourism attraction resource, tourism service resource, tourism ecological resource
Spilanis at al., 2009	Employment, exports, economic performance of enterprises, product, active population, unemployed, job position, income, population, biodiversity, land-use types, water quality and quantity, soil quality and quantity, urban environment

Barzekar et al., 2011	Conservation of natural resources and biodiversity, educational affairs and public awareness, maintenance of soil and water resources, tourists and local people satisfaction, economic benefits and poverty alleviation, maintenance of heritage and cultural diversity, maintenance of scenery, natural and physical feature, maintenance of hygiene and tourist safety, existence of legal, institution, legislation, and policy
Reihanian et al., 2015	Visitors' satisfaction with their experiences, regional development (economy), visitors' awareness (environment), local community awareness (society), local community participation in the planning process (management)
Lee et al., 2021	Environmental management, economic management, socio-cultural management, government policy, human resource management, science, and technology
Dimoska&Petrevska, 2012 (UNWTO, 2004)	Local satisfaction effect of tourism on communities, sustaining tourist satisfaction, tourism seasonality, economic benefits of tourism, energy management, water availability and conservation, drinking water quality, sewage treatment, solid waste management, development control, controlling use intensity
Vagiona&Doxopoulos, 2014	Population, health, transport, tourist services, coasting, accommodation, geographical features, land uses, biodiversity, energy, water wastes, bathing water quality

Table 3. Sample indicators for monitoring sustainable tourism development that are presented in scientific literature

Authors, year	Sample indicators
ETIS, EU, 2016	Percentage of tourism enterprises using voluntary certification, number of tourist nights per month, relative contribution of tourism to the destination's economy (%GDP), daily spending per overnight tourist, average length of stay of tourists, occupancy rate of commercial accommodation, direct tourism employment as a percentage of total employment, percentage of jobs in tourism that are seasonal, percentage of locally produced food, drinks, goods and services, number of tourists per 100 residents, number of beds available in commercial accommodation establishments per 100 residents, percentage of the destination's events that are focused on traditional culture and heritage, percentage of tourists using different modes of transport, percentage of tourism enterprises separating different types of waste, percentage of tourism enterprises taking actions to reduce water consumption, percentage of tourism enterprises taking actions to reduce energy consumption, percentage of annual amount of energy consumed from renewable sources compared to overall energy consumption, percentage of local enterprises in the tourism sector actively supporting protection of local biodiversity and landscapes, etc.
Guerreiro&Seguro, 2018	Number of tourists, percentage of jobs that are seasonal, percentage of excellent or good water quality, direct energy consumption, etc.
Roberts&Tribe, 2008	Employee salaries, percent of locals employed, energy consumption, water consumption, energy conservation measures, water conservation measures, etc.
Durovic&Lovrentjev, 2014	Capacity of transport services, employment generated by the service sector, investment in the service sector, noise pollution, etc.
Mearns, 2015	Education of tourists, training of staff, revenue generated, waste volume produced, number of tourists per square meter of the site, etc.

Silvera et al., 2021	Number of beds, protection of natural assets, expenditure on the environment, percentage of certified facilities, protection of historical sites, etc.
Asmelash&Kumar, 2019	Variety of local products, income to the local community, pressure of tourist activities on fauna and flora species, host-guest interaction, number of additional services, etc.
Lozano-Oyola et al., 2012	Capacity of services, heritage interpretation, tourist routes created, promotion of activities for tourism, volume of tourism employment, etc.
Sobhani et al., 2022	Access to information, access to tourism attractions, access to restaurants, access to accommodation, access to tour agencies, etc.
Ghoochani et al., 2020	Number of businesses related to tourism, number of attractions, public sector investment volume, private sector investment volume, etc.
Islam et al., 2023	Ensuring tourist safety and security, promoting the destination to tourists, number of cultural festivals at the area in a certain period of time, etc.
Chavez-Cortes&Maya, 2010	Number of certified local employees, amount of investment for local personnel training, number of rooms, air quality, endangered, rare species, etc.
Gallagher&Pike, 2011	Carbon offsetting initiatives, environmental conservation initiatives, educational initiatives related to sustainability, waste generation and disposal, etc.
Mutana&Mukwada, 2017	Protecting cultural heritage, presenting culture and heritage, conserving resources, reducing pollution, information, and interpretation, etc.
He at al., 2023	Proportion of domestic tourists to residents, proportion of international tourists to residents, number of intangible cultural heritage per local people, etc.
Spilanis at al., 2009	New enterprises, seasonal workers per employed, protected area per total area, quality of drinking and irrigation water, quality of bathing water, etc.
Barzekar et al., 2011	Diversity of plants and wildlife, number of educational workshops, number of information centers, number of brochures, etc.
Reihanian et al., 2015	Proportion of local community involvement in tourism development, proportion of visitor awareness of conservation regulations, etc.
Lee et al., 2021	The resort provides signs to remind customers when to save resources, environmental friendliness of accommodation, existence of website, etc.
Dimoska&Petrevska, 2012	Number of tourist industry jobs, which are permanent, revenues generated by tourism as a percentage of total revenue, etc.
Vagiona&Doxopoulos, 2014	Peak season tourists to local population, number of visitors per 1 m coastline, peak season energy consumption to off-season energy consumption, etc.

Table 4. Classification and sample social and economic indicators for monitoring sustainable tourism development in destinations

Criteria	Sample social and economic indicators
Indicators related to the number of local population and visitors, the ratio between them and number and the	Number of local people, number of tourists, number of tourists to local people, domestic tourists to local people, international tourists to local people, number of arrivals at accommodation establishments, number of arrivals at accommodation establishments to local people, number of tourists per square meter, number of arrivals at accommodation establishment per square meter, number of tourists per square meter in key

satisfaction of visitors and local people who participate in the various activities and use different services within the destinations	sites, number of tourists in peak months and average for the year, number of tourists participating in different types of activities, number of overnight stays, number of tourist nights per month, number of tourists per night, average length of stay of tourists in days, occupancy rate of accommodation establishments, number of nights spent at accommodation relative to number of local population, number of nights spent at accommodation relative to the area of the region, satisfaction of tourists (measured by their ratings for tourist sites, activities and services on social networks, websites, etc.), number of local people who can communicate with foreign tourists, level of participation of local people and tourists in different types of activities and using the various types services, level of participation in joint initiatives and activities of tourists and local population, etc.
Indicators related to the availability, access, quantity and quality of tourism enterprises, infrastructure, sites, activities, products, and services	Availability of cultural and historical heritage sites, availability of sport facilities, number of local enterprises, percentage of tourism enterprises/ establishments in the destination using a voluntary environmental certification, state and attractiveness of tourism sites, number and quality of recreational facilities and possible activities, provision of local products, amount of local production for sale to tourists, access to cultural and natural tourism attractions, use of green design technology, community activities that foster collective learning, volume of traffic, availability of environment-friendly economic activities, number and quality of restaurants facilities and services, number and quality of accommodation establishments and services, access to emergency services, access to fire services, access to health services, access to garbage containers, number of tour agencies, availability of activities related to protection of nature, and cultural and historical monuments, activities related to supporting arts, culture and handicrafts, state of tourism infrastructure, variety of local services, availability of local events, number of joint initiatives and activities of tourists and local population, number of initiatives involving tourists in environmental protection and cleaning, availability of initiatives involving tourists in supporting local socio-economic development of the destination, number of beds in accommodation in relation to local population, number of bed places relative to the total area of the region, etc.
Indicators related to employment and staff in tourism	Number of employed in tourism sector, number of employees in tourism in relation to the total number employed, number of employees in tourism to the number of local population, percentage of fulltime jobs in tourism, retention level of employees in tourism, number of qualified/ certified employees, number of employed in accommodation and food establishments, number of employed in travel agencies, number of employed at tourist attractions, number of educated and trained local people, formation of apprenticeship training positions, number of employees of local population, quality performance of managers, quality performance of local tour guides, quality performance of environmental guardians, number of people who are engaged in craft art production, number of local people who exercise traditions, number of people who provide local products, etc.
Indicators related to the information provided to visitors	Availability, access and number of information centers, tourist information offices, travel review sites, historical archives and records, educational facilities and workshops, etc., access, availability and quality of information in travel guides, informational and advertising materials, the Internet, at the sites, on signs and signage and signage boards, brochures and banners, etc., access to maps, number of brochures for representing attraction areas and biodiversity, education of nature protection in local educational center,

	documentation of indigenous knowledge, nature interpretation center and visitor facilities, signage of wild life and fauna, etc.
Indicators related to income, revenue, costs, investment, wages, etc.	The share of tourism in GDP, tourism revenue per year, income per capita, average spending per visitor, daily spending per overnight tourist (accommodation, food and drinks, other services), tourism expenditures on museums, entertainment and excursions, training funds spent per employee, share of foreign and local capital investment, level of wages in tourism, in hotel and restaurant sector, in travel agencies and attractions, etc., wage level of local residents, expenditure for access to tourism area, amount of local revenue from tourism, income of local households, income from services such as fishing, harvesting and recreation, level of government financial support; amount of investment in tourism, prices and costs of food, accommodation, transportation, commodities, health services, etc., cost of using local facilities, etc.

Table 5. Classification and sample environmental indicators for monitoring sustainable tourism development in destinations

Criteria	Sample environmental indicators
Indicators related to air quality and noise pollution	Air quality, air pollution, noise pollution, level of carbon emissions, level of carbon emission reduction, monitoring air quality, measures taken for carbon emission reduction, etc.
Indicators related to water quality and consumption	Water consumption, water pollution, level of water reduction, measures taken for water use reduction, conservation of water, monitoring water, quality of water, quality of drinking water, quality of irrigation water, quality of bathing water, etc.
Indicators related to energy consumption	Energy consumption, energy reduction, measures taken for energy reduction, energy consumed from green energy sources, etc.
Indicators related to (solid and liquid) waste management, terrain preservation and soil quality	Waste volume generated, waste disposal, monitoring waste levels, sewage treatment, waste recycled, percentage of tourism enterprises separating different types of waste, etc.
Indicators related to levels and preservation of flora and fauna	Flora and fauna protection, percentage of local tourism enterprises supporting measure for protection of local flora and fauna, diversity of flora and fauna, rare animals, and plants, etc.