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Research Topic: Evaluating Community-Led Technology Interventions and Policy Failures in
Mitigating Environmental Degradation Caused by Tourism in Cox's Bazar

Title: Evaluating Community-Led Technology Interventions and Policy Failures in Mitigating Environmental Degradation Caused by Tourism in Cox's Bazar

Research problem:

The world's longest natural sea beach^[1], Cox Bazar is a popular tourist destination spot in Bangladesh, contributing hugely to the country's economic growth. The scenic hills, cultural diversity, and convenient infrastructure has caused an estimated 3 million visitors to visit this place annually. However, rapid tourism has caused environmental stress including plastic pollution, habitat destruction and harm to marine life. If these are not regulated, it will not only lead to a loss of biodiversity but also jeopardize Cox's Bazar's reputation as a tourist destination [1]. The region thus faces a risk of environmental harm and reduced tourist demand. Although regulatory measures have been established, the problems are still prevalent and increasing. Prior research has either analyzed economic growth or environmental impact without exploring why regulations have yet not been successfully implemented. Studies are also limited in the potential usage of technology and community participation in promoting sustainable tourism. Therefore, this research investigates both the reasons behind failure of previous policies as well as the combination of technology and community involvement in fostering sustainable tourism.

Existing Literature:

^[2] Tourism in Cox's Bazar has become one of the major drivers of Bangladesh's service economy. The immense number of visitors has supported a wide range of jobs in transport, hospitality, and food supply chains. Gomes (2020) has found that the expenditure of tourists contributes an average 4.8% to households' incomes in Cox's Bazar and that tourism activities generate around BDT 1.5 million per day. This highlights how Cox's Bazar plays an important role in economic growth.

The expansion in the number of infrastructure such as hotels, resorts and other facilities has caused coastal erosion and disrupted natural habitats. In the study "Tourism and its Impact on Cox's Bazar, Bangladesh" (2013), Isa Zahra has discussed the adverse environmental impacts of tourism in Cox's Bazar, including excessive crowds, poor waste management, and unplanned hotel construction [3]. Coastal tourism has alarmingly contributed to the degradation of coastal features and ecosystems in Bangladesh[4]. Unsustainable fishing practices and pollution have also adversely affected the diversity of fish populations and coral reefs, causing harm to marine life.

Although regulations and legal frameworks exist, they are not enforced effectively since destructive activities are continuing even in protected areas [5]. Similarly, in a study published in the IOSR Journal of Humanities and Social Science, Sayeda (2017) critiqued that while policies do exist, there is a lack of strategic coherence and poor enforcement, resulting in practices such

as overcrowding and unregulated hotel construction to continue [6]. There also lies a prominent gap between policy intentions and actual outcomes, causing implementation to be inadequate [7].

In response to the environmental degradation caused by mass tourism, a study by Shahzalal (2016) stressed upon the importance of environmental management plans that prioritized waste reduction and water conservation[1]. Afterwards, Shang et al. (2023) recommended that local governance and economic incentives could play a significant role in reducing environmental decline by encouraging policies such as green financing and incentives provided to small businesses [8]. Then, a study by Sarker et al. (2024) demonstrated how an integrated coastal ecosystem monitoring strategy can reliably strengthen enforcement.[9]

Therefore, several studies have successfully demonstrated how environmental degradation of Cox's Bazar is due to unregulated tourism. While failures in policies have also been identified, the reasons behind the enforcement are yet not discovered. At the same time, various suggestions have been made in previous studies, such as green financing [8] and long-term ecological monitoring[9]. Yet, there is still limited research on how incorporating both technological innovations and community participation are strategies for achieving sustainable tourism outcomes. This research intends to fill the gap by analyzing why efforts have been unsuccessful despite policies and how combining technology with community-based approaches could promote economic growth without degrading the ecosystem.

Research question:

Why has there been a failure in ensuring a balance between the economic growth of Cox Bazar and coastal ecosystem protection despite existing policies, and how can the use of technology and community participation elevate sustainable tourism outcomes?

Methodology:

Qualitative Component:

The qualitative phase will focus on understanding why attempts for ensuring a balance between economic growth and sustainability have been unsuccessful. Semi-structured interviews will be conducted with local government officials and tourism authorities ($N = 20$) to provide insights into the challenges faced regarding effective implementation of policies. These interviews will help in uncovering the reasons behind failures in policies, and thus identify the areas where improvement and attention are required. In addition, Focus Group Discussions with local residents will provide understanding of their awareness of policies and potential reasons for struggling to actively follow the regulations. It will assist in understanding barriers such as lack of resources, economic pressures or social and cultural practices that limit ability to comply with the rules.

Quantitative Component:

The quantitative phase will explore the willingness and perceptions regarding enforcing technology based approaches in maintaining the ecosystem of Cox's Bazar. A structured survey will be held among tourists and local residents (N = 300). This will be held using stratified random sampling to represent people from different social, economic and cultural groups. Using numeric rating scales (0–10), the survey will measure perceptions regarding the effectiveness of technology-based interventions. This includes usage of GIS-based monitoring of environmental degradation, mobile reporting platforms for litter and digital waste tracking systems. In the same survey respondents will also rate their willingness to participate in community-led initiatives, such as beach cleanups, awareness campaigns, and more. The question will specifically show how much their willingness is dependent upon possible issues such as convenience, technical skills or cost.

Data analysis:

The qualitative data will be thematically analyzed to reveal patterns behind the failure of policy enforcement. This involves identifying the similarities and differences across groups to understand the challenges. In terms of the quantitative data collected, the calculations will be made using mean, median and standard deviation. Correlation analysis will also be performed to observe relationships between effectiveness and willingness to participate. Altogether, it will provide an understanding of why policies fail and the potential role of incorporating technology for sustainable tourism.

Project practicalities:

The study will be conducted over four months. In a month, surveys and interview guides will be created. During the same time, all the necessary approvals from local authorities will be secured. During the second month, qualitative data will be gathered by interviewing the policy makers, and by holding Focus Group Discussions with the local populace. During the third month, structured surveys will be conducted. After data analysis is conducted at the beginning of Month 4, the latter end of Month 4 will be dedicated to preparing the final report. Strict ethical considerations will be followed at all stages. Before participation, consent will be obtained and participants will have the right to discontinue at any stage. They will have clear information about the cause and methods of data collection. Additionally, the collected data will be anonymous and interactions with local residents will be respectful throughout the entire process.

Conclusion:

This research explores the challenge of balancing economic growth and environmental sustainability in Cox's Bazar. Despite tourism's economic contribution, unsuitable policy implementations have resulted in environmental degradation. The study highlights that policy implementation gaps, low community participation and inadequate technology usage have been

major contributors. However, with the efforts of people, policymakers, and the tourism industry, Cox's Bazar can maintain its unique appeal while still experiencing economic progress.

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