



Impact of tourism development upon environmental sustainability: a suggested framework for sustainable ecotourism

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Abstract

The empirical research investigated the relationship between tourism development and environmental suitability to propose a framework for sustainable ecotourism. The framework suggested a balance between business and environmental interests in maintaining an ecological system with the moderating help of government support and policy interventions. The study population encompasses tourism stakeholders, including tourists, representatives from local communities, members of civil administration, hoteliers, and tour operators serving the areas. A total of 650 questionnaires were distributed to respondents, along with a brief description of key study variables to develop a better understanding. After verifying the instrument's reliability and validity, data analysis was conducted via hierarchical regression. The study findings revealed that a substantial number of people perceive socio-economic benefits, including employment and business openings, infrastructure development from tourism development, and growth. However, the state of the natural and environmental capital was found to be gradually degrading. Alongside the social environment, social vulnerability is reported due to the overutilization of land, intrusion from external cultures, and pollution in air and water due to traffic congestion, accumulation of solid waste, sewage, and carbon emissions. The study suggested a model framework for the development of sustained ecotourism, including supportive government policy interventions to ensure effective conservation of environmental and natural resources without compromising the economic viability and social well-beings of the locals. Furthermore, the variables and the constructs researched can be replicated to other destinations to seek valuable inputs for sustainable destination management elsewhere.

Keywords Tourism development and growth · Environmental sustainability and degradation · Natural environment · Ecosystem and biodiversity · Ecotourism framework

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Introduction

Tourism is a vibrant force that stimulates travel to explore nature, adventures, wonders, and societies, discover cultures, meet people, interact with values, and experience new traditions and events. Tourism development attracts tourists to a particular destination to develop and sustain a tourism industry. Moreover, environmental sustainability is the future-based conscious effort aimed at conserving socio-cultural heritage and preserving natural resources to protect environmental ecosystems through supporting people's health and economic well-being. Environment sustainability can be reflected in clean and green natural landscaping, thriving biodiversity, virgin sea beaches, long stretches of desert steppes, socio-cultural values, and archeological heritage that epitomize tourists' degree of motivation and willingness of the local community to welcome the visitors. In this context, tourism growth and environmental sustainability are considered interdependent constructs; therefore, the increase in tourism development and tourists' arrivals directly affects the quality of sustained and green tourism (Azam et al. 2018; Hassan et al. 2020; Sun et al. 2021).

According to the World Tourism Organization (UNWTO), tourism is one of the fastest-growing industries, contributing more than 10% to the global GDP (UNWTO 2017; Mikayilov et al. 2019). Twenty-five million international tourists in 1950 grew to 166 million in 1970, reaching 1.442 billion in 2018 and projected to be 1.8 billion by 2030. Mobilizing such a substantial human tourist's mass is most likely to trickle environmental pollution along with its positive effects on employment, wealth creation, and the economy. The local pollution at tourist destinations may include air emissions, noise, solid waste, littering, sewage, oil and chemicals, architectural/visual pollution, heating, car use, and many more. In addition, an uncontrolled, overcrowded, and ill-planned tourist population has substantial adverse effects on the quality of the environment. It results in the over-consumption of natural resources, degradation of service quality, and an exponential increase in wastage and pollution. Furthermore, tourism arrivals beyond capacity bring problems rather than a blessing, such as leaving behind soil erosion, attrition of natural resources, accumulation of waste and air pollution, and endangering biodiversity, decomposition of socio-cultural habitats, and virginity of land and sea (Kostić et al. 2016; Shaheen et al. 2019; Andlib and Salcedo-Castro 2021).

Tourism growth and environmental pollution have been witnessed around the globe in different regions. The ASEAN countries referred to as heaven for air pollution, climate change, and global warming are experiencing

economic tourism and pollution (Azam et al. 2018; Guzel and Okumus 2020). In China, more than fifty-eight major Chinese tourism destinations are inviting immediate policy measures to mitigate air pollution and improve environmental sustainability (Zhang et al. 2020). Similarly, Singapore, being a top-visited country, is facing negative ecological footprints and calling for a trade-off between tourism development and environmental sustainability (Khoi et al. 2021). The prior studies established that international tourism and the tourism-led growth surge tourists' arrival, energy consumption, carbon dioxide (CO₂) emissions, and air pollution resultantly cause climate change (Aslan et al. 2021). South Asian countries, more specifically Sri Lanka and Pakistan, are on the verge of tourism growth and environmental pollution compared to other countries (Chishti et al. 2020; Tiwari et al. 2021).

Pakistan is acknowledged in the tourism world because of its magnificent mountains with the densest concentration of high peaks in the world, scenic beauty of Neelum Valley, Murree, Chitral, and swat Valleys', Kaghan, Naran, Hunza, Gilgit Baltistan (Baloch 2007), sacred shrines of Sikhism, archeological sites of the Gandhara and Indus Valley civilizations such as Mohenjo-Daro, Taxila including pre-Islamic Kalasha community (Baloch and Rehman 2015). In addition, Pakistan's hospitable and multicultural society offers rich traditions, customs, and festivals for the tourists to explore, commemorate, cherish, and enjoy. Pakistan's geographical and socio-cultural environment represents its resource and an opportunity (Baloch and Rehman 2015); therefore, Pakistan is looking to capitalize on it as a promising source of the foreign reserve to compensate for its mounting trade deficit (Baloch et al. 2020).

Tourism expansion has been established as a very deleterious ecological cost vis-à-vis the socio-economic benefits it passes to the host communities (Pulido-Fernández et al. 2019; Simo-Kengne 2022). In this context, the research is motivated to investigate the relationships between Pakistan's tourism development activities and environmental sustainability. Drawing from the arguments of Pulido-Fernández et al. (2019) and Simo-Kengne (2022), it is feared that Pakistan's ongoing determination to tourism development is likely to cause environmental degradation in two ways. Firstly, the tourism infrastructure developmental process would consume natural resources in the form of air and water pollution, loss of nature, and biodiversity. Secondly, the proliferation of tourism-related energy-consuming activities harms the environment by adding CO₂ emissions (Andlib and Saceldo-Castro 2021; Chien et al. 2021a). Therefore, to tape this tourism-rich potential without compromising the sustainability of the natural and socio-cultural environment in the area, there is a dire need to develop Pakistan's tourism areas into environment-friendly destinations.

Against the backdrop of a widening level of trade deficit, Pakistan's rich tourism potential is being perceived as an immediate alternative for earning revenue to compensate for the current account gap. However, the developing large-scale tourism industry is considered a threat to deforestation, and air and water pollution, endangering biodiversity trading on resilient ecological credentials. The research study attempts to find an all-inclusive and comprehensive answer to the socio-ecological environmental concerns of tourism development and growth. Therefore, the research investigates the relationship between tourism development and its environmental sustainability to suggest a model framework for the development and growth of Sustainable Ecotourism in Pakistan along with its most visited destinations.

Literature review

Tourism development and growth

Tourism is considered a force of sound as it benefits travelers and communities in urban and suburban areas. Tourism development is the process of forming and sustaining a business for a particular or mix of segments of tourists' as per their motivation in a particular area or at a specific destination. Primarily, tourism development refers to the all-encompassing process of planning, pursuing, and executing strategies to establish, develop, promote, and encourage tourism in a particular area or destination (Mandić et al. 2018; Ratnasari et al. 2020). A tourism destination may serve as a single motivation for a group of tourists or a mix of purposes, i.e., natural tourism, socio-cultural or religious tourism, adventure or business tourism, or a combination of two or more. Andlib and Salcedo-Castro (2021), drawing from an analysis approach, contended that tourism destinations in Pakistan offer a mix of promising and negative consequences concerning their socio-economic and environmental impressions on the host community. The promising socio-economic impacts for the local community are perceived in the form of employment and business opportunities, improved standard of living, and infrastructural development in the area. The adverse environmental outcomes include overcrowding, traffic congestion, air and noise pollution, environmental degradation, and encroachment of landscaping for the local community and the tourists. An extensive review of the literature exercise suggests the following benefits that the local community and the tourists accrue from the tour are as follows:

- a. Generate revenue and monetary support for people and the community through local arts and culture commercialization.

- b. Improve local resource infrastructure and quality of life, including employment generation and access to improved civic facilities.
- c. Help to create awareness and understanding of different ethnic cultures, social values, and traditions, connecting them and preserving cultures.
- d. Rehabilitate and conserve socio-cultural and historical heritage, including archeological and natural sites.
- e. Establishment of natural parks, protracted areas, and scenic beauty spots.
- f. Conservation of nature, biodiversity, and endangered species with control over animal poaching.
- g. Improved water and air quality through afforestation, littering control, land and soil conservation, and recycling of used water and waste.

Tourism and hospitality business incorporates various business activities such as travel and transportation through the air or other modes of travel, lodging, messing, restaurants, and tourism destinations (Szpilko 2017; Bakhridinova and Qizi 2020). A tourist's tourism experience is aimed at leisure, experiencing adventure, learning the culture or history of a particular area or ethnic entity, traveling for business or health, education, or religious purposes. The chain of activities adds value to the Tourism experience. Every activity contributes toward economic stimulation, job creation, revenue generation, and tourism development encompassing infrastructure for all activities involved in the tourism process. Tourism growth expresses the number of arrivals and the time of their stay/trips over a period of time. Tourism growth is measured through the interplay between tourists' arrivals, tourism receipts, and travel time duration (Song et al. 2010; Arifin et al. 2019). The following factors drive the degree and level of tourism development and growth:

- a. Environmental factors include scenic beauty, green spaces, snowy mountains, towering peaks, good climate and weather, the interconnectivity of destination, quality of infrastructure, etc.
- b. Socio-economic factors: the distinctiveness of community, uniqueness of culture and social values, hospitality and adaptability, accessibility, accommodation, facilities and amenities, cost-effectiveness, price index, and enabling business environment.
- c. Historical, cultural, and religious factors include historical and cultural heritage, religious sites, and cultural values and experiences.

Ecotourism

The tourism development process and its different dynamics revolve around the nature of tourism planned for a particular

destination or area, which can be specified as ecotourism, sustainable tourism, green tourism or regenerative tourism, etc. Ecotourism is “responsible travel to natural areas that conserves the environment, sustains the well-being of the local people, and involves interpretation and education” (Cheia, 2013; TIES, 2015). According to the World Conservation Union (IUCN), ecotourism involves “*Environmentally responsible travel to natural areas, to enjoy and appreciate nature (and accompanying cultural features, both past, and present) that promote conservation, have a low visitor impact and provide for beneficially active socio-economic involvement of local peoples*”. Moreover, Blangy and Wood (1993) defined it as “*responsible travel to natural areas that conserves the environment and sustains the well-being of local people*” (p. 32). The concept of ecotourism is grounded upon a well-defined set of principles including “environmental conservation and education, cultural preservation and experience, and economic benefits” (Cobbinah 2015; De Grosbois and Fennell 2021).

Ecotourism minimizes tourism’s impact on the tourism resources of a specific destination, including lessening physical, social, interactive, and psychosomatic impacts. Ecotourism is also about demonstrating a positive and responsible attitude from the tourists and hosts toward protecting and preserving all components of the environmental ecosystem. Ecotourism reflects a purpose-oriented mindset, responsible for creating and delivering value for the destination with a high degree of kindness for local environmental, political, or social issues. Ecotourism generally differs from mass tourism because of its following features (Liang et al. 2018; Ding and Cao 2019; Confente and Scarpi 2021):

- a. Conscientious behavior focuses on the low impact on the environment.
- b. Sensitivity and warmth for local cultures, values, and biodiversity.
- c. Supporting the sustenance of efforts for the conservation of local resources.
- d. Sharing and delivering tourism benefits to the local communities.
- e. Local participation as a tourism stakeholder in the decision-making process.
- f. Educating the tourist and locals about the sensitivity and care of the environment because tourism without proper arrangement can endanger the ecosystems and indigenous cultures and lead to significant ecological degradation.

Sustainability aims to recognize all impacts of tourism, minimize the adverse impacts, and maximize the encouraging ones. Sustainable tourism involves sustainable practices to maintain viable support for the ecology of the tourism environment in and around the destination. Sustainable

tourism is natural resource-based tourism that resembles ecotourism and focuses on creating travel openings with marginal impact and encouraging learning about nature having a low impact, conservation, and valuable consideration for the local community’s well-being (Fennell 2001 & 2020; Butowski 2021). On the other hand, ecotourism inspires tourists to learn and care about the environment and effectively participate in the conservation of nature and cultural activities. Therefore, ecotourism is inclusive of sustainable tourism, whereas the focus of sustainable tourism includes the following responsibilities:

- a. Caring, protecting, and conserving the environment, natural capital, biodiversity, and wildlife.
- b. Delivering socio-economic welfare for the people living in and around tourists’ destinations.
- c. Identifying, rehabilitating, conserving, and promoting cultural and historical heritage for visitors learning experiences.
- d. Bringing tourists and local groups together for shared benefits.
- e. Creating wide-ranging and reachable opportunities for tourists.

Environment and sustainability of ecosystem

The term “environment” is all-inclusive of all the natural, organic living, inorganic, and non-natural things. The environment also denotes the interface among all breathing species with the natural resources and other constituents of the environment. Humans’ activities are mainly responsible for environmental damage as people and nations have contemplated modifying the environment to suit their expediencies. Deforestation, overpopulation, exhaustion of natural capital, and accumulation of solid waste and sewage are the major human activities that result in polluted air and water, acid rain, amplified carbon dioxide levels, depletion of the ozone, climate change, global warming, extermination of species, etc. A clean, green, and hygienic fit environment has clean air, clean water, clean energy, and moderate temperature for the healthy living of humans, animals, and biodiversity as nature is destined for them by their creatures. Maintaining and sustaining a clean environment is indispensable for human and biodiversity existence, fostering growth and development for conducting business and creating wealth. The environment can be sustained through conservation, preservation, and appropriate management to provide clean air, water, and food safe from toxic contamination, waste, and sewage disposal, saving endangered species and land conservation.

The globalization process, known for building socio-economic partnerships across countries, is also charged with encouraging environmental degradation through the

over-consumption of natural resources and energy consumption, deforestation, land erosion, and weakening (Adebayo and Kirikkaleli 2021; Sun et al. 2021). Chien et al. (2021b), while studying the causality of environmental degradation in Pakistan, empirically confirmed the existence of a significant connection between CO₂ emissions and GDP growth, renewable energy, technological innovation, and globalization. However, Chien et al. (2021a) suggested using solar energy as a source of economic intervention to control CO₂ emissions and improve environmental quality in China. The danger of air pollution is hard to escape as microscopic air pollutants pierce through the human respiratory and cardiovascular system, injuring the lungs, heart, and brain. Ill-planned and uncontrolled human activities negatively affect ecosystems, causing climate change, ocean acidification, melting glaciers, habitation loss, eutrophication, air pollution, contaminants, and extinction of endangered species (Albrich et al. 2020).

Humans have a more significant effect on their physical environment in numerous ways, such as pollution, contamination, overpopulation, deforestation, burning fossil fuels and driving to soil erosion, polluting air and water quality, climate change, etc. UNO Agenda for 2030 “Sustainable Development and its Sustainable Development Goals” (SDGs) mirrors the common premise that a healthy environment and human health are interlaced as integral to the satisfaction of fundamental human rights, i.e., right to life, well-being, food, water and sanitation, quality of life and biodiversity to ensure healthy lives and promote well-being for all at all ages (SDG3)—which includes air quality that is dependent upon terrestrial ecosystems (SDG15), oceans (SDG14), cities (SDG11), water, cleanliness, and hygiene (SDG6) (Swain 2018; Opoku 2019; Scharlemann et al. 2020). The UNEP stated that 58% of diarrhea cases in developing economies is due to the non-provision of clean water and inadequate sanitation facilities resulting in 3.5 million deaths globally (Desai 2016; Ekins and Gupta 2019).

Climate change overwhelmingly alters ecosystems’ ability to moderate life-threatening happenings, such as maintaining water quality, regulating water flows, unbalancing the temporal weather and maintaining glaciers, displacing or extinction biodiversity, wildfire, and drought (Zhu et al. 2019; Marengo et al. 2021). Research studies advocate that exposure to natural environments is correlated with mental health, and proximity to green space is associated with lowering stress and minimizing depression and anxiety (Noordzij et al. 2020; Slater et al. 2020; Callaghan et al. 2021). Furthermore, the Ecosystem is affected by pollution, over-exploitation of natural resources, climate change, invasive and displacing species, etc. Hence, providing clean air and water, hygienic places, and green spaces enriches the

quality of life: condensed mortality, healthier value-added productivity, and is vital to maintaining mental health. On the other hand, climate change aggravates environment-related health hazards through adverse deviations to terrestrial ecology, oceans, biodiversity, and access to fresh and clean water.

Tourism development denotes all activities linked with creating and processing facilities providing services for the tourists on and around a destination. Infrastructure development is vital for developing a tourism destination to advance tourists’ living conditions and preserve natural and cultural heritage by constructing new tourist facilities, the destinations administrative and supporting echelons, including community living, etc. Development for tourism infrastructure and land use often burdens natural capital through over-consumption, leading to soil erosion, augmented pollution, loss of natural habitats, and endangered species. Development of tourism infrastructure and construction work has profound implications on environmental degradation, reduction in green spaces, deforestation, solid waste and sewage, overutilization of air and water, emission of CO₂ and other gases contributing to air and water pollution, climate change, loss and displacement of biodiversity, and the degradation of ecosystems. These negative consequences of tourism development result in many problems for the tourists and the indigenous people in the foreseeable future (Azam et al. 2018; Hoang et al. 2020).

A report published by UNEP titled “Infrastructure for climate action” has suggested governments introduce sustainable infrastructure as the prevailing one is responsible for causing 79% of all greenhouse gas emissions in struggling climate change, alleviation, and adaptation efforts. Sustainable infrastructure signifies that structures’ planning, construction, and functioning do not weaken the social, economic, and ecological systems (UNEP 2021; Krampe 2021). Sustainable infrastructure is the only solution that ensures societies, nature, and the environment flourish together. Therefore, Sustainable Ecotourism supports adapting pro-environment and nature-based climate change strategies that help resilient biodiversity and ecosystem to impact climate change. The proposed strategy is to focus on the conservation and restoration of ecosystems to combat climate hazards, fluctuating rainfalls, soil erosion, temperature variations, floods, and extreme wind storms (Niedziółka 2014; Setini 2021)

Pakistan’s tourism infrastructure suffered a colossal amount of damage during the earthquake of October 8, 2005, which left widespread demolition and destruction to its human, economic assets, and infrastructure networks, especially in Kashmir and Khyber Pakhtunkhwa’s tourism areas. The tourism-related infrastructure, including hotels, destination facilities of social service delivery and commerce, water channels, and communications networks, were either drained

or virtually destroyed. The destruction in the aftermath of the earthquake was further added by the war against terror in tourism-hit areas, resulting in the redundancy of tourists and tourism facilities for a long time (Akbar et al. 2017; Zakaria and Ahmed 2019). The tourism revival activities during the post-earth quack, post-terrorism scenario, and COVID-19 period called for various entrepreneurial activities, including the construction of infrastructure, hotels, road networks, community living, etc. Development and reconstruction of the livelihood and hospitality infrastructure through entrepreneurship were undertaken intensively through a public-private partnership from national and international findings (Qamar and Baloch 2017; Sadiq 2021; Dogar et al. 2021).

The revival and reinvigoration of infrastructure in tourism areas were backed up by extensive deforestation, use of local green land, rebuilding of the road network, displacement of biodiversity, and overtaxing the consumption of water and other natural resources. The deforestation, extensive use of green land, and over-consumption of water and other natural resources have depleted the tourism value of the area on the one hand and degraded the environment on the other. However, it was the focused rehabilitation activities of earthquake and Pakistan's Government's socio-environment conservation strategy of the Billion Trees plantation program in the province, including dominating tourism areas. The afforestation and loss of green tops are being reclaimed through these efforts, and the tourism environment is soon expected to regenerate (Qamar and Baloch 2017; Rauf et al. 2019; Siddiqui and Siddiqui 2019).

Government support and policy interventions

Tourism generates wide-ranging benefits for the economy, community, and people. Tourism contributes to the economy through revenue generation and shares responsibility with the Government to alleviate poverty alleviation, create opportunities for job placements, protect environments, and conserve natural ecosystems and biodiversity. It is assumed that if the tourism industry is left to its own, it will most likely prefer its business interests over environments or biodiversity. Governments, custodians of the life and well-being of their subjects, are directly responsible for providing a clean environment, nature, and Ecosystem. Therefore, national and local governments are responsible for preparing and implementing tourism development plans and enforcing values and standards for tourism development in conformity with the prerequisites of environmental sustainability. Through institutional governance, governments help tourism development by providing financial and budgetary support, regulatory framework, land, physical resources, infrastructure, etc. Provision and facilitation for Sustainability of Eco-tourism and conservation of environment and biodiversity

are dependent upon Government-supported interventions as follows:

- a. The regulatory framework for setting up tourism-related entrepreneurship and quality standards can support eco-tourism and prevent environmental degradation on any account.
- b. Provision of budgetary support for ecosystem conservation and regeneration of bio-diversity-related projects.
- c. Plan, rehabilitate if needed, promote conservation and protection of socio-cultural, historic, antique, and natural endowments in coordination with other public and private agencies, and deal with the defaulters, if any.
- d. Promoting and undertaking afforestation alongside land conservation and discouraging deforestation, soil erosion, accumulation of solid waste, littering, and any direct or indirect loss or threat to biodiversity.
- e. Setting restrictions for over-tourism beyond capacity and quality standards for transportation, restaurants, hotels, food and drinking water, etc.
- f. Placing enforcement mechanism necessary to ensure application of the regulatory framework and quality standards applicable along with all activities inclusive to the Ecotourism value chain.

Theoretical support and hypothesis development

According to the social disruption theory, rapidly expanding societies usually experience a period of widespread crisis and a loss of their conventional routines and attitudes. The crisis impacts people whose mental health, worldviews, behavioral patterns, and social networks may all be impacted (Çalışkan and Özer 2021). According to the social disruption theory, fast community change brought on by population growth will result in a variety of social issues that are signs of a generally disorganized community (Smith et al. 2001). Because some types of tourism communities experience rapid expansion accompanied by intensive development and rapid social change over a relatively short period of time, they seem to be great settings for studying various postulations of the social disruption theory.

Place change and social disruption theory are closely connected. According to this assumption, when a community undergoes fast expansion, it tends to experience a generalized crisis that might culminate in several social issues as changes spread throughout the community and among individuals (Rasoolimanesh et al. 2019). Place change can result from fundamental community restructuring due to economic development, new class divides, and migration of both long-term and temporary people (Nelson 2001). Social unrest, though, is not enduring. Instead, it is transitory; societies gradually adjust to these changes (Deery et al. 2012).

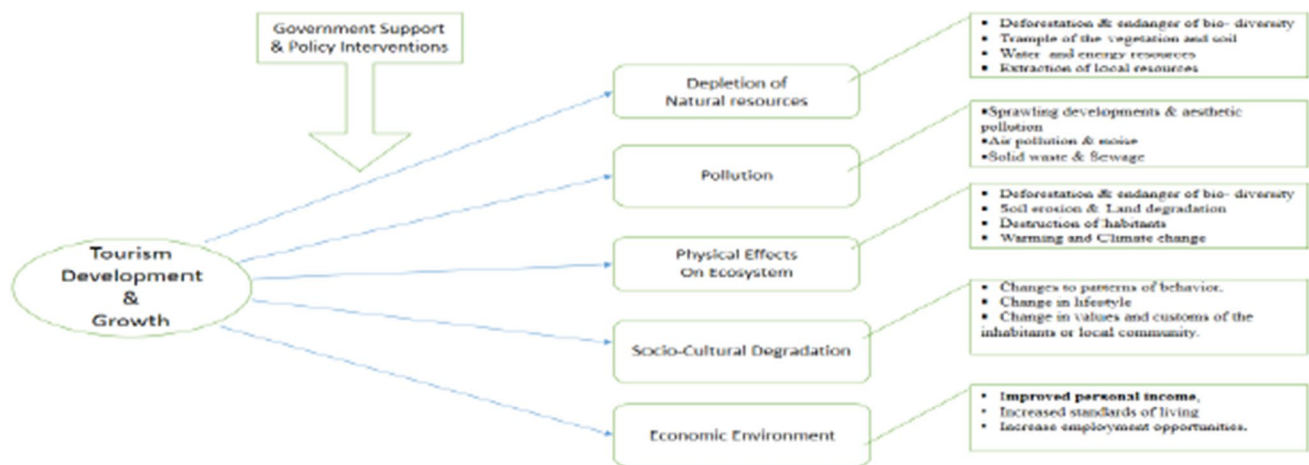


Fig. 1 Conceptual framework

The standard of living may initially deteriorate, but due to the adaptability of people and communities, they will gradually reinvigorate and strengthen themselves accordingly. Furthermore, the social disruption proposition reinforces one of the challenges in analyzing the effects of tourism, particularly in emerging nations, since it is sometimes difficult to distinguish between the effects of tourism and the overall ongoing development (Park and Stokowski 2009) (Fig. 1).

H1: Tourism development and growth significantly affect natural environment resources.

H2: Tourism development and growth significantly affect environmental pollution.

H3: Tourism development and growth significantly affect the physical ecosystem of the environment.

H4: Tourism development and growth significantly affect the socio-cultural environment.

H5: Tourism development and growth significantly affect the economic environment of people and the community.

H6: Government policy and support significantly moderate the relationship between tourism development and growth and the environmental factors.

Methodology

The study aimed to investigate the association of tourism development and its impact on environmental factors. Therefore, a survey method was employed to collect data by including all the relevant people in the locality. The study is based on stakeholders' opinions from Pakistan's most visited tourist areas, including Murree, Swat, Chitral, Naran, Kaghan, Neelum Valley, Malam Jabba, Ayubia, and Nathia Gali. A total of 650 stakeholders were contacted from the

Table 1 Sample configuration

Participants	Number
Civil administration members	10
Hotel managers—10 from each destination	100
Tourists operators—2 × each from each destination	20
Community representatives	20
Tourists—50 from each destination	500
Total sample size	650

Field survey—2021

Table 2 Instrument reliability

Variables	No. of items	α-reliability
Tourism Growth and Development	5	.93
Depletion of Natural Resource	3	.97
Pollution	3	.89
Physical Effects on Ecosystem	4	.91
Socio-Cultural Degradation	3	.95
Economic Environment	3	.88
Government Interventions and Support	5	.94

above-mentioned tourist destinations through survey. The distribution of the sample is mentioned in Table 1.

Using quantitative techniques, hierarchical linear regression analysis was employed to investigate the possible relationships between tourism growth and various dimensions of environmental sustainability. The results below reveal that tourism development translates into environmental deterioration, and the relationship between tourism and environmental sustainability is bidirectional.

Tourism growth and development were measured through a five-item scale. The environment was measured through

Table 3 Correlation matrix

	M	SD	1	2	3	4	5	6	7
Tourism growth and development	4.45	0.57	1						
Pollution	2.89	0.80	.20**	1					
Physical effects on ecosystem	2.89	0.81	.19**	.68**	1				
Depletion of natural resources	3.23	1.07	.24**	.76**	.76**	1			
Socio-cultural degradation	3.24	1.05	.18**	.75**	.75**	.66**	1		
Economic environment	4.19	0.58	.29**	.06	.05	.07	.06	1	
Government interventions and support	3.25	0.70	.13*	.58**	.41**	.56**	.67**	.20**	1

* $p < 0.05$; ** $p < 0.01$ **Table 4** Regression analysis for H1–H5

	Tourism growth and development	
	<i>B</i>	ΔR^2
Depletion of natural resources	0.20**	0.041
Pollution	0.19**	0.039
Physical effects on ecosystem	0.24**	0.060
Socio-cultural degradation	0.18**	0.036
Economic environment	0.29**	0.088

** $p < 0.01$

16 items combined scale with sub-dimensions; depletion of Natural Resources=3 items, Polluting Environment=3 items, Physical Effects on Ecosystem=4 items, Socio-Cultural Degradation=3 items, and Economic Environment=3-items. Similarly, our moderating variable, Government Interventions and Support, was measured using a 5-item scale. Table 2 below presents the details of the instruments.

Analysis and results

Data were analyzed using SPSS Version 26. It includes correlation, linear regression, and stepwise hierarchal regression analysis.

Table 3 above shows that our Tourism Growth and Development has significant and positive relationship with Polluting Environment ($r = 0.20^{**}$), Physical Effects on Ecosystem ($r = 0.19^{**}$), Depletion of Natural Resource ($r = 0.24^{**}$), Socio-Cultural Degradation ($r = 0.18^{**}$). However, Tourism Growth and Development has positive relationship with Economic Environment ($r = 0.29^{**}$) and Government Interventions and Support ($r = 0.13^{**}$).

Results of linear regression analysis at Table 4 above depict that tourism growth and development predicts 4.1% variance in Depletion of Natural Resources ($\beta = 0.20$, $p < 0.01$), 3.9% variance in pollution ($\beta = 0.19$, $p < 0.01$), 6% variance in Physical Effects on Ecosystem ($\beta = 0.24$, $p < 0.01$), 3.6% variance in Socio-Cultural Degradation ($\beta = 0.18$, $p < 0.01$), and 8.8% variance in Economic Environment ($\beta = 0.29$, $p < 0.01$).

The study analyzes the applied two-step hierarchal regression. In the first step, Tourism Growth and Government Interventions were treated as independent variables,

Table 5 Moderation analysis

Variables	Depletion of natural resources	Pollution	Physical effects on ecosystem	Socio-cultural degradation	Economic environment
Step 1					
Tourism and Growth	0.20**	0.19**	0.24**	0.18**	0.29**
Government Interventions	0.51**	0.49*	0.54*	0.43**	0.52*
R^2	0.63	0.34	0.49	0.44	0.25
Step 2					
Tourism and Growth \times Government Interventions	-0.07**	-0.12*	-0.23*	-0.13**	0.14*
R^2	0.64	0.43	0.57	0.49	0.42
ΔR^2	0.01	0.09	0.08	0.05	0.17

* $p < 0.05$; ** $p < 0.01$

and their significant impact was measured. In the second step, the interaction term Tourism and Growth \times Government Interventions was added, and its impact was measured. The results suggest that Government Interventions and Support moderate the relationship between Tourism Growth and the Environmental variables (Table 5).

Discussion

The study has reported unique findings regarding tourism and its environmental impacts. We found that tourism growth and development generate economic activity on the one hand. However, it has specific adverse environmental and socio-cultural outcomes on the other hand as well. Our study revealed that tourism growth and development predict a 4.1% variance in Depletion of Natural Resources ($\beta = 0.202^*$, $p < 0.01$). This suggests that due to the expansion of tourism in the country, natural resources are continuously depleted to meet the needs of tourists. Studies also supported our findings and suggested that revival and reinvigoration of infrastructure in tourism areas were backed up by extensive deforestation, use of local green land, rebuilding of the road network, displacement of biodiversity, and overtaxing the consumption of water and other natural resources (Qamar and Baloch 2017; Sadiq 2021; Dogar et al. 2021). The prior studies are consistent with our hypothesis that “tourism development and growth significantly affect natural environment resources.”

We further found that tourism growth and development predict a 3.9% variance in pollution ($\beta = 0.198^*$, $p < 0.01$), suggesting that tourism expansion may pollute the natural environment. Furthermore, recent national statistics depict that major human activities at local tourism destinations such as Kalam, Sawat, Muree, and Northern Areas have accumulated solid waste and sewage, resulting in polluted air and water. Further, research also suggests that the overflow of tourists to tourist destinations may adversely affect the environment due to human activities (Noordzij et al. 2020; Slater et al. 2020; Andlib and Salcedo-Castro 2021; Callaghan et al. 2021). Thus, it is safe to argue that the growth of tourism has a particularly detrimental effect on the environment. These findings also support our hypothesis, “Tourism development and growth significantly contribute to environmental pollution.”

The results reported that tourism growth and development predict a 6% variance in Physical Effects on the Ecosystem ($\beta = 0.245^*$, $p < 0.01$). Studies have reported that deforestation and alteration in species' natural environment for tourism facilities construction may adversely affect environmental health (Kuvan, 2010; Azam et al. 2018; Hoang et al. 2020; Andlib and Salcedo-Castro 2021). During post-terrorism and post-Covid-19 times in Pakistan, millions

of local tourists moved to popular tourist destinations that required new infrastructure to accommodate these tourists. Consequently, colossal deforestation and other detrimental human activities have negatively affected ecosystem. These findings also support our hypothesis that tourism development and growth significantly affect the physical ecosystem of the environment.

The study reported a total of 3.6% variance in socio-cultural degradation ($\beta = 0.189^*$, $p < 0.01$) due to tourism growth and development. These findings suggest that tourism's growth and development may lead the inhabitants to imitate the foreign tourists regarding their living standards, which may endanger their traditional culture. Thus, our hypothesis that “tourism development and growth significantly affect the socio-cultural environment” is confirmed.

Further, it was found that tourism growth and development predict an 8.8% variance in the economic environment ($\beta = 0.297^*$, $p < 0.01$). It is established from the literature that tourism growth and development generate economic activity in the country. Development projects such as the construction of infrastructure, hotels, and road networks generate economic activity to facilitate international and indigenous tourists, positively affecting the community's living standard (Baloch et al. 2020). Thus, our hypothesis, “tourism development and growth significantly affect economic environment of people and community,” is confirmed.

Due to tourism growth and development, our study reported a 1.8% variance in Government Support and Interventions ($\beta = .133^*$, $p < 0.01$). However, more recently, the Government of Pakistan has devised specific interventions that may help curb the adverse impacts of detrimental environmental factors. For example, developmental schemes such as the Billion Trees Plantation drive and Road-Infrastructure Network Development under the China-Pakistan Economic Corridor initiative may prove moderators to curb the negative impacts of tourism growth on the environment (Qamar and Baloch 2017; Rauf et al. 2019; Siddiqui and Siddiqui 2019). Therefore, the hypothesis, Government policy and support, significantly moderates the relationship between tourism development and growth with the environment is confirmed based on these findings.

Suggested model for ecotourism framework

Through its detailed review of existing literature, prevailing tourism policies, and empirical inputs from the stakeholders' perspectives, the study has identified a wide range of obstacles limiting the development and growth of ecotourism in Pakistan. The study suggests National Tourism Management authorities carefully invest in ecotourism destination's

planning and development in coordination with the environment development agency. The suggested model for ecotourism framework is initially meant for the tourism destinations specifically designated for ecotourism. However, selected points can also be extended to the quality management parameters set for the National Parks, Conservation and Protracted Areas, Museums, National or International event sites, etc. The national tourism authorities are to lay particular emphasis in their forthcoming National Tourism Policy on the development and promotion of Sustainable Ecotourism having, with focus on the following key areas:

- a. Identify and classify four to five ecotourism destinations, including ecotourism-centered activities of value chains for priority development, which are administratively possible within budgetary constraints. However, the development plan shall consider the integral benefits of other developmental schemes such as the Billion Trees Plantation drive, Road-Infrastructure Network Development under the China-Pakistan Economic Corridor initiative, International Union for Conservation of Nature (ICUN) programs in the area.
- b. While staying within the alignment of UN Millennium Development Goals (MDG) calling for ‘environmental sustainability’ and the development vision of each designated destination, the Tourists Management System shall take into cognizance of issues like managing capacity of the place, quality parameters for the conservation of the environment, and allowable activities thereof.
- c. Identify degenerated destinations of religious, socio-cultural, or historical significance for their rehabilitation under the Regenerated tourism program.
- d. Tourism Destinations that have been over-consumed and exhausted (e.g., Murree, Galiaat, Naran, Malam Jabba) because of over-tourism shall be planned for their reclamation through regenerated tourism. However, to facilitate the success of the regeneration of their tourism potential following is to be catered for:
 - i. To deflect the tourist pressure upon these destinations, the potential tourists from nearby cities and metropolitan areas be provided with nearby alternative destinations for leisure tourism as stay-tourism sites.
 - ii. To prevent the environment from air pollution, the traffic load on the destination be curtailed through an effective traffic management strategy, provision of off-destination parking for combustion engine vehicles, and encouraging electric driven or hybrid vehicles for nearby parking.
- e. Develop all-inclusive, comprehensive execution plans to expedite the investments for the sustainable ecotourism, encouraging public–private cooperation, community involvement, and infrastructure mapping guaranteeing environmental conservation and safeguards.
- f. Develop and place on the ground an all-inclusive program of capacity building for sustainable ecotourism, regenerative and green tourism services.
- g. Develop and launch Pakistan tourism profile and Sustaining Ecotourism obligatory framework “to promote tourism on the one hand and nurture conscious ecological behavior among the potential tourists of the area”.
- h. In order to fetch local ownership for the ecotourism center developments, all efforts shall be made to share the socio-economic benefits integral to the development scheme with the local population for community development.
- i. As part of the destination management planning, identify complementary value chains and livelihood activities that could be developed as part of the overall ecotourism destination package.
- j. Governments at all levels and the tourism Development and Promotion Agencies Network in Pakistan shall join hands to chalk out and, with a strict enforcement mechanism, a “Regulatory Framework for Ecotourism Friendly Destination” to sustain the efforts and policies undertaken in this regard on the one hand and generate responsible behavior from the tourism stakeholders on the other. Some of the suggestive points could be:
 - i. Setting new quality standards facilitating the promotion of ecotourism and environmental sustainability through acts of various bodies operating in the Ecotourism value chain, such as:
 - k. Revision of Private hotels Management Act (1976) and Tourists Operators Act (1976) alongside introduction and promulgation of a new “Tourism Destination Management Act” incorporating new quality standards as of today.
 - l. Promulgating laws to make all new construction/development projects responsible from any agency in the area, incorporating quality standards needed for environmental sustainability, and promoting ecotourism.
- iii. Provision of clean drinking water through public infiltration plants, public toilets, solid waste carriers, and recycling of sewage and used water is recommended in the most visited areas of the destination.
- iv. Signposting at appropriate places, giving social messages encouraging to maintain cleanliness, avoid littering, ensure nature conservation, and humility toward biodiversity.

- m. Set measures for the preservation of the local biodiversity and preservation of endangered species, including seeking support from internationally active environment conservation agencies, declaring local hunting illegal, introducing licensing programs for hunting of certain selected animals/ birds on the payment of a handsome amount to be used for the welfare of the local community.
- n. Create awareness programs against deforestation, land conservation, and biodiversity, and maintain cleanliness, inculcating a culture of respecting and enjoying nature instead of spoiling it.

Conclusion, implications, and limitations of the study

Conclusion

The study premise was based on the contention that sustenance of ecotourism focuses on the economic viability of the business interests alongside the conservation and preservation of natural ecosystems, including ethical fairness to the socio-cultural environment of the host community. Ecotourism is a phenomenon that contributes to environmental sustainability through well-planned and careful destination management capable of balancing conflicting interests of business growth and environmental sustainability. Tourism-environment paradox suggests that the sustainability and survival of both are dependent upon the flourishing mode of each other. Quality of environment and sustainability of bio-ecosystem stimulates tourists' arrivals and over-tourism beyond capacity with irresponsible behavior from tourists negatively influencing the environment and harming the ecosystem of nature. Ecotourism is not inevitably sustainable unless it is economically sustainable and environmentally maintainable besides being socio-culturally acceptable. Socio-culturally intolerable ecotourism means the activity which does not benefit locals and their socio-cultural values. Hence, the study concludes that ecotourism has to positively interplay between economy, environment, and culture without compromising one over others. The pursuit of sustainable ecotourism is not an end in meeting the little comforts of the business interests but rather a means to end the sustainability issues created due to ill-conceived tourism development and unmanageable growth.

Practical implications

Drawing from the findings and conclusions of the research, the study extends the following practical implications for effectively managing the process of tourism development

and environmental sustainability in line with the dictates of the philosophy behind ecotourism:

- a. Paradoxically tourism necessitates ecological capitals as primary ingredients for the creation of tourism experiences on the one hand. However, it is also contingent upon the conservation and preservation of ecological integrity on the other. The study suggests that unbalancing this "resource paradox" results in the harshness and tenacity of adversarial climate change, natural calamities, environmental pollution, and endangered biodiversity.
- b. The research findings and the suggested framework for ecotourism imply that sustainable ecotourism principles-based planning is mandatory for destination management to assure effective trade-off between the business interests' sustainability of the environmental ecosystem.
- c. Tourism development and growth shall be steered through ecotourism principles as its sustainable model offers enduring social, environmental and economic, ecological integrity, and social and cultural benefits for the local community. Therefore, ecotourism is a recipe for preventing environmental degradation and guarantees sustainability of ecosystems nature and its biodiversity. Hence, ecotourism shall stand central priority focus for strategic management to nurture quality experiences from sustainable tourism.
- d. To revive back the sustainability of the environment, in the areas where over-tourism has degraded the environment, schemes for regenerated tourism shall be immediately launched to mitigate the negative footprints on the sustainability of destinations, including reinforcing protracted conservation sites, biodiversity, and recouping endangered species, afforestation drives, recycling of water and solid waste, refurbishing of landscaping, preservation, and rehabilitation of cultural heritage and refurbishing of depleted infrastructure accordingly. Furthermore, to regenerate and sustain the tourism infrastructure of the destinations experiencing over-tourism, capacity building measures like capacity, recycling of water and solid waste, preventive measures to control air and water pollution, traffic control management, and spread of entertainment facilities shall be the focus of the regeneration plans.
- e. The study implies that government authorities and policymakers have a special role in placing their moderating intervention in terms of policy guidelines, regulatory framework, and budgetary support, provision of inter-organizational synergy in planning and implementation of ecotourism strategies, protection of environmental resource base and conservation of natural and biological ecosystem, sustenance of socio-cultural value of local

community over and above their economic and social well-being/quality life for the long run.

- f. The study also implies that public and private policy-makers lay down threshold criteria for responsible travel and tourism standards for destination management and its related supply chain. The laid criterion would facilitate management in nurturing “responsible behavior” to plan, protect, conserve, preserve, and sustain natural and cultural resources and responsible socio-economic development without compromising the sustainability of the environment and long-term well-being of the host community. The deep-seated adherence to social responsibility protocols by the tourism supply chain network can significantly increase the capacity of tourism destinations and improve the conscious awareness of green consumers along the tourism supply chain. Furthermore, the consciously responsible behavior among stakeholders and legislatures can strike a needed balance between the business interests and environments in favor of sustainability of socio-cultural, economic, and natural capital.
- g. The study elucidates that responsible behavior necessitates purpose-built eco-friendly infrastructure and policy parameters to support the sustainability of environments across destinations. The strategic planning aligned with the sustainability-focused objectives dictates the need for artistic, innovative, and talented people and quality intuitions in harnessing quality tourism services and responsible tourism behavior. Furthermore, the study encourages community involvement in the developmental process, enactment of structural policies, preservation of socio-cultural heritage, and conservation of natural biodiversity as it would foster emotional bond-age between the people of the host community and the tourism undertakings. Therefore, community and value chain managers shall collaborate to maximize the perceived benefits of responsible tourism while developing cultural exchanges and planning opportunities for leisure and tourism.
- h. Regulatory measures help offset negative impacts; for instance, controls on the number of tourist activities and movement of visitors within protected areas can limit impacts on the ecosystem and help maintain the integrity and vitality of the site. Limits should be established after an in-depth analysis of the maximum sustainable visitor capacity. Furthermore, the variables and the constructs researched can be replicated to other destinations to seek valuable inputs for sustainable destination management elsewhere.

Study limitation

Besides the functional, practical applications, the study has some limitations. Besides having integral disadvantages of cross-sectional research, the respondents selected for the study were visitors on peak days with the highest tourist arrivals, thereby having experiences of a higher degree of environmental pollution and natural disorder. Furthermore, the research is limited to stakeholders’ perspectives instead of any scientifically generated data or mathematical or econometric model.

Author contribution QBB: conceptualization, methodology, writing—original draft. SNS: data curation and supervision. NI: visualization, editing, proofreading. MS: review and editing. MA: review and editing. SM: editing, data curation. AUK: review and editing.

Data availability The data that support the findings of this study are openly available on request.

Declarations

Ethics approval and consent to participate The authors have no relevant financial or non-financial interests to disclose. We also declare that we do not have human participants, data, or tissue.

Consent for publication We do not have any person’s data in any form.

Competing interests The authors declare no competing interests.

References

- Abir T, Khan MYH (2022) Importance of ICT advancement and culture of adaptation in the tourism and hospitality industry for developing countries. In: ICT as innovator between tourism and culture. IGI Global, pp 30–41
- Adebayo TS, Kirikkaleli D (2021) Impact of renewable energy consumption, globalization, and technological innovation on environmental degradation in Japan: application of wavelet tools. *Environ Dev Sustain* 23(11):16057–16082
- Akbar J, Tanveer S, Khan MN, Naeem A (2017) Role of facilities available and un-available in attracting of tourist in Swat Valley Pakistan. *J Landsc Ecol* 10(1):5–19
- Albrich K, Rammer W, Seidl R (2020) Climate change causes critical transitions and irreversible alterations of mountain forests. *Glob Change Biol* 26(7):4013–4027
- Andlib Z, Salcedo-Castro J (2021) The impacts of tourism and governance on CO2 emissions in selected south Asian countries. *ETIKONOMI* 20(2):385–396
- Arifin M, Ibrahim A, Nur M (2019) Integration of supply chain management and tourism: an empirical study from the hotel industry of Indonesia. *Manage Sci Lett* 9(2):261–270
- Aslam AM (2020) Intertemporal relationship between tourism demand and environmental quality in Sri Lanka. *Test Eng Manage* 82(January-February):17841–17856
- Aslan A, Altinoz B, Özsolak B (2021) The nexus between economic growth, tourism development, energy consumption, and CO 2

- emissions in Mediterranean countries. *Environ Sci Pollut Res* 28(3):3243–3252
- Azam M, Alam MM, Hafeez MH (2018) Effect of tourism on environmental pollution: further evidence from Malaysia, Singapore and Thailand. *J Clean Prod* 190:330–338
- Bakhriddinova AN, Qizi KDR (2020) Tourism logistics: relationship between tourism and logistics. *Academy* 7(58):22–23
- Baloch QB (2007) Managing tourism in Pakistan: a case study of Chitral valley. *J Manag Sci* 2(2):169–190
- Baloch QB, Rehman A (2015) Regional integration of Pakistan tourism: exploring prospects. *Abasyn Univ J Soc Sci* 8(2):405–415
- Baloch QB, Irshad M, Qamar FM, Naseebullahshah S (2020) Development of tourism's sector in the face of scarce economy. *The Discourse* 6(1):75–96
- Blangy S, Wood ME (1993) Developing and implementing ecotourism guidelines for wildlands and neighboring communities. *Ecotourism Society*, pp 32–54
- Boers B, Cottrell S (2007) Sustainable tourism infrastructure planning: a GIS-supported approach. *Tour Geogr* 9(1):1–21
- Bramwell B, Lane B (1999) Sustainable tourism: contributing to the debates. *J Sustain Tour* 7(1):1–5
- Briassoulis H, Van Der Straaten J (eds) (2013) *Tourism and the environment: regional, economic, cultural and policy issues*, vol 6. Springer Science & Business Media
- Butowski L (2021) Sustainable tourism: a human-centered approach. *Sustainability* 13(4):1835
- Callaghan A, McCombe G, Harrold A, McMeel C, Mills G, Moore-Cherry N, Cullen W (2021) The impact of green spaces on mental health in urban settings: a scoping review. *J Ment Health* 30(2):179–193
- Çalışkan U, Özer Ö (2021) Relationship between local residents' perceptions of tourism and support attitudes in post-communist countries: case of Turkestan (Kazakhstan). *Tour Plan Dev* 18(5):573–593
- Cheia G (2013) Ecotourism: Definition and concepts. *Revista De Turism-Studii Si Cercetari in Turism* 15:56–60
- Chien F, Ajaz T, Andlib Z, Chau KY, Ahmad P, Sharif A (2021a) The role of technology innovation, renewable energy and globalization in reducing environmental degradation in Pakistan: a step towards sustainable environment. *Renew Energy* 177:308–317
- Chien F, Sadiq M, Nawaz MA, Hussain MS, Tran TD, Le Thanh T (2021b) A step toward reducing air pollution in top Asian economies: the role of green energy, eco-innovation, and environmental taxes. *J Environ Manag* 297:113420
- Chingarande A, Saayman A (2018) Critical success factors for tourism-led growth. *Int J Tour Res* 20(6):800–818
- Chishti MZ, Ullah S, Ozturk I, Usman A (2020) Examining the asymmetric effects of globalization and tourism on pollution emissions in South Asia. *Environ Sci Pollut Res* 27(22):27721–27737
- Cobbinah PB (2015) Contextualizing the meaning of ecotourism. *Tour Manag Perspect* 16:179–189
- Confente I, Scarpi D (2021) Achieving environmentally responsible behavior for tourists and residents: a norm activation theory perspective. *J Travel Res* 60(6):1196–1212
- de Grosbois D, Fennell DA (2021) Sustainability and ecotourism principles adoption by leading ecolodges: learning from best practices. *Tour Recreat Res*. <https://doi.org/10.1080/02508281.2021.1875170>
- Deery M, Jago L, Fredline L (2012) Rethinking social impacts of tourism research: a new research agenda. *Tour Manag* 33(1):64–73
- Dogar AA, Shah I, Elahi N (2021) Sports tourism in post conflict peace building: evidence from Swat, Pakistan. *J Contemp Issues Bus Government* 27(1):480–489
- Desai BH (2016) 14. United Nations Environment Programme (UNEP). *Yearbook Int Environ Law* 27:481–488
- Ding ZF, Cao B (2019) Exploring the factors in visitors' behavioral intentions—mediation effects on perceived environmental involvement and ecotourism support. *Appl Ecol Environ Res* 17(1):1083–1092
- Ekins P, Gupta J (2019) Perspective: a healthy planet for healthy people. *Global Sustainability* 2(e20):1–9. <https://doi.org/10.1017/sus.2019.17>
- Fennell DA (2001) A content analysis of ecotourism definitions. *Curr Issue Tour* 4(5):403–421
- Fennell DA (2020) *Ecotourism*. Routledge
- Guzel AE, Okumus İ (2020) Revisiting the pollution haven hypothesis in ASEAN-5 countries: new insights from panel data analysis. *Environ Sci Pollut Res* 27(15):18157–18167
- Hassan A, Kennell J, Chaperon S (2020) Rhetoric and reality in Bangladesh: elite stakeholder perceptions of the implementation of tourism policy. *Tour Recreat Res* 45(3):307–322
- Harris R, Williams P, Griffin T (2012) *Sustainable tourism*. Routledge, Oxford
- Hill J, Gough G (2009) Can the conservation attitudes and behavioural intentions of tourists to tropical forest be improved through biodiversity interpretation? A case study from Australia. *Principles and practice, ecotourism and environmental sustainability*, pp 175–196
- Hoang TTH, Van Rompaey A, Meyfroidt P, Govers G, Vu KC, Nguyen AT et al (2020) Impact of tourism development on the local livelihoods and land cover change in the northern Vietnamese highlands. *Environ Dev Sustain* 22(2):1371–1395
- Holden A (2008) *Tourism and the environment*, 2nd edn. Routledge, New York
- Khoi NH, Le NH, Ngoc BH (2021) The effect of tourism development on the ecological footprint in Singapore: evidence from asymmetric ARDL method. *Curr Issue Tour* 25(15):2500–2517
- Kostić M, Miličević S, Nedeljković I (2016) Research of tourists' perception of the relationship between tourism and environment. *Вестник апк Ставрополя* S4:32–35
- Krampe F (2021) Ownership and inequalities: exploring UNEP's environmental cooperation for Peacebuilding program. *Sustain Sci* 16(4):1159–1172
- Kuvan Y (2010) Mass tourism development and deforestation in Turkey. *Anatolia* 21(1):155–168
- Liang Y, Wang L, Zhu Y (2018) Using environmental sensitivity for discussing the correlation between ecotourism cognition and environmental attitude. *Ekoloji* 27(106):1653–1659
- Mandić A, Mrnjavac Ž, Kordić L (2018) Tourism infrastructure, recreational facilities and tourism development. *Tour Hosp Manag* 24(1):41–62
- Marengo JA, Cunha AP, Cuartas LA, Deusdará Leal KR, Broedel E, Seluchi ME, Bender F (2021) Extreme drought in the Brazilian Pantanal in 2019–2020: characterization, causes, and impacts. *Frontiers in Water* 3:639204
- Mikayilov JI, Mukhtarov S, Mammadov J, Azizov M (2019) Re-evaluating the environmental impacts of tourism: does EKC exist? *Environ Sci Pollut Res* 26(19):19389–19402
- Nelson CA (2001) The development and neural bases of face recognition. *Infant and Child Development: An International Journal of Research and Practice* 10(1–2):3–18
- Niedziółka I (2014) Sustainable tourism development. *Reg Form Dev Stud* 8(3):157–166
- Noordzij JM, Beenackers MA, Groeniger JO, Van Lenthe FJ (2020) Effect of changes in green spaces on mental health in older adults: a fixed effects analysis. *J Epidemiol Community Health* 74(1):48–56
- Park M, Stokowski PA (2009) Social disruption theory and crime in rural communities: comparisons across three levels of tourism growth. *Tour Manag* 30(6):905–915

- Opoku A (2019) Biodiversity and the built environment: implications for the Sustainable Development Goals (SDGs). *Resour Conserv Recycl* 141:1–7
- Pförr C (2001) Concepts of sustainable development, sustainable tourism, and ecotourism: definitions, principles, and linkages. *Scand J Hosp Tour* 1(1):68–71
- Pulido-Fernández JJ, Cárdenas-García PJ, Espinosa-Pulido JA (2019) Does environmental sustainability contribute to tourism growth? An analysis at the country level. *J Clean Prod* 213:309–319
- Qamar F, Baloch QB (2017) Reviving tourism through entrepreneurial capabilities in swat, Dir & Chitral Triangle in post operation environment. *Journal of Managerial Sciences* 11(2):209–228
- Rasoolimanesh SM, Md Noor S, Schubert F, Jaafar M (2019) Investigating the effects of tourist engagement on satisfaction and loyalty. *Serv Ind J* 39(7–8):559–574
- Ratnasari SL, Susanti EN, Ismanto W, Tanjung R, Darma DC, Sutjahjo G (2020) An experience of tourism development: how is the strategy? *J Environ Manag Tour* 11(7):1877–1886
- Rauf T, Khan N, Shah SJ, Zada M, Malik SY, Yukun C, Sadique A (2019) Poverty and prosperity: impact on livelihood assets of billion trees afforestation program in Khyber Pakhtunkhwa (KPK), Pakistan. *Forests* 10(10):916
- Raza SA, Jawaid ST (2013) Terrorism and tourism: a conjunction and ramification in Pakistan. *Econ Model* 33:65–70
- Sadiq N (2021) COVID-19, adaptive capacity and tourism governance: the case of Pakistan's tourism industry. In: *Pandemics and travel*. Emerald Publishing Limited, pp 49–66
- Scharlemann JP, Brock RC, Balfour N, Brown C, Burgess ND, Guth MK, Kapos V (2020) Towards understanding interactions between sustainable development goals: the role of environment–human linkages. *Sustain Sci* 15(6):1573–1584
- Setini M, Wardana I, Sukaatmadja I, Ekawati N, Yasa N, Astawa I (2021) Policy models for improving ecotourism performance to build quality tourism experience and sustainable tourism. *Manage Sci Lett* 11(2):595–608
- Shaheen K, Zaman K, Batool R, Khurshid MA, Aamir A, Shoukry AM, Gani S (2019) Dynamic linkages between tourism, energy, environment, and economic growth: evidence from top 10 tourism-induced countries. *Environ Sci Pollut Res* 26(30):31273–31283
- Siddiqui F, Siddiqui DA (2019) Causality between tourism and foreign direct investment: an empirical evidence from Pakistan. *Asian J Econ Mod* 7(1):27–44
- Simo-Kengne BD (2022) Tourism growth and environmental sustainability: trade-off or convergence? *Environ Dev Sustain* 24(6):8115–8144
- Slater SJ, Christiana RW, Gustat AJ (2020) Recommendations for keeping parks and green space accessible for mental and physical health during COVID-19 and other pandemics. *Prev Chronic Dis* 17:200204. <https://doi.org/10.5888/pcd17.200204>
- Smith MD, Krannich RS, Hunter LM (2001) Growth, decline, stability, and disruption: a longitudinal analysis of social well-being in four western rural communities. *Rural Sociol* 66(3):425–450
- Song H, Li G, Witt SF, Fei B (2010) Tourism demand modelling and forecasting: how should demand be measured? *Tour Econ* 16(1):63–81
- Stefănică M, Butnaru GI (2015) Research on tourists' perception of the relationship between tourism and environment. *Procedia Econ Finance* 20:595–600
- Sun Y, Yesilada F, Andlib Z, Ajaz T (2021) The role of eco-innovation and globalization towards carbon neutrality in the USA. *J Environ Manag* 299:113568
- Sunchindah A (2015) Transboundary haze pollution problem in Southeast Asia: reframing ASEAN's response working papers DP-2015-82, economic research institute for ASEAN and East Asia (ERIA)
- Swain RB (2018) A critical analysis of the sustainable development goals. *Handbook of sustainability science and research*. Springer, Cham, pp 341–355
- Szpilko D (2017) Tourism supply chain—overview of selected literature. *Procedia Eng* 182:687–693
- Tiwari AK, Nasreen S, Iqbal Z (2021) Nexus between tourism and environmental pollution in South Asia: a comparative analysis using time-varying and non-parametric techniques. *Curr Issue Tour* 24(21):2996–3020
- UNEP (2021) New report reveals how infrastructure defines our climate. October, 12
- Zakaria M, Jun W, Ahmed H (2019) Effect of terrorism on economic growth in Pakistan: an empirical analysis. *Econ Res-Ekonomska Istraživanja* 32(1):1794–1812
- Zakaria M, Jun W, Ahmed H (2019) Effect of terrorism on economic growth in Pakistan: an empirical analysis. *Economic Research-Ekonomska istraživanja* 32(1):1794–1812
- Zhang L, Gao J (2016) Exploring the effects of international tourism on China's economic growth, energy consumption and environmental pollution: evidence from a regional panel analysis. *Renew Sustain Energy Rev* 53:225–234
- Zhang N, Ren R, Zhang Q, Zhang T (2020) Air pollution and tourism development: an interplay. *Ann Tour Res* 85:103032
- Zhu L, Ives AR, Zhang C, Guo Y, Radeloff VC (2019) Climate change causes functionally colder winters for snow cover-dependent organisms. *Nat Clim Chang* 9(11):886–893

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