IJCEAS

International Journal of Contemporary Economics and Administrative Sciences
ISSN: 1925 – 4423
Volume: XV, Issue: 1, Year: 2025, pp.231-253

Climate Change Performance IDEX (CCPI) and Climate Action in the Tourism Sector

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Received:21.04.2025, Accepted:21.05.2025
DOI Number: 10.5281/zenodo.18130037

Abstract

Average temperatures and global emission trends are on the rise. Emissions must be reduced to zero by the 2050s to keep global warming at an acceptable level. This study focuses on the climate change performance of countries responsible for 90% of global emissions. CCPI is used for this purpose. The climate change performance scores and international tourist numbers of 54 countries included in the index, whose data can be fully accessed, between 2009-2022 were compiled as longitudinal panel data. These data were explained with descriptive statistics. Then, they were compared with the Climate Change Vulnerability Index for Tourism (CVIT) vulnerability rates. It was observed that the countries' average climate change performance scores were low despite the increasing international tourist numbers. Some countries have low climate change performance scores and high international tourist numbers. As a result of the research, countries with low performance, high vulnerability scores, and high international tourist numbers were determined. The situation in these countries is particularly striking. Considering this data, a summary of the methodology and tools used to measure emissions in the tourism sector was drawn and presented.

Keywords: Climate Change, Climate Change and Tourism, ı

JEL Code : L83, Z32, Z38

1. Introduction

The debate about climate change is interconnected with the Global Development Agenda. It is also essential to the Sustainable Development Goals by becoming a focal point for adopting and localizing the Sustainable Development

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Agenda 2030 (Dube, 2024, p. 1). Tourism is perceived as a sector that contributes internationally to the Sustainable Development Goals. Nevertheless, climate change and its impacts are an increasing obstacle to this contribution (Scott et al., 2019, p. 49).

There is a global agreement that climate change is primarily caused by human activities. Human activities such as consuming fossil fuels or logging "carbon sinks" (forests, peatlands, etc.) are extensive requirements for climate change. These requirements resulted in human-induced greenhouse gas emissions, dramatically affecting the climate with global warming (Conefrey and Hanrahan, 2022, p. 2).

International tourism is recovering from the effects of COVID-19. In 2022, it generated 963 million international tourists, $1.3 trillion in spending, and an economy of $2.5 billion. Tourism is a global phenomenon due to its economic, environmental, and social size (United Nations World Tourism Organization (UNWTO), 2023a, p. 3; Ruhanen and Shakeela, 2013, p. 36). Tourism is a significant sector in developing economies with high growth rates. Its economic impact is regarded as a leading solution for poverty reduction and development (Scott et al., 2012, p. 1). Physiography, climate, and natural sources contribute to a destination’s attractiveness (Gössling and Scott, 2024, p. 1). Nevertheless, tourism is very sensitive to climate (Scott et al., 2012, p. 1). Climate and weather conditions play a focal role in the tourism activities to be carried out.

The tourism industry's emission values contradict trends in other industries and popular opinion (Peeters et al., 2024, p. 1). Tourism plays a paradoxical role in climate change. It contributes to the problem and suffers the consequences (Prideaux et al., 2014, p. 1)—environmental and socioeconomic changes stemming from climate change (Scott et al., 2020, p. 1). Carbon risks that make traveling costly and physical and socioeconomic climate risks are the two principal axes of climate change concern (Gössling and Scott, 2024). Additionally, carbon risks as a cause and carbon costs as an effect are calculated economically and socially (Tol, 2023).

5% of anthropogenic emission values originate from tourism (2005 data). The leading sector is transportation, with a share of 75% (UNWTO and United Nations Environment Programme (UNEP), 2008). As Gössling et al. (2024, p. 2) argue, based on the evaluation method, air, land, water, and rail transportation account for nearly half of tourism's contribution to climate change. Later, within the scope of new research, this rate was revised between 5.2% and 12.5% (Scott et al., 2012, p. 3). In more recent studies, there is an agreement that this rate is between 8% and 10%.

If tourism's resources and innovations are effectively harnessed and directed towards addressing its critical issue, then it has the potential to significantly impact climate change. Moreover, climate change is a significant challenge for sustainable tourism (UNWTO and UNEP, 2008, p. 27; Tourism Panel on Climate Change (TPCC), 2023, p. 3).

Alternative tourism and the implementation of low water consumption are fundamentals in the ethical and sustainable battle against climate change (Hoogendoorn and Fitchett, 2018a, p. 12). While climate change was previously seen as a future phenomenon, this perception has changed recently. There is an awareness of regulating tourism in a low-carbon manner, especially regarding the Climate Change Mitigation Mechanism. In addition, various tourism stakeholders emphasize the need to consider tourism's carbon footprint.

Carbon footprint is a concept formulation that calculates and evaluates the intensity of greenhouse gas production and consumption associated with goods and services (Conefrey and Hanrahan, 2022, p. 6). Reducing tourism's carbon footprint and contributing to the fight against climate change is imperative. These critical topics demand urgent attention and action (Dube, 2024, pp. 10-13).

The effects of climate change, climate-related consequences in response to adaptation and maladaptation, mitigation, and resilience are current topics in tourism research (Scott et al., 2024, p. 283). For instance, in her study, Becken (2024) developed a Mitigation Context Index focusing on public transportation, green energy, and nature conservation. Climate change limitation strategies typically draw on "improving, restoring, creating, or preserving" contemporary standards to balance the impacts that cannot be avoided. In contrast, climate change adaptation strategies seek to reveal and adjust to the effects of climate change by changing current standards (Dogru et al., 2019, pp. 292-293). For instance, one notable climate change adaptation method in the tourism sector is snow production for ski areas (Scott et al., 2024, p. 282).

It is obvious how important it is to act against climate change worldwide. Globalization, increasing welfare, technological developments, and innovations in all other tourism-related areas, especially transportation, have increased tourist mobility. Based on today's data, this mobility is expected to grow even more.

Most tourism and climate change studies have focused on North America, Europe, Australia, New Zealand, China, and South Africa (Dube, 2024, p. 13). A remarkable point is that this topic has not been examined in low-income countries (Gössling and Scott, 2024, p. 2). Therefore, more inclusive research must address this issue worldwide. Numerous countries have progressed recently in developing strategies to mitigate and adapt to the adverse social effects of climate change. Nevertheless, these efforts remain limited (Valkengoed et al., 2024, p. 554). Global climate policy is a substantially underexplored topic in the literature. Tourism policy struggles with climate policy in many countries (Gössling and Scott, 2024, p. 5).

Individuals play a critical role in addressing climate change. They can develop and implement sustainable, ongoing, and adaptive responses to mitigate climate change and its effects. Moreover, they can reduce greenhouse gas emissions and slow down climate change by taking initiative, encouraging others, providing guidance, and mobilizing efforts (Wolf and Moser, 2011, p. 547). Tourists often

display flexibility in their destination choices. Additionally, tourism operators confront challenges such as wasted resources, adverse weather conditions, fluctuating vacation costs, declining socio-economic stability, and reliance on specific locations (Gössling and Scott, 2024, p. 2). Therefore, National Climate Change Performance monitoring programs are essential for tourism. Including tourism activities in the program is vital for evaluating their success and assessing improvements in the sector's carbon footprint (Becken et al., 2020, p. 1620).

Many countries and their governments have recently been involved in developing policies for climate change (Becken and Clapcott, 2011). Nevertheless, the impacts of climate change on the tourism sector remain uncertain both regionally and at specific destinations. Additionally, the geographic scope of existing studies is limited (Scott et al. 2019, p. 50). In this context, considering the millions of people who provide tourism services and participate in tourism movements, the sector's impact on anthropogenic climate change is significant.

In this study, countries' performance measurement in combating climate change, their vulnerabilities, and climate action in the tourism sector were examined as examination topics. A large geographical area was attempted to be evaluated holistically. Climate change is ultimately a global event affecting the world's geography. In this context, studies conducted on different geographical areas that have not been addressed before will be important in combating this event globally. Climate action to be taken against climate change in a single geography will not be sufficient in most cases, and action will be required with many geographies and participants on this issue.

Indexes are widely used analytical tools employed in various fields, including decision-making processes related to policy and operation, especially in tourism (Scott et al., 2019, p. 51). The study evaluated countries' climate performance, vulnerabilities, and international tourist numbers. Nevertheless, adaptation to climate change mainly focuses on decreasing short-term climate risk (Scott et al., 2024, p. 283). Potential strategies against climate change are not principles that can apply to every destination (Dogru et al., 2019, p. 294). It is more accurate for each destination to determine strategies according to its characteristics. This study has provided a comprehensive perspective by considering twelve years. In addition, this study can be a resource for future studies in climate management and control.

2. Literature Review

Within the research's theoretical framework, climate change and global warming, among the current research topics, were discussed. Then, CCPI and CVIT measurement tools were included in climate change and tourism. Climate change and tourism, indexes related to climate change and tourism, and the conceptual background of climate action in tourism were defined.

2.1. Climate Change and Global Warming

Climate and weather are different terms within the time frame. While climate refers to typical weather patterns in a particular region over 30 years or more, weather refers to short-term atmospheric conditions (National Aeronautics and Space Administration (NASA), 2024). Throughout history, there have been climate changes, such as ice ages and warmer periods. Nevertheless, current climate change is not only natural but also human-induced. The concept of climate change today refers to human-induced changes in climate patterns. Global warming is a key indicator of climate change (Jackson and Jerome, 2021).

The greenhouse gas effect is heat radiating from Earth to space that is trapped in the atmosphere. Human activities are the main reason for the warming of the atmosphere, seas, and land. Global warming is related to accelerated and significant changes in the atmosphere, ocean, cryosphere, and biosphere (Jarosova and Pajdlhauser, 2022, p. 217). A limited number of researchers question human-induced global warming. Nonetheless, there is enormous evidence from scientific research that the leading cause is human activity. In contrast, the change's moment and magnitude are unclear (Pang et al., 2013, p. 4).

Within the scope of the Paris Agreement assurances, human-induced warming is expected to exceed 1.5 °C above pre-industrial levels (International Panel on Climate Change (IPCC), 2019). If emissions persist, they may exceed 2 °C (Organization for Economic Co-operation and Development (OECD) and UNEP, 2011, p. 21). Exceeding 2 °C is an essential problem for the global economy (Scott et al., 2019, p. 50) and life on Earth.

A rise of 1.5-2 °C would result in high average temperatures, extreme temperatures in inhabited regions, unbalanced precipitation, droughts, and floods in many areas. To keep warming around 1.5 °C, global emissions must be reduced to zero by 2050. If the current emissions remain, the safe borders of climate change will be exceeded. Reducing emission values is essential to remain safe within social and environmental limits (IPCC, 2019; OECD: 2011, p. 21).

Strategies require environmental sustainability and sustainable management to reduce global emissions (Don et al., 2023, p. 1). For the United Nations and scientific audiences, the 2020s were a watershed point for standing against climate change (Scott et al., 2024, p. 282).

2.2. Climate Change and Tourism

Tourism and climate change share a reciprocal relationship. One of the major global industries, tourism, has experienced extraordinary growth. Nonetheless, it is a major contributor to climate change (Conefrey and Hanrahan, 2022, p. 3). Climate and weather are key resources for resource-dependent tourism (Mushawemhuka et al., 2021, p. 443). Climate change is not a phenomenon that will occur in the future. It requires the development of tourism policies and

management. Severe weather conditions such as excessive rainfall, heat waves, storms, and uncontrolled fires have become more intense and frequent.

Climate change is one major factor affecting destinations and tourism demand globally. It also impacts critical tourism assets. For instance, snowfall in winter tourism destinations is becoming increasingly unpredictable. Warming oceans and rising sea levels significantly threaten coral reefs and beaches. Moreover, climate change is increasing travel costs, which is impacting the global geography of travel tourism (Gössling and Scott, 2024, p. 1).

The climate change debate started in the mid-1980s. The primary focus was on the hazardous impacts of climate change on winter and beach tourism. In the 1990s, the discussion about the impact of the aviation sector on greenhouse gas emission levels became prominent. Since the 2002s, the number and diversity of research in the literature have increased (Scott et al., 2012, p. 3; Jarosova and Pajdlhauser, 2022).

The effects of climate change might have serious consequences. For instance, if many destinations and tourism businesses are affected, changes due to them and resulting responses from tourists can influence various aspects of the tourism system and its competitors. Moreover, with the effects of climate change, the tourism system can have negative consequences and opportunities within the global competitive environment (Scott et al., 2012, p. 4). It is challenging to develop a common understanding of climate change in the multifaceted tourism sector (Becken and Claocott, 2011, p. 2).

Tourism is projected to grow rapidly in some areas in the following decades; nevertheless, there is a regional information gap for them (Scott et al., 2019, p. 50). According to Conefrey and Hanrahan (2022), tourism's carbon footprint has not been assessed globally. This indicates a lack of planning and assessment in tourism's decarbonization efforts.

The three main problematic aspects of climate change are direct climate effects, indirect effects of climate change, and greenhouse gas emissions (Becken and Clapcott, 2011, p. 3). There are two ways to understand the relationship between climate change and tourism. First, climate change impacts the natural environment on which tourism relies; therefore, the tourism industry must adapt. Second, the fossil fuels used in the tourism industry contribute to greenhouse gas emissions (Richardson and Witkowski, 2010, p. 318).

Carbon budget refers to the quantity of carbon emissions in the atmosphere before reaching a specific temperature threshold. Recently, efforts have been made to determine global warming and climate change by the remaining carbon budget (Gössling et al., 2024, p. 2). Although the carbon budget method is suitable for action against climate change, various risk dimensions exist, such as the economic, environmental, social, and technological possibilities of Mult crisis and political instability. Additionally, the negative impacts of climate change may potentially reinforce other crises (Gössling and Scott, 2024, p. 7). Climate policy integration in the tourism sector (Di Gregorio et al., 2017) is an important issue. For instance,

Becken et al. (2020, p. 1605) defined concepts that reflect the steps or degrees of climate policy integration. Coordination, cooperation, consistency, and integrity are the concepts they represented. They also revealed that climate change is not a priority for tourism policymakers.

For Scott et al. (2012, p. 4), "direct climate impacts, indirect climate-induced environmental change, indirect climate-induced socio-economic change, and mitigation and adaptation policy responses" from outside the tourism industry are the ways that will affect the prospects of international tourism. In addition to international tourism, internal tourism must be considered for a more detailed evaluation.

Dube's (2024) bibliometric analysis revealed a significant increase in academic publications identifying climate change's multifaceted effects on tourism. Tourism and climate change studies focus on adaptation and the long-term battle against climate-induced disasters (Hoogendoorn and Fitchett, 2018a, p. 4). Severe, heavy, or harsh weather, loss of assets, climate disasters, management, technological developments, tourism geographies, and climate change are the current topics in tourism research (Gössling and Scott, 2024).

As Dube (2024) also stated, studies on tourism and climate change issues include Tourism Climate Index, Vulnerability, Adoption (Amelung et al., 2007; Scott et al., 2012; Roshan et al., 2016; Li et al., 2023; Hoogendoorn and Fitchett, 2018b; Scott et al., 2019; Mushawemhuka et al., 2021; Gössling and Scott, 2018), Climate Change and Winter Tourism, Ski Tourism, Artificial Snow Production (Scott et al., 2012; Scott et al., 2020; Scott, et al., 2024; Scott and Steiger, 2024), Tourism and Water Use (Gössling et al., 2012; Roson and Sartori, 2013; Cole et al., 2020), Aviation and Climate Policy (Gössling, et al., 2024; Jarosova and Pajdlhauser, 2022).

The impacts of climate change on tourism development have been examined in various destinations (Cavlek et al., 2018; Prideaux et al., 2021; Samarasinghe et al., 2023; Mushawemhuka et al., 2021). In this context, the study of climate change and tourism examines the geographical distribution of destinations according to their environmental and climatic features, natural resources (such as beaches, snow, and biodiversity), socio-economic stability, and travel costs (Gössling and Scott, 2024, p. 2). The literature also investigates the impacts of climate change on coastal (sea level rises, floods, etc.) and nature-based tourism destinations (Scott et al., 2012). Rich resources and diversity are crucial for destinations' adaptation and resistance to climate change (Dogru et al., 2019, p. 293). Studies on the effects of climate change on winter tourism destinations are also available. Scott and Steiger (2024) sought an answer to how climate change will affect the billion-dollar ski industry in the coming years.

Some special social models regard the following 50-75 years as uncertain. Climate change will alter the geographical distribution of tourism demand for these models. Moreover, they indicate that following a tourism demand decrease in

specific destinations, property values, employment, and foreign exchange inflow will create adaptation challenges. The same adaptation issue will be valid for some destinations with increased transportation, water capacity, and sustainable environmental regard to tourism demand (Scott et al., 2012, p. 6).

Academic studies that address future scenarios related to climate change are valuable endeavours. Scott et al. (2012, p. 6) suggested that with climate change, tourists from places such as Northern Europe, Japan, the USA, and Canada will dominate international tourism and benefit from new climatic opportunities in areas close to their countries. They also suggest that demand for subtropical, tropical, and some Middle Eastern countries will decline with fewer arrivals than in temperate countries. More external passive tourism will occur in these countries.

Scott et al. (2020) estimated that the number of ski resorts in Norway that rely on natural snow will decrease by half in the 2030s and by one-third in the 2050s in their projections for 110 ski resorts. In this context, artificial snow production is regarded as an adaptation strategy for ski centres that do not have sufficient regular snowfall (Dogru et al., 2019, pp. 293-294).

The predictions of carbon and its related social costs are compelling in destinations where their economy primarily depends on tourism (Scott and Steiger, 2024, p. 13). Becken et al. (2020, p. 1618) researched policy documents and found that the countries with the highest levels of emissions and tourism do not adequately address this issue in the public domain. The limited integration of climate policy related to this matter is a significant finding. Countries need to improve their performance on such a crucial issue for life on Earth in the fight against climate change.

Climate change can affect the tourism system in three ways: (1) Changes in season lengths will change the availability of certain tourism activities; (2) climate changes will also change the comfort and enjoyment of general tourism experiences; (3) climate changes can affect the ecological systems and natural resources in the destination, which can ultimately change the quality of tourism opportunities (Richardson and Witkowski, 2010: 318). Climate change will change both the competitiveness of tourism destinations and major tourism market segments (e.g., ski tourism). All tourism destinations will adjust to climate change by reducing risks and seizing new opportunities related to local impacts from climate change or its effects in the broader tourism system and competitors (Scott et al., 2012, p. 13).

2.3. Climate Action in Tourism

Climate action is essential in tourism. Nevertheless, it is particularly critical for developing economies that are highly vulnerable to climate change and reliant on tourism within the dichotomy of climate change and tourism development (Scott et al., 2012, p. 3). Regions receiving high tourist arrivals often show fragility and resilience, particularly when facing widespread challenges like climate change. This resilience typically depends on the availability of substantial political, economic, and social capital (Dogru et al., 2019, p. 293).

Scott et al. (2019) conducted a study on the vulnerability of global tourism to climate change. This study identified Africa, the Middle East, South Asia, and Small Island Developing States as the most vulnerable regions. Western and Northern Europe, Central Asia, New Zealand, and Canada were evaluated as the least vulnerable regions. According to them, countries in areas where tourism accounts for a large proportion of GDP and is forecasted to grow in the coming years are the most vulnerable to climate change.

Policies are fundamental to coping with the vulnerability of climate change. Tourism spans various jurisdictions within society and the economy. Consequently, tourism and climate change policies necessitate horizontal and vertical integration (Becken et al., 2020, p. 1608). Examining the effects of climate change on tourism requires both internal (country's borders) and international (cross-border) evaluation (Scott et al., 2019, p. 50). Tourism has social, cultural, economic, and environmental aspects, which are interconnected. This attribute of tourism could help limit climate change and enhance successful adaptation strategies (Dogru et al., 2019, p. 71).

Global tourism is constantly growing, so the system's emission values are rising. Analyzing the lack of policies and existing obstacles can illuminate the difficulties faced (Gössling and Scott, 2024, p. 7). In tourism, which is mainly travel and accommodation, the effects of climate change must be evaluated in a multidimensional and holistic manner.

In their study, Becken et al. (2020) gave the following examples as best practices in terms of scope, climate change coverage, materiality, and political harmony regarding climate policy integration: England; “Sustainable Tourism in England: A Framework for Action Meeting the Key Challenges”, Australia; “Queensland’s Tourism Climate Change Response Plan (2017)”, Caribbean; “The Caribbean Sustainable Tourism Policy Framework (2008)”, Zambia; “Zambia’s National Climate Change Response Strategy”, Suriname “Final National Climate Change Policy, Strategy and Action Plan for Suriname”, Mauritius; “Mauritius’ National Climate Change Adaptation Policy Framework” and the European Union’s “The European Tourism Indicator System – ETIS Toolkit for Sustainable Destination Management”.

There may be good examples of climate action among countries and regions. In addition, good examples implemented regionally need to be spread worldwide. It is an essential issue that organizations that direct both companies and investors against climate change, such as the “Task Force on Climate-Related Financial Disclosures” (TCFD, 2024), established by a group of G-20 countries in 2015, become more widespread and active. The methodologies that can be used in tourism for climate change are presented in Table 1.

2.4. CCPI

CCPI is an index that evaluates countries' performance on climate change. The countries included in CCPI cover more than 90% of greenhouse gas emissions globally. Now, the index assesses 63 countries and the European Union. CCPI assesses countries' performance in four categories, which are presented in Table 1.

Table 1. CCPI Performance Category Scores and Components

Climate policy 20%	National climate policy 10%
	International climate policy 10%
Energy usage 20%	Current level of energy use: Total Primary Energy Supply per Capita (TPES/Capita) 5%
	TPES/Capita trend 5%
	Current TPES/Capita level 5% paths to compliance below 2°C
	TPES/Capita 2030 Target 5% paths to compliance below 2°C
Renewable energy 20%	Compared with compliance pathways below 2°C Renewable Energy 2030 Target 5%
	Compared with compliance pathways below 2°C Current share of Renewable Energy 5%
	Energy supply from Renewable Energy sources 5%
	Current share of Renewable Energy per TPES 5%
Greenhouse gas emissions (GHG) 40%	Current level of GHG Emissions per Capita 10%
	Historical Trend of GHG Emissions per Capita 10%
	Current level of GHG Emissions per Capita compared with compliance pathways below 2°C 10%
	GHG Emission Reduction Target 2030 compared with compliance pathways below 2°C 10%

Source: CCPI (2024b)

CCPI has chosen four elements because an effective climate policy may impact energy use and foster renewable energy, resulting in a reduction in the current levels of emissions. The CCPI consists of 14 indicators, and 80% of country performances are based on quantitative data from various well-known institutions worldwide. Each of the categories of "GHG Emissions, Renewable Energy, and Energy Use is defined by four indicators: (1) Current Level; (2) Historical Trend; (3) Compliance below 2°C above the current level, and (4) Countries' Compliance below 2°C below the 2030 Target." The final 20% of the assessment comes from the global climate policy section of the CCPI. The category covers recent advancements in national climate policy frameworks that are not in the quantitative data. (1) National Climate Policy and (2) International Climate Policy are the two indicators of the section The scores in the assessment are listed as very low 0-44.54, Low 44.55-57.68, Medium 57.69-63.88, High 63.89-75.59, and very high 75.60-100 (CCPI, 2024b).

2.5. CVIT

Climate is amongst the most critical factors shaping preferences for tourism destinations. Any change in the current climate conditions can impact both incoming and outgoing tourism. These changes, in turn, affect tourism revenues, consumption patterns, income, and overall welfare (Roson and Sartori, 2013, p. 213). Tourism destinations are structured according to their environment. Creating destinations has opportunity costs. Therefore, many vulnerabilities are associated with climate change within the scope of tourism. Vulnerability can be defined according to the impact on national income, tourist arrivals, tourism revenue, tax revenues, and compliance costs, ultimately affecting Gross Domestic Product (GDP) and socioeconomic well-being" (Richardson and Witkowski, 2010, p. 315).

Climate change has environmental, social, economic, and other adverse effects. Consequently, vulnerability can be described as the extent to which we cannot address these issues. The 27 indicators in CVIT are divided into six index dimensions listed below (Scott et al., 2019, p. 52). Table 2 lists the indicators within these dimensions.

Table 2. CVIT Dimensions and Indicators

Dimension	**Indicator**
(1) Tourism Assets (TA)	Climate suitability for tourism Ecotourism impact (terrestrial) Ecotourism impact (marine) Beach tourism impact Ski tourism impact
(2) Tourism Operating Costs (TOC)	Water competition and operating costs Energy costs Food costs
(3) Tourism Demand (TD)	Impact of climate change on international arrivals

	Economic growth in the country's top 5 international markets Distance from the country's top 5 international markets Percentage of international leisure arrivals Impact of climate change on domestic departures Economic growth in the country (GDP)
(4) Host community determinants (HCD)	Air disasters Security impacts Health impacts
(5) Tourism sector adaptation capacity (TSAC)	Tourism competitiveness Country image and brand attractiveness Outbound market size Wealth distribution Quality of transport infrastructure
(6) Host country adaptation capacity (HCAC)	Socio-economic conditions supporting adaptation Governance quality Sustainability management and performance

Source: Scott et al. (2019, pp. 52-53)

The study's dimensions and indicators were tested using two weighting sets. Set 1: TA (%18.5)+TOC (%18.5)+TD (%22.3)+HCD (%11.1)+TSAC(%18.5)+HCAC (%11.1). Set 2: TA (%12.5)+TOC (%12.5)+TD (%12.5)+HCD (%12.5)+TSAC (%25%)+HCAC (%25). The correlation coefficient based on individual countries was very high (0.97) (Scott et al., 2019, p. 54).

3. Method and Findings

The evaluation of tourism emission values by country presents challenges. For instance, emissions can be calculated locally or based on destination. Moreover, transportation, accommodation, activities, shopping, and food sectors must be included when considering tourism. Other factors to account for are these sectors' life cycles and supply chains, and the need to monitor and report on both short-lived and long-lived greenhouse gases (Gössling and Scott, 2024, p. 3). Richardson and Witkowski (2010) highlighted in their research that small island states, which rely heavily on tourism for their economies, are particularly susceptible to the impacts of climate change. Monitoring the adverse effects of climate change in destinations where tourism plays a central role in the economy is essential.

International Journal of Contemporary Economics and Administrative Sciences
ISSN: 1925 – 4423
Volume: XV, Issue: 1, Year: 2025, pp.231-253

Longitudinal research is the collection of values of variables related to the research question at different times and the determination of the development and changes in the phenomenon or event as a result. Collecting and analyzing data from different time series from the same analysis units is panel research, a subtype of longitudinal research (Gürbüz and Şahin, 2018, p. 116). In this study, performance scores against climate change and international tourist numbers in countries where data could be obtained were compiled between 2009 and 2022 and analyzed with descriptive statistics. In addition, the CVIT vulnerability rates of these countries were presented holistically with this data to evaluate changes and developments.

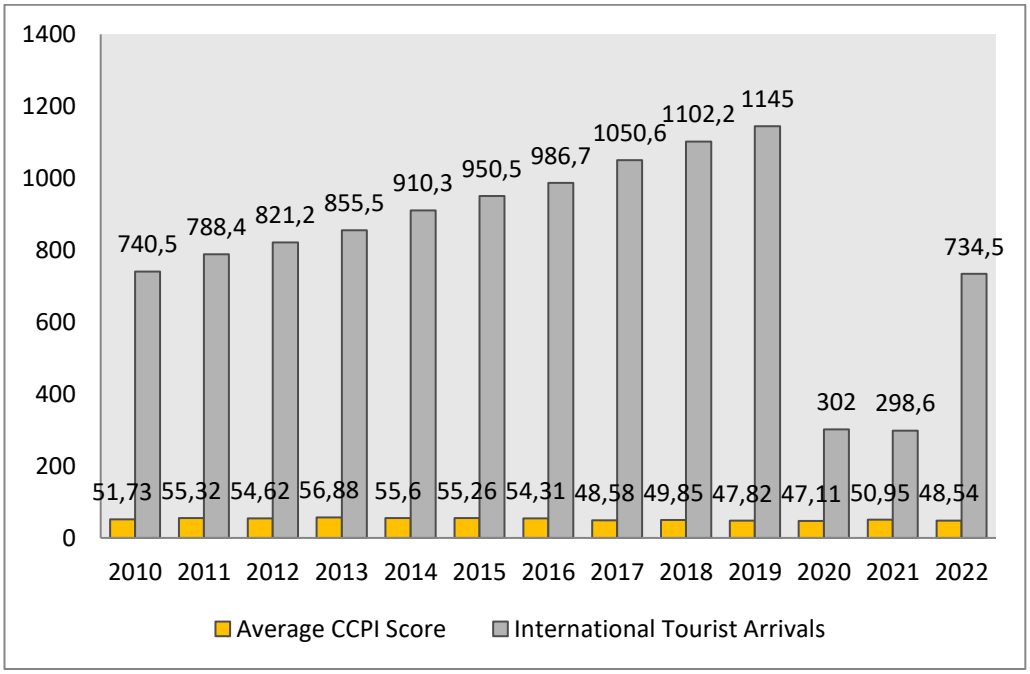

Figure 1. Average CCPI Scores and International Tourist Arrivals 2010-2022

Source: Data used from UNWTO (2024) and CCPI (2011, 2012, 2013, 2014, 2015, 2016, 2017, 2018, 2019, 2020, 2021, 2022, 2023)

Figure 1 displays the average CCPI score and total international tourist arrivals for 53 countries with complete data available in the index from 2010 to 2022. As the data indicates, the overall average score of these countries is low. This performance requires improvement, especially given the number of international tourists arriving. While there was a short-term decline in international tourist numbers during the COVID-19 pandemic, this situation has improved. However, there has been no improvement in the performance scores of these countries.

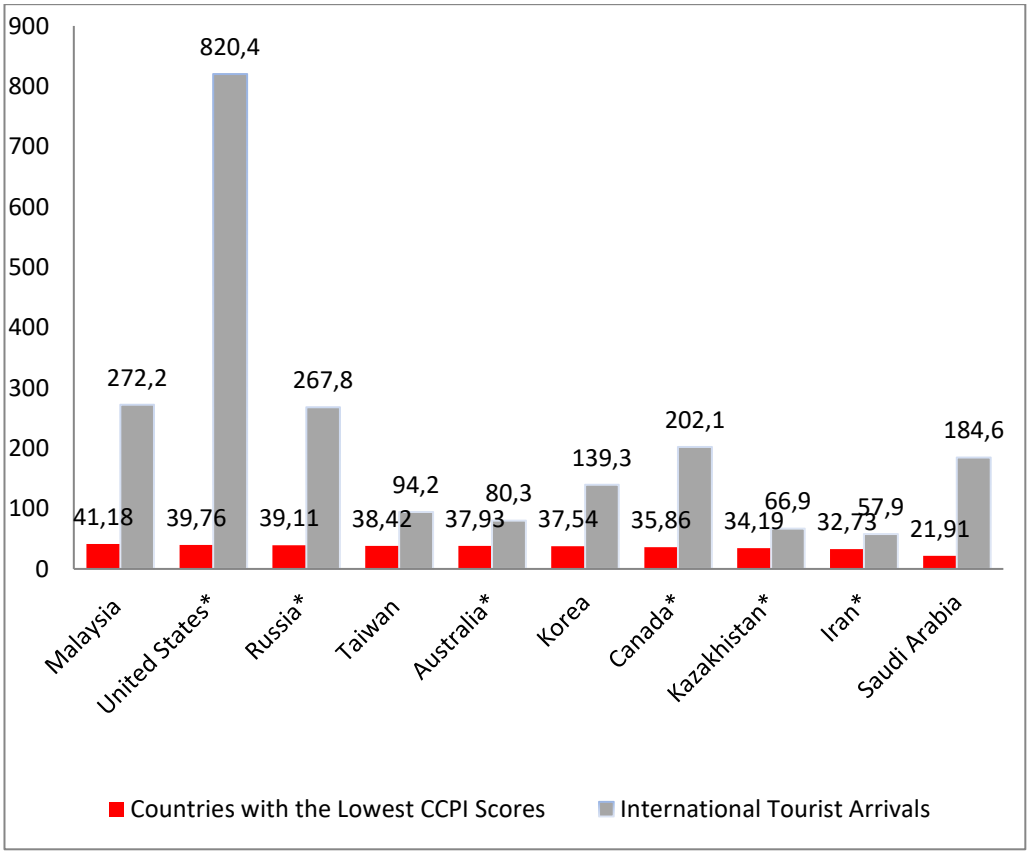

Figure 2. Countries with Very Low CCPI Scores and International Tourist Arrivals 2010-2022

*Countries are fossil fuel-producing countries.

Source: Data used from UNWTO (2024) and CCPI (2011, 2012, 2013, 2014, 2015, 2016, 2017, 2018, 2019, 2020, 2021, 2022, 2023)

Figure 2 presents data for ten countries with low CCPI scores. Among these countries, the USA, Russia, Australia, Canada, Kazakhstan, and Iran are prominent in fossil fuel production. The USA stands out with its low climate performance and high international tourist arrivals. Canada and Malaysia are also in a similar position. Saudi Arabia is a country that should be carefully evaluated in terms of demand continuity, as it hosts religious tourism.

According to the data presented in Table 3, Indonesia, New Zealand, Austria, South Africa, Turkey, China, Australia, Iran, and Saudi Arabia are the countries with the lowest climate change performance and the highest vulnerability. Additionally, the data in Table 3 can be utilized to compare and draw more conclusions about climate change performance and tourism vulnerability.

IJCEAS

International Journal of Contemporary Economics and Administrative Sciences
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Volume: XV, Issue: 1, Year: 2025, pp.231-253

Table 3. 2010-2022 Average CCPI Scores, International Tourist Arrivals, and CVIT Vulnerability Status

Country	**2010-2022 Average CCPI Scores**	**CCPI Climate Performance Status**	**2010-2022 International Tourist Arrivals**	**CVIT Vulnerability Status**
Sweden	71,56	High	97,7	Near low
Denmark	68,72	High	125,5	Near low
England*	66,94	High	393	Near low
Morroco	65,13	High	122,7	High
Switzerland	63,38	High	115,5	Near low
Norway*	63,11	Middle	61,61	Near low
India*	62,76	Middle	147,3	Middle
Malta	62,12	Middle	22,9	Near low
Lithuanian	61,53	Middle	25,9	Near low
Germany*	61,51	Middle	389,4	Near low
France	61,21	Middle	962,9	Near low
Latvia	60	Middle	18,2	Near low
Finland	59,03	Middle	36,5	Near low
Brazil*	57,91	Middle	67,3	Middle
Mexico*	57,53	Low	411,4	Middle
Luxembourg	57,43	Low	12,1	Near low
Slovakia	56,96	Low	54,2	Near low
Romania	56,61	Low	118,8	Near low
İtaly	56,37	Low	621,9	Near low
Belgium	55,91	Low	94,6	Near low
Netherlands	55,39	Low	178,3	Near low

Croatia	55,09	Low	159,4	Near low
Indonesia*	54,83	Low	115,1	High
Spain	53,88	Low	786,6	Near low
Ireland	53,77	Low	91,2	Near low
Greece	52,76	Low	273,7	Near low
Estonia	52,6	Low	34,3	Near low
Southern Cyprus	52,44	Low	35,1	Near low
Hungary	52,02	Low	160,7	Near low
Belarus	51,69	Low	16,7	Near low
New Zealand	51,38	Low	32,7	High
Thailand	51,12	Low	296,4	Middle
Austria*	51,04	Low	320,3	High
Slovenia	50,89	Low	38,2	Near low
South Africa*	50,66	Low	105,3	High
Czech Republic	49,93	Low	123,4	Near low
Bulgaria	49,01	Low	83,6	Near low
Algeria	48,15	Low	25,3	Middle
China*	47,58	Low	601,5	Middle
Argentina	47,5	Low	74,5	Middle
Poland*	46,45	Low	199,9	Near low
Türkiye	45,01	Low	480,1	High
Japan	44,72	Low	190,6	High
Malaysia	41,18	Very low	272,2	Middle
United States*	39,76	Very low	820,4	Near low
Russia*	39,11	Very low	267,8	Near low
Taiwan	38,42	Very low	94,2	High
Australia*	37,93	Very low	80,3	High

South Korea	37,54	Very low	139,3	Orta
Canada*	35,86	Very low	202,1	Near low
Kazakhstan*	34,19	Very low	66,9	Near low
Iran*	32,73	Very low	57,9	High
Saudi Arabia	21,91	Very low	184,6	High

Source: Data used from UNWTO (2024), CCPI (2011, 2012, 2013, 2014, 2015, 2016, 2017, 2018, 2019, 2020, 2021, 2022, 2023) and Scott et al.

In his bibliometric analysis, Dube (2024) stated that the USA leads in academic publications on tourism and climate change, followed by the UK, Australia, China, Spain, Canada, Germany, Italy, and South Africa. The USA, Australia, and Canada were among the countries with very low CCPI scores between 2010 and 2022. It is interesting to reveal that although climate change attracts academic attention, these countries still perform poorly against it. Gössling et al. (2024, p. 9) revealed in their research that the national tourism organizations (NTOs) they examined targeted wealthy long-distance markets. Therefore, more inclusive studies must be considered for a detailed tourism and climate change picture.

4. Discussion and Conclusion

The 1990s and the beginning of the 2000s are crucial for understanding climate change's contribution and its impact on tourism (Gössling and Scott, 2024, p. 3). Today, climate action is the thirteenth of the seventeen Sustainable Development Goals (United Nations Department of Economic and Social Affairs, 2024). Determining, limiting, adapting to, and being resilient to the effects of climate change is a current and important issue in the sustainability of life in the world.

When considering the dimension that international tourism has reached, it is obvious how important tourism policy and planning have become regarding climate change. Becken et al. (2020, p. 1607) identified that tourism policy emphasizes several positive aspects, including the economic benefits of tourism, its geographic expansion, the enhancement of visitor experiences, the growth of collaborations between the public and private sectors, and the use of tourism statistics in the literature. Considering the risks posed by climate change, combating it should take the lead within the scope of policy and planning and be associated with other prominent policy headings.

When looking at the intersection of tourism and climate change issues, it is seen that there are two basic perspectives in the literature. The first of these is the impact of climate change on destinations. The second is the carbon footprint created by tourism and its impact on climate change. Risks will probably be encountered regarding climate conditions and carbon footprint due to climate change in terms of tourism. The effects of climate change on different destinations' tourism types

(sports, skiing, culture, heritage, etc.) and disasters such as fires and similar disasters that occur in destinations due to climate change are areas that need to be examined in more depth. In addition, more comprehensive, standardized, and applicable studies should be conducted on the carbon footprint for both supply and demand in the tourism sector.

The countries' average CCPI scores are low. Considering the risks of climate change for life on Earth, it is imperative to implement political policies and plans on this issue. One of the leading topics in the action against climate change is tourism. The data obtained from the research is interesting in showing global mobility and the number of international tourists hosted by the countries.

Achieving net-zero carbon in tourism is an important goal. Measures such as carbon budgets, carbon taxes, etc., are rarely implemented worldwide to reduce the effects of climate change. Such issues are important research areas that need to be examined in more depth in the tourism sector.

If today's emission values continue, climate change will affect destinations serving many different types of tourism. For example, the season will be shortened in destinations serving winter and ski tourism. A significant budget may be allocated to producing artificial snow for ski resorts. In addition, some of these destinations may have to reposition themselves for different types of tourism, such as nature-based tourism, highland tourism, etc. These effects and the aims of avoiding costs and keeping climate change and global warming at specific rates require controlling anthropogenic climate change. In this context, the performance of countries in combating climate change is significant.

Tourism Climate Indexes adapted for different types of tourism (camping, beach, etc.) in different destinations should be considered. It is necessary to adapt to the climate change that will occur in the future in the context of the destination and tourism type. Action against climate change can only be carried out with non-superficial policies. As a result of the study, it was revealed that the performance of countries against climate change is low on average. Ensuring policy integration is an important issue in these countries. Coordination, cooperation, harmony, and integrity should be important in policy integration. In addition, physical, economic, and social dimensions should be considered holistically when adapting to climate change.

Since the United Nations promotes sustainable and universally accessible tourism, UNWTO should focus on studies that will adapt tourism adaptation strategies to the 2030 sustainable development goals in a world exceeding +2 °C (Scott et al., 2019, pp. 59-58). Developing policies and guidelines for climate action by supranational institutions is important in combating this issue.

International tourism and combating climate change must be examined holistically. Although analyses were conducted on longitudinal data in this study, studies are conducted for each branch in the tourism sector, which has a multi-sectoral cross-sectional structure, and these should be evaluated within the tourism system. Future studies should examine the effects on sectors such as accommodation, intermediaries, transportation, etc., in more depth. In addition, scenario studies examining the possible effects of climate change on tourism may also be valuable in preparing for the future.

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