Climate Change affects Tourism Development

Subjects: Others

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Tourism-related carbon dioxide (CO2) emissions are a central driver of anthropogenic climate change. At the same time, climate change has both direct and indirect impacts on tourism, varying from damages of tourist assets due to extreme weather events, to losses of biodiversity.

Keywords: tourism ; CO2 emissions ; climate impacts ; Pacific region ; Solomon Islands ; Tonga

1. Introduction

Even though tourism science has been dealing intensively with the topic of climate change for about 25 years, there remains a pressing need for further research to support the necessary transformation of the tourism sector to a sustainable undertaking [1]. The number of scientific publications has shown a clear upward trend in the last one and a half decades, with a sharp increase in the last eight years, including key adaptation literature on climate change affecting tourism [2][3][4][5], adaptation and carbon mitigation [6][7], policy [8][9], and sustainability [10][11]. Substantial research gaps exist, there seems to be a geographical bias on the developed part of the world, methodological weaknesses in determining tourism-related greenhouse (GHG) emissions along the value chain, and issues regarding equity [12][13]. Counteracting the geographical bias by its focus on small island developing states (SIDS), this interdisciplinary paper aims to provide a review of tourism development and the implications of its global emissions on the global climate, and links it with possible and already seen influences of climate change in the Pacific region to explain the growing vulnerability of the overall sector, with a particular focus on SIDS tourism in the Pacific region. The effects of the SARS-COV2 pandemic on international tourism and its consequences for the national development of Pacific SIDS complement the analysis. Case studies of two Pacific Islands present some evidence of current climate impacts, grounding the multiple risks small island nations and their tourism sectors face in the literature.

Operationally, the well-known, risk-based conceptualization of vulnerability resembles the analytic lens for this paper [14]. Linking disaster risk management and climate change adaptation, this framing can support the identification and prioritization of adaptation options and helps to strengthen resilience to changing conditions [15]. For this reason, this paper documents some of the observed impacts of climate change in two less researched, low-lying Pacific Island countries (PICs), i.e., Tonga and the Solomon Islands. This is complemented with future climate projections and linked with the development and challenges of international tourism, a sector that is a key pillar of national development in these islands. These islands are seldom investigated, so a concrete contribution to the literature is provided here.

2. Climate Change Impacts and the Tourism Sector

Climate and climate-related factors play a crucial role in the selection of tourist destinations, and in determining the season, the time of travel, and the length of stay [16][17]. Depending on the geographical location of the tourist destination and the type of touristic activity, climate change may therefore influence, i.e., impact, the tourism sector as a whole, and tourism activities in particular, in many ways. These can be differentiated according to environmental, socio-cultural, and economic dimensions.

Regarding environmental impacts, for instance, the Himalayan ranges and the Tibetan plateau (high altitude regions in Asia) are currently facing glacier melting, glacier floods, and lake outbursts [18]. Furthermore, increased temperatures in some Middle Eastern countries have led to water shortages and increases in the frequency of heat waves, resulting in a decrease in tourism [19]. Winter tourism that is dependent on snow cover at mountainous resorts has also been impacted by alterations in the snow cover [20]. Concerning coastal and island tourism, slow-onset phenomena such as sea-level rise (SLR) and the warming of oceans as well as short-onset events such as flooding, high waves, and extreme weather events affect coastal areas and related marine attractions.

Due to anthropogenic forcing, the global mean sea level is rising, and this rise is accelerating [21]. In 2019, the global mean sea level rose to 8.76 cm above the 1993 average, which resembles the highest annual average in the satellite record [22]. As sea-level rise is not uniform, it shows substantial regional variability, which, for example, leads to an intensified higher rise in the Western tropical Pacific Ocean [21] (p. 340). Some low-lying PICs have already disappeared [23][24][25]. Low-lying SIDS with long coastlines are susceptible to many impacts of global climate change; the inundation of low-lying coastal land, erosion of beaches and shorelines, and saltwater intrusion into freshwater lenses endangers coastal infrastructure, which is particularly crucial for those SIDS with few economic alternatives to tourism [21][26]. Concerning PICs, about 57% of their built infrastructure is located in risk-prone coastal areas [27].

The oceans and their sea life are other prominent tourism assets that are being affected. The world's oceans (especially the upper 2000 m) in 2019 were the warmest in recorded human history [28]. The value of coral reef tourism was estimated to be 11.5 billion USD in 2010 [18][29]. Coral reefs are home to different organisms and endangered fish species. In 2010, ocean acidification already threatened about 60% of the world's coral reefs [30]. Even if the global average temperature keeps within the 1.5 °C limit, climate scientists believe that coral reefs will decline by a further 70–90%; with a global temperature rise of 2 °C, almost all coral reefs are expected to disappear [31] (p. 10). Eco- or biodiversity tourism has also been gaining more attention. Urban tourists with a keen interest towards nature usually select these destinations [32]. Here, dry spells increasingly lead to forest fires. The Mediterranean basin, for example, is being affected by increased temperatures, reduced rainfall and variations in seasonal patterns [33][34]; in California, climate change has been at least partially responsible for forest fires [35].

The consequences for tourism must also be considered in a socio-cultural and economic context, which may weigh even more in destinations where, for example, a large share of the population depends on tourism as a main source of income. As sea levels continue to rise at a high rate, especially affecting the Pacific region, decision-makers are beginning to discuss adaptive migration, i.e., the relocation of entire villages and island populations, as a response to sea-level rise and other natural hazards [21][36]. Other consequences are a shrinking productivity and harvest, changes in seasonal patterns, rise in prices for basic foodstuff and consumer goods, widespread poverty as a consequence of disastrous events, increasing spread of diseases due to higher temperatures, shortages of fresh water supply, wars over gaining access to limited resources, heat impacts on human health and well-being, and a high cost of adaptation and mitigation measures especially in coastal areas [37]. The Table 1 below provides some examples of the socio-economic impacts of climate change on tourism.

Table 1. Selected examples of socio-economic impacts of climate change on tourism.

Impacts	Consequences	Challenges
Influence of temperature increase on supply and demand		
Reduction of appropriate period of sun exposure; Thermal stress; Increase in incidence of skin cancer	**Redirection of demand to other potential destinations. e.g., conservation units;**	**Promote low-carbon activity;**
	Adaptation of travel period;	**Offer destinations of nature all year round;**
	Fragmentation of holiday period with reduction in stay;	**Promote actions and run campaigns on sun protection**
	Poor quality of experience	
Influence of extreme events on geographical space, demand, supply and agents		

Impacts	Consequences	Challenges
Destruction of tourism infrastructure; Road blockades; Interruption of media Services; Changes in hydrologic cycle	Real estate speculation;	Foster new, more sustainable destinations;
	Contamination, spread of diseases;	Promote actions and run campaigns informing about protection and rational use of resources;
	Lack of drinking water;	New investments, technologies and marketing strategies;
	High cost of recovery;	Create plans, actions, develop strategies to deal with consequences of extreme events
	Low capacity for emergency care (rescue, evacuation, medical services);	Implement warning measures that anticipate occurrences of extreme events
	Unavailability of emergency accommodation, counseling and assistance to victims;	Implement measures to mitigate risk and protect local inhabitants and tourists
	Increase in price of trips;	
	Insecurity;	
	Poor quality of experience;	
	Consumer distrust	
Influence of sea-level rise on geographical space, supply and agents		
Degradation of beaches; Bleaching of corals; Coastal erosion; Destruction of mangroves; Destruction of waterfront infrastructure	Decrease in sand space for leisure	Promote mitigation and adaptation actions and initiatives;
	Impacts on freshwater reserve;	Plan and order use and territorial occupation of the seaside;
	High cost of waterfront restoration	Implementation of coastal engineering works

Source: [38] cited in [13] (p. 11).

Tourism stakeholders cannot neglect these impacts of climate change anymore, as they may render locations unattractive and result in declining tourist visits, potentially constraining the development path of popular destinations. Particularly valid for the Pacific region with its dispersed islands, climate change is just one of many serious challenges that they are confronted with [39] (p. 846). Many of them show a high vulnerability to climate impacts, but this vulnerability is unequally distributed, depending on the level of isolation, or remoteness, as well as adaptive capacity. The following Table 2 provides an overview of some of the already visible impacts of climate change on tourism attractions in the wider Pacific region, before exploring in more detail the cases of Tonga and the Solomon Islands.

Table 2. Observed impacts of climate change on tourism in the wider Pacific region.

Area	Impacts	Literature
Coral Triangle Initiative areas (Indonesia, Malaysia, Papua New Guinea, Philippines, Solomon Islands and Timor-Leste)	Coral Reefs affected by impacts of climate change	[40]
	Coral reefs attract majority tourists to visit the CTI region	[41]
	Sea-level rise major concern in Solomon Islands communities	[23]
South Western PICs	Coral Bleaching across the Pacific	[42]
	Warming of sea grass linked with sea surface temperature rise (SST) and ocean acidification.	[43]
	Coral reef susceptibility at ecoregional scale with increasing influence on conservation management.	[44]

Area	Impacts	Literature
PICs	High-risk destination for disastrous events during cyclone season.	[45]
	Heavy rainfall events and flashfloods influence travel choices.	[46]
Solomon Islands; Vanuatu; Fiji, Tonga; Samoa	Negative impacts on mangrove and coastal ecosystems' community livelihoods.	[47]

Source: Authors.

The following case studies of Tonga and the Solomon Islands offer interdisciplinary insights into concrete current challenges of climate change and the global pandemic for tourism and, consequently, sustainable national development, complemented by projected future impacts. The two assessed PICs are both characterized by the fact that their dependency on tourism has increased substantially, as evidenced by a long-term assessment of tourism receipts over 23 years: with 48.1 USD million in 2018, Tonga's tourism sector contributes today about a tenth of the island's GDP [48]. Even though the Solomon Islands are one of the least frequently visited islands worldwide, the steady growth in tourism receipts from USD 44 million in 2010 to USD 67 million in 2017 indicates the growing relevance of the tourism sector to Tonga [49] (p. 16).

3. Conclusions

As this paper has shown, tourism plays an ambivalent role for touristic destinations, not just in Pacific SIDS; a decoupling between economic growth and environmental pollution, at least in the context of the tourism industry, has not yet been proven. This may have severe implications for the global tourism industry, and, consequently, the sustainable development of Pacific PICs as indicated in this paper. Strengthening the maritime and air transport infrastructure on island nations, so as to allow it to uphold trade and tourism development, would imply substantial investments in sustainable technology, which brings about the advantage of making infrastructure less vulnerable to damages from extreme events. Combining engineering solutions to increase climate resilience (e.g., coastal protection against waves) with less capital-intensive approaches (e.g., ecosystem-based adaptation such as reconstruction of mangroves) linked with community-based adaptation action can increase resilience to climate impacts, empower communities, and secure local livelihoods.

To ensure this can happen, the strategies and measures chosen need to be sustainable not just for the sector in question; SIDS decision-makers will need to pay attention to policy coherence so as to ensure overall societal well-being and to leave no-one behind.

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