

TOURISM DEVELOPMENT AND SUSTAINABILITY: SOCIO-ECONOMIC AND ENVIRONMENTAL IMPACTS IN COX'S BAZAR, BANGLADESH

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Abstract: This study explores the socio-economic and environmental impacts of tourism in Cox's Bazar. One of the most popular tourist destinations with a focus on sustainable development perspectives in Bangladesh. The aim is to assess the complex interplay between socio-economic outcomes, environmental challenges, and tourism growth while exploring the potential for sustainable tourism practices through sustainable tourism development (STD) model and community-based tourism (CBT) model. A mixed-method approach was used, utilizing stakeholder interviews and thematic analysis. This methodology identified four key themes such as environmental degradation, social division, cultural destruction, and eco-tourism awareness. It provides a comprehensive view of the challenges and opportunities associated with tourism in the region. The findings reveal that tourism has significantly contributed to economic growth and cultural preservation. However, it has also resulted in several challenges related to eco-tourism awareness, such as pollution, habitat loss, rising social inequality and commodification of local culture. While tourism has driven development, these negative outcomes have raised concerns about its long-term sustainability. The research emphasizes the importance of adopting the STD model that balances economic needs with social, and environmental sustainability. Additionally, the CBT model is proposed to empower local communities, ensuring their active participation in tourism management while preserving their environmental and cultural heritage for eco-tourism. The study provides actionable recommendations for policymakers to ensure that tourism contributes to long-term economic resilience, environmental sustainability and social equity in Cox's Bazar. These encompass policies promoting sustainable tourism, local engagement, environmental safeguards, and economic diversification to reduce dependency on tourism. Furthermore, the adoption of STD model and CBT model can guide future tourism practices, ensuring inclusivity and environmental responsibility in the region.

Keywords: environmental impacts, cultural preservation, community-based tourism, sustainable tourism, cox's bazar

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INTRODUCTION

Tourism in Cox's Bazar has evolved from a small-scale industry into a significant economic driver of Bangladesh. This coastal town, renowned for its natural beauty and as the home of the world longest sandy beach. It has become a central hub for domestic and international tourism (Abdul, 2021; Kuri et al., 2024; Ahmed, 2025). The rapid growth of tourism has led to both positive and negative consequences for the local community and ecosystem. To address these complexities, a focus on sustainable tourism development is essential (Gomes & Blake, 2020; Ou, 2025). Tourism has brought substantial economic growth, including foreign exchange, employment opportunities and infrastructure development (Rahman, 2010; Hossain et al., 2016; Telfer & Sharpley, 2016). In such frameworks, tourism is commonly associated to improved living standards and economic independence (Telfer & Sharpley, 2016; Kuri et al., 2024). However, the increase in tourist numbers has also generated significant traditional cultures, socio-economic and environmental challenges such as inflation and over-reliance on a single industry (Udegbumam, 2020; Kuri et al., 2024). These issues are making sustainable tourism practices a pressing necessity particularly in developing countries like Cox's Bazar within Bangladesh (Ahmed, 2025; Ou, 2025).

While tourism can serve as a catalyst for economic growth, particularly by improving living standards and contributing to economic independence (Telfer & Sharpley, 2016; Kuri et al., 2024), its rapid development often comes with unintended consequences. These include the destruction of traditional cultures, environmental degradation, and challenges such as inflation and an over-reliance on a single industry (Udegbumam, 2020). In Cox's Bazar, tourism development has been largely unregulated, leading to severe environmental concerns like beach erosion, habitat loss, and marine pollution, alongside growing socio-economic inequalities (Ahmed, 2025; Ou, 2025). Globally, tourism economic contribution is undeniable with the World Travel and Tourism Council (WTTC) reported that tourism grew at

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an average annual rate of 4.4% from 2009 to 2018, contributing 10.5% to global GDP and supporting 297 million jobs (Amin et al., 2025; Comerio & Strozzi, 2019). Tourism plays a vital role on driving economic activity in Bangladesh (Sadekin, 2025; Telfer & Sharpley, 2016). However, the development of tourism in Cox's Bazar, particularly since in the 1960s, has resulted in a proliferation of hotels, motels, guesthouses, and others tourist facilities (Hasan, 2014).

This growth has not only created economic opportunities but also exacerbated socio-cultural tensions, raised land values, as well as environmental degradation due to overdevelopment (Ebeler et al., 2025; Khater et al., 2024; Christaller, 1963). Although tourism has generated new economic opportunities in Cox's Bazar, including job creation and improved infrastructure, it has also led to negative outcomes such as inflation, higher land values, and increased job seasonality (Zaei & Zaei, 2013; Carrillo-Hidalgo & Pulido-Fernández, 2019). Cultural impacts have included the destruction of traditional lifestyles and social issue over the distribution of tourism benefits. Furthermore, the environmental consequences are severe, with issues such as beach erosion, habitat loss, and marine pollution (Rahman, 2010; Giuliatti et al., 2018; Kalam & Hossen, 2018).

The need for a sustainable tourism model that balances economic growth with environmental protection and cultural preservation is critical. Sustainable tourism seeks to long term-term benefits for local communities while preserving the natural environment and maintaining cultural integrity (Ijatuyi et al., 2025; Partanen et al., 2023; Rahman, 2010). The concept emphasizes sustainability, particularly focusing on how tourism can be made sustainable despite its challenges. The significance of involving local communities in decision-making processes and ensuring that tourism development is inclusive and equitable. Tourism income increased by incorporating local labor and capital, eco-tourism has shown potential in creating a sustainable model that benefits both economy and environment (Ijatuyi et al., 2025; Carrillo-Hidalgo & Pulido-Fernández, 2019). This study aims to critically assess the socio-economic, cultural, and environmental impacts of tourism in Cox's Bazar. However, it provides actionable recommendations for fostering sustainable tourism practices through the Sustainable Tourism Development (STD) model and Community-Based Tourism (CBT) approaches.

LITERATURE REVIEW

The tourism development is recognized globally for its significant socio-economic, cultural, and environmental impacts on host communities. It is widely seen as a key driver of economic growth, particularly in coastal areas like Cox's Bazar, where its rapid development has brought both benefits and challenges. The literature highlights the complex relationship between tourism ability to drive economic growth and its negative effects on local communities and ecosystem (Telfer & Sharpley, 2016; Patwary et al., 2019; Rubio-Cisneros et al., 2022).

Socio-Economic Impacts of Tourism

Tourism industry significantly contributes to household incomes, particularly in sectors such as hospitality, transportation, and retail in Cox's Bazar (Gomes & Blake, 2020; Karim & Mimura, 2008; Talukder & Khan, 2024). However, the economic benefits of tourism are frequently unequally distributed, with large businesses and external investors reaping more benefits than local residents (Telfer & Sharpley, 2016; Patwary et al., 2019). Additionally, tourism can lead to inflation and higher costs for essential goods and services, especially during peak seasons, making it difficult for the local population to afford basic necessities (Haque, 2016; Comerio & Strozzi, 2019). While tourism has stimulated infrastructural improvements in Cox's Bazar, such as road development and better healthcare facilities. These improvements often come at the expense of local culture and traditions (Amarasinghe et al., 2025; Patwary et al., 2019). The commercialization of local traditions and the alteration of lifestyles to cater to tourist expectations can lead to cultural dilution, threatening the uniqueness of the local culture (Rahman, 2010; Khoa et al., 2025; Ningrum & Abdullah, 2025).

Environmental Impacts of Tourism

Cox's Bazar's fragile ecosystems are particularly vulnerable to the environmental impacts of tourism. The influx of tourism activity has been linked to increased pollution, particularly plastic waste, water contamination, as well as significant environmental degradation, including beach erosion, habitat loss, and marine pollution (Rahman, 2014; Hossain et al., 2016; Kalam & Hossen, 2018). The exploitation of natural resources, such as freshwater and forest areas, has intensified as tourism continues to expand (Rahman, 2014; Hossain et al., 2016). Although some studies suggest that eco-tourism could mitigate these impacts by raising environmental awareness among both tourists and local communities (Talukder & Hoque, 2025; Liu et al., 2017). However, the lack of a proper eco-tourism framework in Cox's Bazar limits the region's ability to capitalize on this potential. To address these issues, sustainable policies and strategies must be implemented to balance tourism's economic benefits and the preservation of the local environment conservation (Zaei & Zaei, 2013; Telfer & Sharpley, 2016; Patwary et al., 2019). Eco-tourism has been identified as a promising alternative to mass tourism, emphasizing conservation and sustainable practices (Talukder & Hoque, 2025; Karataş et al., 2025). However, the lack of regulatory enforcement and infrastructure for eco-tourism in Cox's Bazar limits its impact.

Socio-Cultural Impacts

The socio-cultural impacts of tourism are also significant development in Cox's Bazar. The expansion of tourism has led to cultural commodification, with local traditions being altered to meet tourist expectations (Patwary et al., 2019; Amarasinghe et al., 2025; Khoa et al., 2025). This process of commercialization cultural practices diminishes their value to the residents and highlights the authenticity of the lack culture (Ma et al., 2025). Furthermore, the benefits of tourism are not always equitably shared, leading in social inequality and increasing tensions within the community.

Sustainable Tourism and the Role of Policy

To address the challenges posed by tourism, many scholars have proposed various sustainable tourism frameworks, such

as the STD model. Which seeks to balance economic growth with environmental and cultural preservation. The STD model offers a potential framework for addressing the socio-economic and environmental challenges posed by mass tourism. This model aims to balance economic, social and environmental dimensions by promoting responsible resource use and involving local communities in decision-making (Hutnaleontina et al., 2022; Thananusak & Suriyankietkaew, 2023). Additionally, the community-based tourism (CBT) model has also been identified as a promising model particularly the Caribbean and Southeast Asia (Bisht et al., 2025; Sharma et al., 2023). The importance of local engagement and equitable benefit-sharing is essential for long-term sustainability (Mason et al., 2022; Amoiradis et al., 2023). Aligning tourism practices with global sustainability initiatives, such as the United Nations' Sustainable Development Goals (SDGs), is essential for ensuring that tourism contributes positively to both human and environmental well-being (Wani et al., 2024; Alramamneh et al., 2025; Vargová & Matušíková, 2025). The promotion of sustainable practices across all sectors of tourism like destination management, accommodations, and transport can help reduce negative impacts while enhancing the quality of the destination (Mason et al., 2022; Amoiradis et al., 2023). Although, the growing body of literature on sustainable tourism in coastal regions, there is a need for further research to explore the effectiveness of eco-tourism and CBT in mitigating the socio-economic and environmental challenges of tourism (Manojlović et al., 2025). Studies on tourism governance, particularly on how policies can promote sustainable tourism while ensuring that the benefits are shared equitably among local communities, are essential for ensuring the long-term viability of tourism in Cox's Bazar (Bhuiyan et al., 2020).

MATERIAL AND METHODS

This study employs a mixed-methods approach to examine the impacts of tourism on the local community of Cox's Bazar. The integration of both quantitative and qualitative methods enhances the robustness of the findings, providing a comprehensive understanding of tourism's complex effects on the region.

Quantitative Data Collection

Quantitative data were gathered through structured surveys with 200 residents of Cox's Bazar, selected using stratified random sampling. This sampling method ensures adequate representation from both the tourism and non-tourism sectors. Specifically, the sample was divided into two strata: residents involved in tourism-related businesses (such as hospitality, transportation, retail), and those not directly involved in tourism.

Each stratum proportionately sampled based on its population share in the study area. The survey instrument used Likert-scale items to assess economic, social, and environmental impacts of tourism, to capturing the residents' perspectives on various aspects of tourism development. To ensure the validity and reliability of the instrument, a pre-test was conducted with a small sample of residents to refine the questions.

Qualitative Data Collection

Qualitative data were collected through 15 semi-structured interviews with key stakeholders, including government officials, NGO representatives, and local business owners. These participants were purposively selected for their expertise and involvement in the tourism industry in Cox's Bazar. The interviews explored participants' insights into the nuanced effects of tourism, focusing on topics such as cultural preservation, social equity, environmental sustainability, and the role of policy in managing tourism impacts. The interview protocol included open-ended questions designed to allow for in-depth discussions while maintaining consistency across interviews.

Data Analysis

Quantitative data were analyzed using MS Excel and SPSS (Statistical Package for the Social Sciences). Descriptive statistics, including means and standard deviations, were used to summarize the responses, while inferential statistics, such as frequency analysis, were applied to test for significant differences between tourism and non-tourism sectors. Additionally, qualitative data were analyzed using thematic analysis with Python. Thematic coding was performed to identify recurring themes related to the socio-economic and environmental impacts of tourism. Matplotlib integrates with Pandas and NumPy, were employed to assist with data management and coding in Python. This analysis was then linked to broader theoretical frameworks on sustainable tourism to contextualize the findings within the existing literature.

Geospatial Analysis

Base maps of the study area were obtained from Cox's Bazar Municipality and digitized using ArcGIS 10.8v software. These maps were used to provide spatial context for the study, with a focus on the geographical distribution of tourism-related businesses. The geographic patterns of tourism impacts were analyzed by integrating spatial data with survey results to examine how tourism impacts varied across different areas of Cox's Bazar.

Study Area

The study was conducted in Cox's Bazar, a town consisting of 12 wards. To focus on areas with high tourism activity, seven wards (02, 03, 04, 05, 09, 10, and 11) were selected based on the concentration of tourism-related businesses (Figure 1). The selection of these wards was based on their tourism intensity, business presence, and their representative status for understanding the wider impacts of tourism on the community.

Ethical Considerations

Ethical guidelines were strictly followed during the data collection process. Informed consent was obtained from all participants, and their anonymity was ensured. Data were collected to protect participants' privacy, and reported to prevent identification of individual respondents.

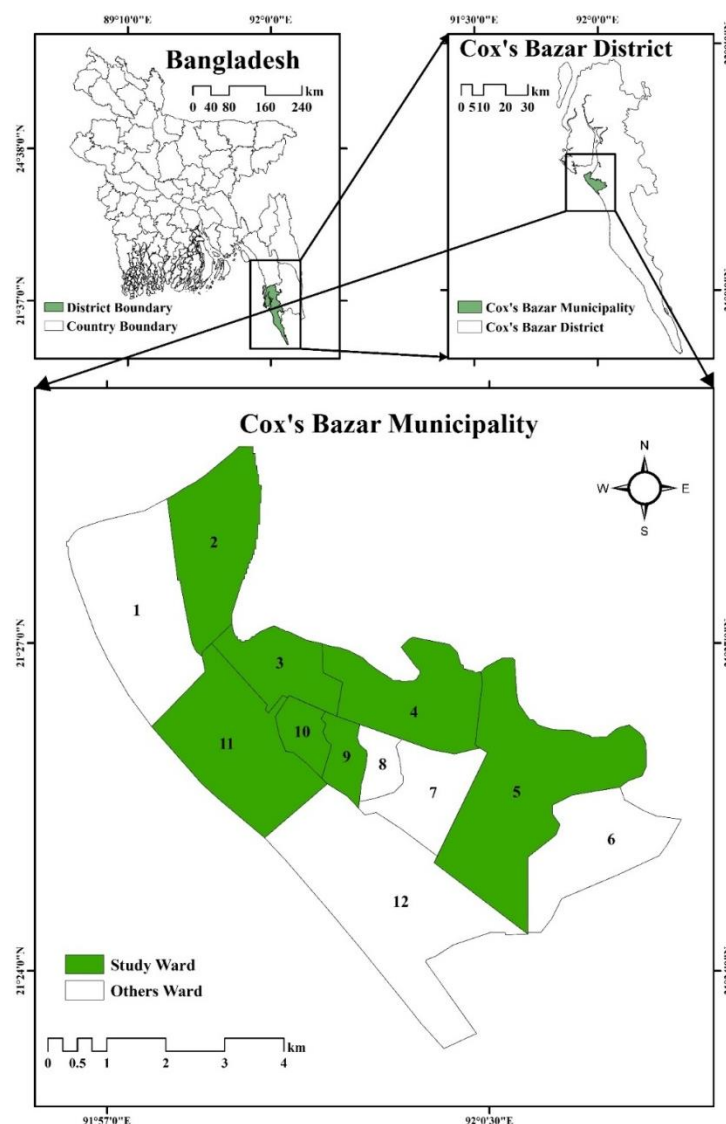


Figure 1. Study Area Map (highlighting the study wards 02, 03, 04, 05, 09, 10, and 11) (Sources: Cox's Bazar Municipality, 2024)

RESULT & DISCUSSION

Demographic Profile

Understanding the demographic profile of the respondents is crucial for interpreting the study's findings, as it not only reflects the characteristics of the local population but also ensures the validity and accuracy of the data (SI 1). This study was conducted in Cox's Bazar, Bangladesh, a region renowned for having the world's longest natural sea beach and as a major tourist destination (Kalam & Hossen, 2018). The local population in Cox's Bazar is diverse, comprising long-term residents, indigenous groups, and migrants from other parts of Bangladesh, largely due to the expanding tourism sector (Mustary, 2020). This rapid demographic shift, coupled with increasing tourism, has placed considerable pressure on the socio-economic and environmental systems of the region (Kalam & Hossen, 2018).

The data were collected from a representative sample of 200 local residents, business owners, and workers in the tourism industry, with 59% of respondents being male. As shown in Figure 2 a significant portion of respondents (52%) were aged group of 31-40 years, with smaller proportions from below 30 (27%) and older age groups. A relatively small number of respondents (3%) were aged between 51-60 years, and (1%) were over 60 years. The findings suggest that the majority of the local population involved in tourism-related activities falls within a working-age group (Gomes & Blake, 2020).

The findings (SI) provide a detailed breakdown of the socio-demographic profile of 200 respondents from a field survey conducted in 2024. The gender distribution reveals a male-dominated sample, with 59% male and 41% female. In terms of education, the majority have a relatively low level of formal education, with 7% illiterate, 13% with less than an SSC qualification, and only 5% holding a Master's degree. The income distribution shows that a significant portion (69%) of respondents earn between 5,000 and 20,000 BDT, indicating a predominantly low to middle-income group, with just 23% earning above 20,000 BDT, which suggests economic vulnerability. Occupationally, respondents are spread across diverse sectors, with the largest groups working in small businesses (29%), followed by fishing (24%), and a notable portion in the informal sector (27%), reflecting a lack of formal employment opportunities. Marital status data shows that 61% of respondents are married, reflecting the strong social and cultural norms around family structures. When considering family size, the majority live in nuclear families (53%) with 2-4 members, while 47% are part of

extended families, indicating a balance between more modern and traditional family setups. Housing conditions are also telling; 12% live in Katcha houses, 43% in semi-pucca houses, and 45% in pucca houses, indicating that most respondents have access to basic yet stable housing. Finally, household ownership reveals that 54% of respondents own their homes, while a substantial 34% rent, which could indicate socio-economic constraints on homeownership, with a small portion living in slums (5%) or squatting (2%). These results suggest a population that is predominantly working class, with limited access to higher education and financial resources, often working in the informal economy, and living in modest housing conditions. This socio-demographic data paints a picture of a community that faces significant economic challenges but demonstrates resilience in adapting to their social and economic environment.

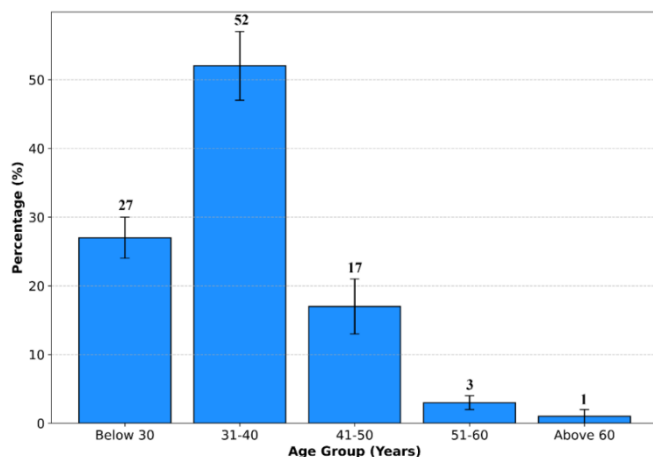


Figure 2. Age Group Distribution: The bar chart shows the percentage of respondents across five age groups. Error bars represent data variability (Source: Adopted from field survey, 2024)

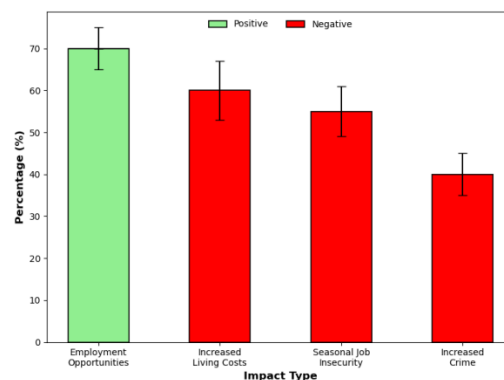


Figure 3. Socio-Economic Impacts Distribution: The bar chart illustrates the percentage distribution of positive and negative socio-economic impacts across four categorized as Employment Opportunities, Increased Living Costs, Seasonal Job Insecurity, and Increased Crime. Positive impacts are represented in green, while negative impacts are shown in red. Error bars indicate the variability in the data, reflecting uncertainty in the measurements for each impact type (Source: Adopted from field survey, 2024)

Socio-Economic Impacts

Tourism has had a profound impact on the socio-economic aspects of Cox's Bazar. The economic benefits of tourism are evident, with increased employment opportunities and growth in local businesses. Additionally, positive impacts include improved local attitudes and behaviors, preservation of cultural traditions, and economic benefits from increased demand for traditional handicrafts. However, these benefits are accompanied by significant challenges, such as economic inequality, cultural destruction, and rising social crime rates. While, the income disparity between tourism-centric and non-tourism areas highlights a growing economic divide, impacting community cohesion and local security (Hillman, 2016). The qualitative interviews provided further insight into this issue. Local business owners and stakeholders emphasized that, although tourism had increased demand for services, the high level of competition and domination by larger businesses often marginalized smaller, locally owned enterprises. Furthermore, seasonal fluctuations in tourist arrivals created uncertainty for local workers, as job opportunities diminished during the off-peak season. This economic vulnerability raises concerns about the sustainability of tourism as a long-term solution for poverty alleviation in the region.

Figure 3 illustrates the socio-economic impacts of tourism, with both positive and negative impacts represented alongside error bars. Tourism has generated substantial economic benefits for the local community, particularly through job creation. Approximately 68% of respondents reported that tourism had provided employment opportunities, particularly in hospitality, transportation, and retail services. This increase in employment has enhanced the livelihoods of many local residents and bolstered the local economy (Karim & Mimura, 2008; Paul & Routray, 2010). Moreover, tourism has created a demand for traditional handicrafts, leading to increased economic activities in the artisan sector. Despite these advantages, the growth of tourism has led to rising living costs, inflation, and income instability due to the seasonal nature of tourism-related jobs. A notable 58% of respondents indicated that the cost of living had risen as a result of tourism development (Rahman, 2010; Hossain et al., 2016). Additionally, the influx of tourists has exacerbated social issue within the community, as those who benefit from tourism are often distinct from those who do not, leading to tensions over resource distribution. The findings also reveal that tourism has contributed to an increase in social crimes such as theft, drug abuse, and other forms of criminal activities. Approximately 45% of respondents noted a rise in such incidents, which they attributed to the growing number of tourists in the area. This increase in crime has further stressed the need for regulatory frameworks to manage tourism growth responsibly.

Socio-Cultural Impacts

Many residents expressed concerns that their traditional ways of life were being replaced by activities tailored to meet tourists' preferences. Tourism has significantly influenced the local culture of Cox's Bazar, bringing both positive and negative changes. Tourism in Cox's Bazar has significantly impacted local cultural norms and traditions. While some respondents in Figure 4 reported positive cultural changes, such as improved attitudes towards sustainability and increased participation in cultural events, others expressed concerns over the destruction of cultural authenticity. Around 33% of respondents felt that tourism had led to the loss of cultural originality, as local customs were commercialized to provide to

tourist demands. This cultural shift has led to growing concerns about the long-term preservation of the region's heritage. Statistically, it has improved local attitudes and behaviors (25.76%), preserved cultural and historical traditions (22.52%), and increased community participation in STD (18.25%). Additionally, tourist demand has boosted the promotion of traditional handicrafts and artifacts (17.65%), supported the local economy and sustained traditional crafts. Cultural programs, such as music and poetry recitations held on the beach or at cultural centers, also provide platforms to showcase local talent and traditions (15.82%) (Rahman, 2010). These positive impacts highlight the role of tourism in fostering cultural preservation and economic development (Telfer & Sharpley, 2016). So, the positive potential of tourism for cultural preservation and revitalization, alongside its negative impacts. However, tourism has also introduced several negative cultural consequences Figure 4 such as economic inequality between locals and tourists (33.16%) has become pronounced, exacerbating local economic loss and leading to social tensions. The loss of cultural originality (30.71%) is another concern, as the influence of foreign tourists and the adoption of non-traditional practices have diluted the unique cultural heritage of Cox's Bazar. Additionally, the rapid growth of tourism has been associated with an increase in crime rates. There has been an increase in social crimes such as thefts, hijacking, smuggling, drug abuse, eve-teasing, and other criminal activities (34.03%), which these attributed to the influx of the tourism industry (Auerbach et al., 2015). These issues underscore the need for a balanced approach to tourism development that mitigates negative impacts while maximizing cultural and economic benefits (Muhanna, 2006). The socio-cultural impacts of tourism also underscore the importance of preserving local traditions and cultural heritage. Efforts to promote responsible tourism that respects and values local culture should be encouraged to prevent the commercialization and loss of traditional ways of life.

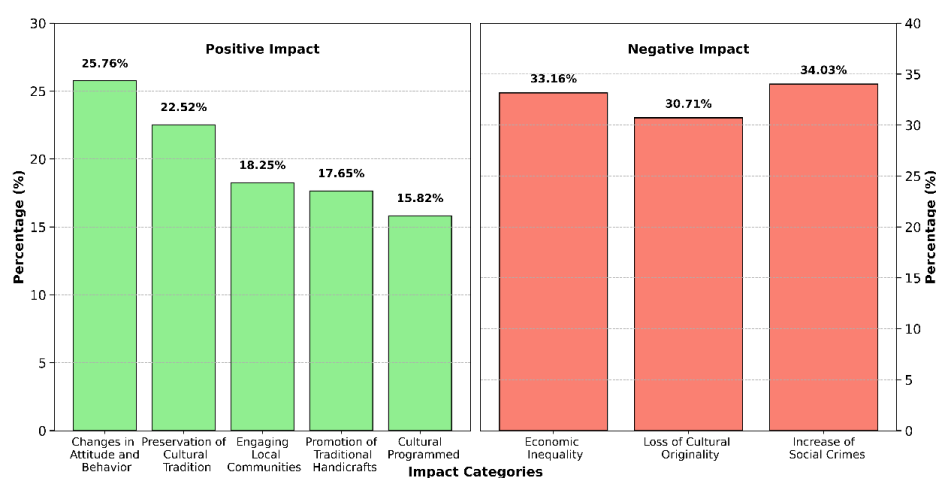


Figure 4. Evaluating the Dual Impacts of Tourism on Local Culture and Society (Source: Field survey, 2024)

Environmental Impacts

Tourism has also had significant environmental consequences, with degradation of coastal ecosystems being one of the most pressing issues. The study (Table 1; Figure 5) found that 39% of respondents considered the intensive use of water and land by tourism and leisure facilities to be very severe, while another 35% rated it as severe. Changes in the landscape due to the construction of tourism infrastructure were reported as very severe (34.5%) of respondents, and severe (48.5%). The weak drainage and sewage systems, leading to untreated wastes being drained into the sea, were marked as very severe 46.5% of respondents. Hill cutting, which increases the risk of landslides, was noted as very severe 35.5% of respondents. Noise disturbance, deforestation for tourism enterprises, and beach erosion were also significant concerns, with a notable portion of respondents rating these impacts as very severe (Islam, 2015).

Table 1. Environmental Impacts of Tourism on Coastal and Marine Ecosystems (Source: Field Survey, 2024)

Environmental Impacts N.B: Multiple answer consideration	Percentage (%)			
	High	Moderate	Low	Total
1. Intensive use of water and land	39	35	26	100
2. Landscape changes due to tourism	34.5	48.5	17	
3. Wastewater discharge and plastic pollution	46.5	34.5	19	
4. Hill cutting and landslides.	35.5	38.5	26	
5. Disruption of wildlife and locals (e.g., by noise).	44	28	28	
6. Forests are cleared for living and tourism enterprises.	40	43	17	
7. Beach erosion	37.5	31	31.5	
Nature of Impact on Coastal Environment				
1. Destruction of nesting sites for endangered marine turtles	64	32	4	100
2. Dumping wastewater and plastics into waters around coral reefs and other fragile marine habitats.	48.5	36.5	15	
3. Straining local fish populations and overfishing.	10	15	75	
4. Collecting corals, shells, and other marine souvenirs.	58.5	27.5	14	
5. Development of hotel, resort, near sea beach	46	32	22	
6. Spilling of oil from tourism vessels, sea boat	17	38.5	45.5	

The impacts (Table 1; Figure 5) on the coastal environment were equally alarming. 64% of respondents opined that marine turtle was identified very severe and discharge of wastewater and plastics into sensitive marine habitats was marked as very severe by 48.5% of respondents, highlighting the detrimental effects on coral reefs and marine life (Bhuiyan et al., 2020). 58.5% of respondents reported the collection of corals, shells, and other marine souvenirs by tourists and locals as very severe. The construction of hotels and resorts near the beachfront emerged as a significant concern, with 46% of respondents rating it as very severe. Additionally, oil spills from tourism vessels were considered a moderate issue by 45.5% of respondents and less severe by 38.5%. The findings are consistent with the effort of Rahman (2014); Kalam & Hossen (2018), who stated that the rapid expansion of tourism has damaged Cox's Bazar's natural resources and led to increased pollution levels. The discussions with environmental experts and local stakeholders reinforced this concern, as many participants pointed out that inadequate regulations and enforcement have allowed for unchecked environmental harm. Additionally, the severe environmental impacts highlighted by respondents including beach erosion and habitat destruction, focusing the urgent need for stronger environmental regulations to manage tourism footprint.

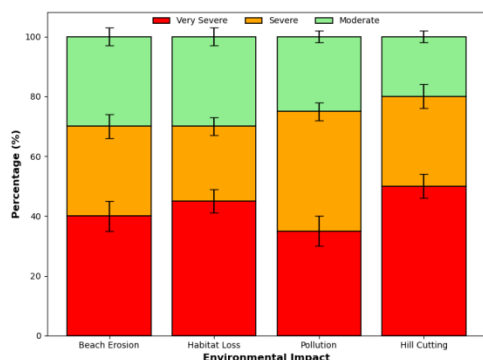


Figure 5. Environmental Impact Levels with Severity Distribution:

This stacked bar chart presents the percentage distribution of environmental impacts categorized as Beach Erosion, Habitat Loss, Pollution, and Hill Cutting. Each category is divided into three severity levels: Very Severe (red), Severe (orange), and Moderate (green). Error bars indicate the variability in measurements across each severity level, providing a visual representation of the uncertainty associated with the data.

However, respondents noticed that the intensive use of water and land by tourism infrastructure as a major concern. Additionally, the construction of tourism facilities has altered the landscape and contributed to environmental degradation. The impact of waste disposal, including untreated sewage and plastics, was marked as severe of respondents. Furthermore, issues like hill cutting, deforestation, and beach erosion were identified as critical threats to the local environment. The environmental degradation is compounded by the disruption of marine life, with endangered species such as marine turtles facing habitat destruction. The increased number of tourists also leads to overfishing and the collection of marine souvenirs, further straining the coastal ecosystem.

Thematic Analysis of Tourism Impacts

As illustrated in Figure 6, the frequency of key qualitative themes derived from the thematic analysis of interviews and stakeholder perceptions. The analysis identified four major themes: social issues, cultural destruction, eco-tourism awareness, and environmental degradation. Environmental degradation emerged as the most frequently discussed issue, with concerns including habitat loss, soil erosion, water pollution, and the destruction of biodiversity.

Respondents highlighted the adverse effects of unregulated tourism activities, such as beach littering, illegal fishing, and unplanned infrastructure development, all of which contribute to the degradation of natural resources. Social division is the second most frequently mentioned theme, with respondents observing the growing gap between locals benefiting from tourism (through employment and business opportunities) and those left behind. Disparities in wealth distribution, changes in land use, and the displacement of traditional livelihoods have resulted in social tension. Cultural destruction is another critical theme, with many local communities expressing concern over the commodification of their cultural practices. Traditional crafts, rituals, and festivals have been altered to cater to tourists' expectations, leading to a loss of authenticity and cultural identity. Eco-tourism Awareness is less frequently mentioned, indicating a gap in awareness and implementation of eco-tourism practices. Stakeholders expressed interest in eco-tourism but cited challenges such as lack of infrastructure, limited government support, and the absence of local community involvement in eco-tourism initiatives. The error bars in Figure 6 reflect the variability in stakeholder responses, suggesting differing perceptions of tourism's impact based on socio-economic status, education level, and proximity to tourism hubs.

Implications for Sustainable Tourism Development

The results highlight the need for targeted interventions to balance tourism's economic benefits with environmental and social stewardship. Aligning these findings with the STD Model, this study suggests that Cox's Bazar must adopt strategies that integrate environmental, social, and economic goals in tourism planning. Specifically, the findings suggest that the

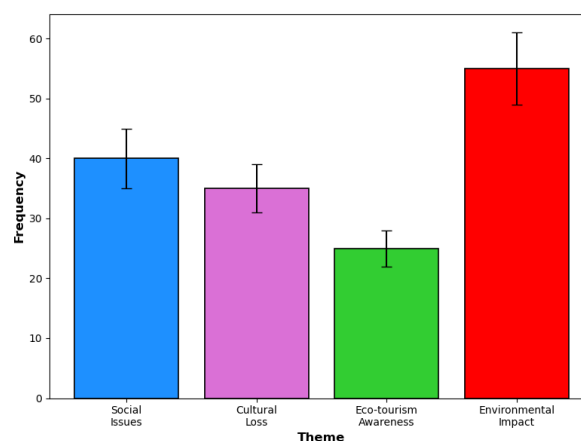


Figure 6. Frequency of qualitative themes from the thematic analysis, illustrating key socio-economic, cultural, and environmental impacts of tourism in Cox's Bazar.

Error bars represent variability in stakeholder perceptions (Source: Adapted from STD Model)

implementation of CBT, which emphasizes local participation in tourism planning and management, can provide a pathway toward sustainable tourism. Eco-tourism initiatives, such as the development of low-impact accommodations, waste management, and biodiversity conservation, and community-run tours, mitigate environmental degradation while promoting cultural exchange. However, the challenges highlighted in the results, such as low levels of eco-tourism awareness and inadequate infrastructure, must be addressed through education, investment, and capacity-building for local communities.

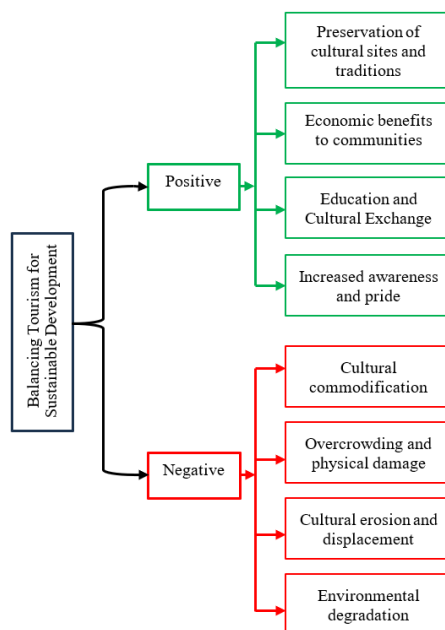


Figure 7. Framework for Sustainable Cultural Heritage Management

Tourism and Sustainable Development in Bangladesh

Tourism in Bangladesh, particularly within the framework of SDG 11 (Target 11.1)¹, offers both opportunities and challenges for sustainable development. As shown in (Figure 7) the positive socio-economic impacts of tourism in Bangladesh, including employment generation, cultural exchange, and local development, are well-documented.

As seen in other heritage sites, such as Mahasthangarh², sustainable tourism strategies have shown that integrating conservation efforts with tourism can foster cultural preservation while providing economic benefits (Tosun, 2005; Kumar et al., 2023; Nowreen & Moran, 2022; Khan & Huda, 2023). Furthermore, CBT has demonstrated its value in promoting cultural exchange, local pride, and sustainable livelihoods (Kumar et al., 2023; Alamineh et al., 2023). However, the negative impacts of tourism such as cultural commodification, which alters authentic cultural practices to meet tourist expectations, and environmental degradation, including biodiversity loss require urgent attention (Tania, 2022; Afroz, 2022).

Overcrowding, physical damage to landmarks, and carbon emissions also threaten the sustainability of tourism in many heritages' sites (Rajani & Boluk, 2022; Islam et al., 2023). To address these issues, the study emphasizes sustainability (Figure 7), specifically focusing on how tourism can be made sustainable for integrated planning and effective governance to balance the benefits despite its risks of tourism. The need for integrated planning and effective governance to balance the benefits and risks of tourism. The Sundarbans conservation model demonstrates how sustainable tourism can coexist with environmental protection, providing a pathway for STD in other regions like Cox's Bazar (Tosun, 2005; Nowreen & Moran, 2022). Community engagement in heritage conservation ensures tourism benefits are equitably shared and cultural authenticity preserved (Kumar et al., 2023; Alamineh et al., 2023). Lastly, effective governance and policies are vital to balancing tourism development with financial inclusion and environmental goals (Tania, 2022).

By adopting these strategies, Bangladesh can harness eco-tourism's potential to support sustainable cities and communities, contributing meaningfully to SDG 11 (Target 11.1)¹. This study adds to the existing literature by offering insights into how Community-Based Tourism (CBT) and eco-tourism can mitigate the adverse impacts of tourism in the coastal areas of Bangladesh, particularly in Cox's Bazar. Community participation in tourism development not only ensures equitable distribution of benefits but also promotes the preservation of cultural heritage and natural resources.

Policy Recommendations for STD

To address the challenges posed by tourism development in Cox's Bazar, strategic management plans are essential. These plans should involve residents as active partners in tourism development, ensuring their voices are heard and their

¹ Goal 11 is about making cities and human settlements inclusive, safe, resilient and sustainable. Tourism is seen as a source of growth, from which many countries and destinations could benefit. However, there is growing concern that important tourism development comes at a cost, as there are negative sociocultural and environmental impacts with many tourism-dependent areas being vulnerable to demand shocks. To address and contribute to Target 11.1, tourism development should be managed properly to avoid tourism activities displacing local residents and worsening existing conditions.

² Mahasthangarh is the oldest archaeological site in Bangladesh, dating back to 300 BCE. It was the ancient capital of the Pundra Kingdom and remains the earliest known fortified urban settlement in the country. Among its notable features is a temple housing the tomb of Shah Sultan Balkhi Mahisawar, a 14th-century dervish of royal lineage who arrived in the region to promote Islam.

needs are addressed. Emphasizing the positive impacts of tourism while mitigating the negative consequences is crucial for advancing sustainable tourism. Based on the findings of this study, several key recommendations are proposed for promoting STD in Cox's Bazar:

1. **Community Participation in Tourism Planning:** Involve local residents in the tourism planning process to ensure their voices are heard and that tourism benefits are equitably shared. This approach will foster a sense of ownership and enhance the sustainability of tourism initiatives.

2. **Strict Environmental Regulations:** Implement and enforce regulations to prevent environmental degradation, including pollution control and habitat preservation. These regulations should be regularly monitored to ensure compliance and effectiveness.

3. **Promotion of Eco-Tourism Models:** Encourage eco-tourism initiatives that prioritize the conservation of natural resources while respecting local cultural heritage. Eco-tourism can raise awareness and engage both tourists and locals in sustainable practices.

4. **Economic Diversification:** Promote alternative income sources to reduce the region's over-reliance on tourism. This will help build economic resilience and ensure that local communities have stable livelihoods, even in the face of fluctuating tourist numbers.

5. **Cultural Preservation Initiatives:** Support programs that safeguard local traditions and cultural practices. These initiatives can help prevent cultural commodification and ensure that tourism contributes to the long-term cultural sustainability of Cox's Bazar.

By implementing these strategies, Cox's Bazar can achieve a more STD Model that not only enhances socio-economic development but also tourism economy preserves the region's natural and cultural heritage (Abdul, 2021).

CONCLUSION

Tourism in Cox's Bazar has provided significant economic benefits but also considerable challenges including environmental degradation, social inequalities, and cultural destruction. While tourism has been a driver of economic growth and local development, it has also contributed to pollution, habitat destruction, and a widening socio-economic divide among the local population. The findings highlight the need for a sustainable tourism model that integrates environmental protection, cultural preservation, and socio-economic equity. An integrated approach to tourism development is essential to mitigate negative impacts while ensuring long-term benefits for the community and the natural environment. This integrated approach is crucial for ensuring the resilience of Cox's Bazar as a prime tourism destination. It's also contributing to broader goals of sustainable development and the achievement of SDG 11¹ (Sustainable Cities and Communities). However, this study has several limitations including primarily it is geographically focused on Cox's Bazar, and while the findings are relevant to this region, they may not be fully applicable to other coastal areas in Bangladesh also worldwide. The study also relies on a limited range of data sources, primarily from local communities, government officials, and tourism stakeholders, which may not fully capture the perspectives of all groups impacted by tourism. Additionally, the research is cross-sectional, meaning it offers a snapshot of the current situation rather than tracking long-term changes in environmental, social and economic conditions. Future research should explore the long-term impacts of community-based tourism models on local economic resilience and assess how eco-tourism can be effectively integrated into mainstream tourism practices in Bangladesh. Additionally, further research into tourism governance and its role in balancing development with sustainability necessary to better understand how to safeguard both the government and local cultures.

This study's findings highlight the critical necessity for sustainable tourism development in Cox's Bazar to safeguard its distinctive cultural and natural assets while promoting the long-term welfare of its inhabitants.

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