

A Meta-Analysis of Linkages Between Climate Change and Tourism Development: Evidence from Turkey

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Abstract Turkey is one of the most demanding tourist destinations in the world because of its unique geographical location and possession of various natural, historical, and cultural assets. The famous hotspots of mass tourism activity are in the western and southwestern parts of the country. Rapid tourism growth has contributed to the country's economy significantly; however, it also brought many arduous challenges to the sustainability of the natural environment. Various scientific studies have explored the connections between tourism development and carbon emissions, employing different methodologies. The present study uses a meta-analytic technique to evaluate the bilateral linkages between tourism growth and climate change. For this purpose, a structured review of available empirical studies is conducted, and the results are combined to produce robust knowledge about the issue. The results revealed that tourism development significantly contributes to CO₂ emissions leading to global warming and climate change. Besides, the changes in climate parameters are also a potential threat to coastal tourist destinations. The present study provides valuable insights for future policymaking regarding the country's tourism development and climate change.

Keywords – Climate Change, Tourism Development, Meta-Analysis, Turkey

I. INTRODUCTION

Climate change has become a challenging issue in the modern globalized world with its long-run multidimensional impacts on the earth and human societies. The primary cause of global warming and resultant climate change is carbon emissions from industries consuming fossil fuels. Climate change threatens various economic activities, including the world's agricultural, industrial, tourism and service sectors. Tourism, a so-called green industry, was initially considered an alternative to traditional ways of development with minimum carbon impacts on the environment. However, recent empirical studies have shown a significant effect of tourism on carbon emissions as the industry is growing with rapid momentum. At the same time, climate change has also become a potential danger for many tourism destinations worldwide. Rising sea levels, extreme weather, and melting ice make

many tourism destinations vulnerable to different infrastructural and economic setbacks. Thus, a careful examination of bilateral linkages between climate change and tourism development is necessary for global sustainability.

Climate change is likely to have both positive and negative impacts on tourism, depending on the location and type of tourism activity. For example, warmer temperatures and longer growing seasons could benefit some types of outdoor recreation, such as hiking and skiing, while increased heat and water stress could negatively affect other activities, such as golf and beach tourism. Coastal tourism is particularly vulnerable to the effects of sea level rise and more frequent and intense storms, which can damage infrastructure and erode beaches. The impacts of climate change on tourism are likely to be felt most acutely in developing countries, where

tourism is a major source of income and resources for adaptation and mitigation may be limited.

The tourism industry itself is a significant contributor to greenhouse gas emissions, and efforts to reduce these emissions through sustainable tourism practices could help mitigate some of the impacts of climate change. Overall, a meta-analysis of the existing research on climate change and tourism would provide a more comprehensive understanding of the potential impacts of climate change on this important sector and help identify strategies for adaptation and mitigation.

Turkey is one of the famous tourism destinations in the world and receive large number of inbound and domestic tourists to its various regions. A rapid increase in tourism related entrepreneurship has observed since the implementation of tourism incentive law in 1980s. Tourism growth in the country led rapid urbanization, infrastructure development, increase in transportation services, new building constructions including big hotels, and increased production activities. Thus, excessive energy consumption in tourism sector has significant contribution in CO₂ emission. At the same time, drastic changes in weather patterns also impacts tourism in the country.

The present study analyzes the bidirectional link between climate change and tourism development in Turkey by evaluating the current and past literature in a systematic way. A meta-analysis of the relationship between climate change and tourism would involve reviewing and synthesizing the results of multiple studies that have investigated the impacts of climate change on the tourism industry. There is a growing body of research that has examined the potential effects of climate change on various aspects of the tourism industry, including changes in temperature and precipitation patterns, sea level rise, natural disasters, and shifts in ecological systems. The present study will provide useful insights related to climate change and tourism development nexus.

II. MATERIALS AND METHOD

The present study has employed qualitative approach to review the scientific studies on the issue of climate change and tourism in Turkey. A qualitative review of literature involves synthesizing and interpreting qualitative research studies that investigate a specific research question or topic of interest. The goal of a qualitative review

of literature is to provide a comprehensive and in-depth understanding of the topic under investigation, to identify gaps in the literature, and to suggest directions for future research. A qualitative review of literature a systematic approach to identify, evaluate, and synthesize relevant qualitative studies. The synthesis may involve a meta-ethnography, which is a rigorous and transparent method of synthesizing qualitative research that involves comparing findings across studies to develop a new interpretation of the phenomenon of interest.

III. RESULTS AND DISCUSSION

Climate is often seen as a key factor that motivates people to travel and is considered an important aspect of a destination's appeal. In tourism discourse, climate is viewed as both an image asset and a determinant of tourist activities. Therefore, climate change is expected to have a significant impact on the tourism industry, affecting the demand for tourism, patterns of tourism flow, destination choices, travel duration, activities undertaken, as well as indirectly influencing the socio-economic structure of destinations and the costs of the tourism industry. This is a well-established theme in the literature on tourism and climate change.

Tourism has been recognized as a significant contributor to economic growth and job creation, however, in recent times, it has also been associated with environmental harm due to its high energy consumption and resulting carbon dioxide emissions. This issue has been highlighted in previous studies. Policymakers face significant pressure due to the environmental problems caused by high carbon dioxide (CO₂) emissions, such as climate change and global warming. As a result, reducing global CO₂ emissions and developing sustainable low-carbon economies has become an urgent priority worldwide. In this context, researchers are increasingly studying the potential connections between tourism and CO₂ emissions, including the contribution of tourism to overall CO₂ emissions.

In a study on Turkish ski tourism, researchers analyzed the potential impacts of climate change on the winter tourism industry in the Uludağ National Park in Turkey. The study found that rising temperatures and declining snowfall could lead to a decline in winter tourism in the region, with

negative economic impacts for local communities and businesses[1]. According to research, there will be a rise in the number of extremely hot days over 40 degrees Celsius along the Mediterranean coast of Turkey by the year 2100. This could result in a decline in the appeal of coastal regions due to changes in the climate. As a result, summer tourism may become less popular, leading to a shift in tourism demand towards other regions and types of tourism, with the peak period possibly moving to spring and autumn. This shift in weather patterns and extreme weather events may cause the loss of unique natural habitats and environments, which are a crucial component of the tourism industry. The risk of forest fires may also increase, putting ecotourism at risk and leading to the loss of ecosystems[2][3][4].

Another study, published in the journal *Sustainability* in 2019, examined the vulnerability of coastal tourism destinations in Turkey to sea level rise and storm surges[4]. The study found that many coastal areas in Turkey are at high risk of flooding and erosion, which could damage tourism infrastructure and affect the attractiveness of these destinations for visitors. The research found that tourists were generally aware of climate change and its potential effects, but that these factors did not significantly influence their travel decisions or behavior. Analysis of CO₂ emissions from tourism-related activities in Turkey from 1995 to 2012 has revealed important insights. The studies found that tourism-related emissions increased by 82% over this period, from 21.3 million tons of CO₂ in 1995 to 38.8 million tons in 2012. The study also found that international tourism accounted for the majority of these emissions[5]. Another study examined the carbon footprint of hotels in Turkey. The study found that the average carbon footprint per room per night was 29.8 kg CO₂, with energy use and waste generation accounting for most emissions. The study also found that the carbon footprint varied significantly depending on the hotel's location, size, and level of certification [6]. A study analyzed the potential for renewable energy sources to reduce tourism-related CO₂ emissions in Turkey. The study found that significant reductions could be achieved using solar and wind power, but that there were several barriers to their adoption, including policy and regulatory issues, lack of financial incentives, and a lack of public awareness [7]. A study published in the *Journal of Sustainable*

Tourism in 2018 analyzed the impact of climate change on tourist arrivals in Caribbean destinations. The study found that rising temperatures and the increased frequency and intensity of natural disasters had a negative impact on tourism arrivals in the region, with potential long-term economic implications for tourism-dependent economies [8].

Climate change has the potential to reduce the length of the tourism season in Turkey, particularly for beach tourism destinations, which could lead to a decline in tourist arrivals. Rising temperatures and decreasing precipitation levels could negatively impact the demand for winter tourism in Turkey, particularly for ski resorts at lower elevation. Climate change is likely to increase the frequency and intensity of extreme weather events, such as heatwaves and droughts, which could negatively impact tourism arrivals in Turkey. Changes in weather patterns and sea levels could lead to the erosion of beaches and coastal infrastructure, which could negatively impact tourism arrivals in Turkey [9][10].

Climate change is likely to increase the risk of wildfires in Turkey, particularly during the summer season, which could negatively impact tourism arrivals in affected regions. Rising temperatures and the increasing risk of heatwaves could negatively impact outdoor recreational activities, such as hiking and camping, which could lead to a decline in tourist arrivals. Changes in weather patterns could lead to a decline in agricultural productivity, which could negatively impact rural tourism destinations in Turkey. Climate change is likely to increase the risk of water scarcity, particularly in arid and semi-arid regions of Turkey, which could negatively impact tourism arrivals. Changes in weather patterns could lead to a decline in biodiversity, which could negatively impact ecotourism destinations in Turkey. The perceived risk of climate change and the impact of climate-related events on the natural and built environment could lead to a decline in tourist arrivals in Turkey, particularly among environmentally conscious travelers[11][12][13].

Tourism is a significant contributor to greenhouse gas emissions in Turkey, accounting for approximately 4.5% of total emissions. Transport-related emissions, particularly from air travel, are the largest source of tourism-related emissions in Turkey. Accommodation and food services are also significant contributors to tourism-related emissions

in Turkey, particularly in coastal tourism destinations. The carbon footprint of international tourism in Turkey has increased significantly in recent years, driven by an increase in tourist arrivals and longer stays. The tourism sector in Turkey is highly dependent on fossil fuels, particularly for transportation and accommodation. The use of energy-efficient technologies, such as solar panels and energy-efficient lighting, could significantly reduce tourism-related emissions in Turkey. The implementation of carbon pricing mechanisms, such as carbon taxes or emissions trading schemes, could encourage tourism businesses in Turkey to reduce their emissions[14].

Public awareness campaigns and educational programs could increase tourist awareness of their carbon footprint and encourage more sustainable travel behaviors. The implementation of sustainable tourism certification programs, such as Travelife or Green Key, could encourage tourism businesses in Turkey to adopt more sustainable practices. The use of electric and hybrid vehicles in the tourism sector in Turkey could significantly reduce transport-related emissions. The development of public transportation networks in tourism destinations could reduce the use of private vehicles and, consequently, emissions. The adoption of sustainable waste management practices in tourism destinations, such as recycling and composting, could significantly reduce emissions from waste disposal. The promotion of sustainable tourism practices in Turkey could increase the attractiveness of the country as a tourism destination, particularly among environmentally conscious travelers. The use of local and organic food products in the tourism sector in Turkey could reduce emissions from food production and transportation. The adoption of sustainable water management practices in tourism destinations, such as water conservation and reuse, could significantly reduce emissions from water treatment and distribution.

The development of green infrastructure, such as green roofs and walls, could help reduce the urban heat island effect in tourism destinations in Turkey. The restoration of degraded ecosystems in tourism destinations in Turkey could increase carbon sequestration and reduce. The use of renewable energy sources, such as wind and solar power, in the tourism sector in Turkey could significantly reduce emissions from energy production. The adoption of sustainable tourism practices in Turkey could also

have social and economic benefits, such as the creation of new employment opportunities and the preservation of cultural heritage sites. The development of sustainable tourism strategies in Turkey could help mitigate the impacts of climate change on the tourism sector and promote more resilient tourism destinations.

IV. CONCLUSION

Climate change has become a significant global concern in recent decades, and its impacts are being felt in various sectors, including tourism. Turkey, a popular tourist destination, is not immune to these impacts, and there are links between climate change and tourism development in the country. A review of the literature suggests that climate change is likely to affect Turkey's tourism industry in several ways. Rising temperatures and more frequent extreme weather events can have negative impacts on natural attractions, such as beaches and forests, and disrupt tourism activities such as skiing and water sports. This can lead to a decrease in tourist arrivals and revenues, affecting the country's economy.

Moreover, tourism development itself can contribute to climate change by increasing greenhouse gas emissions, particularly through air travel and energy-intensive hotel operations. The growth of tourism infrastructure can also lead to land use changes, environmental degradation, and loss of biodiversity, further exacerbating the impacts of climate change. Despite these challenges, there are also opportunities for Turkey to adapt to the impacts of climate change and promote sustainable tourism development. For example, the country can diversify its tourism products and promote alternative forms of tourism, such as cultural and ecotourism, that are less dependent on natural resources and less vulnerable to climate change. Additionally, promoting energy efficiency and renewable energy in the tourism sector can help reduce greenhouse gas emissions and enhance the sector's resilience to climate change.

In conclusion, the links between climate change and tourism development in Turkey are complex and multifaceted. Addressing these links requires a comprehensive and integrated approach that involves collaboration among stakeholders from the government, private sector, and civil society. By promoting sustainable tourism practices and

reducing its contribution to climate change, Turkey can help mitigate the impacts of climate change while enhancing the resilience and competitiveness of its tourism industry.

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