4

Global Tourism Climate Impacts and Adaptation

The foundation for effective adaptation action is a robust understanding of exposure to climate hazards and observed as well as potential impacts on tourism operations, infrastructure, natural and cultural heritage assets, and demand patterns.

Finding 10

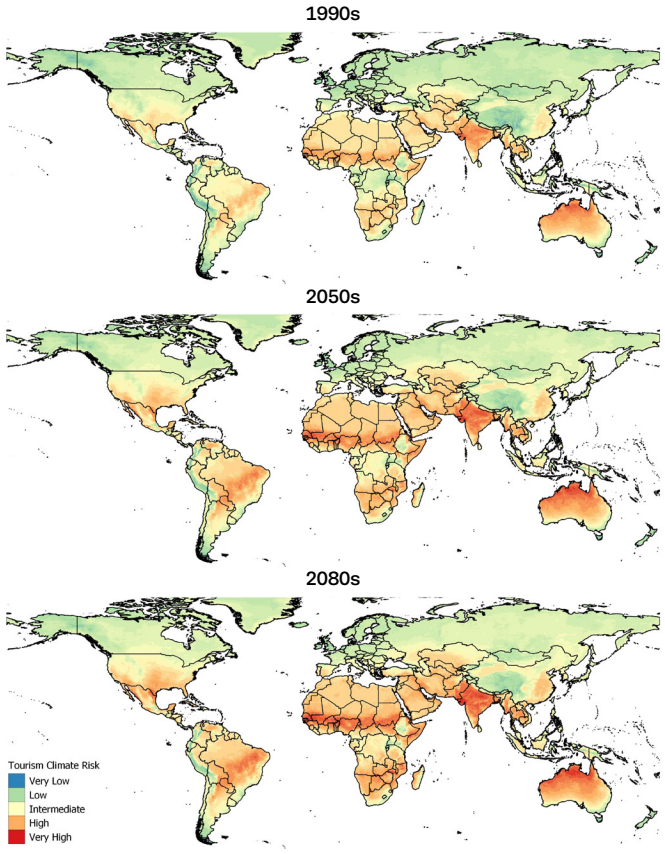
Climate change exposure and impacts are anticipated to be far-reaching for tourism. High sector vulnerability often coincides, both with regions where tourism contribution to GDP is high and those where tourism growth is anticipated to be the strongest through to the 2050s. Current forms of tourism will not be viable at some destinations.

Metric: Cumulative Climate Hazard Exposure

Tourism is a highly climate-sensitive sector that is strongly influenced by multiple climate hazards,[95] which are observed to be changing and will continue to evolve in the decades ahead.[96] Figure 17 illustrates the differential and changing global distribution of tourism exposure to multiple (19) climate hazards under a moderate (IPCC: RCP4.5) emission scenario.[97]

Figure 17

Tourism exposure to cumulative climate hazards



Exposure hotspots are found in South and South-East Asia, sub-Saharan Africa, the Amazon and central South America, small island developing states in the Caribbean and Indian and Pacific Oceans, Northern Australia and Southern USA and Mexico. Lowest exposures are found in Western and Northern Europe, Central Asia, and parts of China, Canada and New Zealand. High exposure in regions where tourism represents a large part of the economy (see Figure 3 earlier) or is considered a future development strategy demonstrates where climate change will pose a barrier to tourism contributions to the SDGs and where countries most need to incorporate tourism into National Adaptation Plans (see section 5.2). The implications of changing climate hazard exposure for tourism infrastructure, assets, operating costs and insurability remain important uncertainties. Links between tourism, disaster response and humanitarian aid may become increasingly relevant (see Box 9). This will require greater policy integration and collaboration at the destination level (see section 5.4).

Box 9 Tourism and Climate Disaster Response

The tourism sector is not only impacted by disasters, but often contributes to response and recovery, working on the ground to support visitors and communities. KAITHA, formed in Kerala (India), is an emerging platform that brings together stakeholders from tourism, development, and humanitarian sectors to develop more formal and planned links that increase the climate resilience of destinations. Hotel Resilient is a similar initiative that works with accommodation providers to increase climate and disaster preparedness and enable hotels to become islands of resilience for the wider community.

4.1 Extreme Heat

Metric: Heat Risk Exposure Days

The increased frequency and intensity of extreme heat events are aggravating heat-related illness (HRI) and mortality.[98] International travellers are particularly at risk of HRI because they are often not acclimatised to heat at destinations, they are physically active at the hottest time of day and they can have communication barriers to heat warnings.

HRI exposure for tourists and tourism workers is increasing in the world's leading city destinations.[99] The cumulative number of annual heat risk days (humidex exceeding 31°C)[100] at the 100 top city destinations increased 18% between the 1950s and current conditions (2015–2025) (Figure 18). By the 2050s, heat risk days are projected to further increase 13–18% above current conditions (RCP4.5 and 8.5 emission scenarios respectively). Late-century scenarios reveal more pronounced increases in tourist heat exposure (20-35%).

Figure 18

Cumulative annual heat risk days (>31°C) at the top 100 city destinations (relative to 2015–2025)

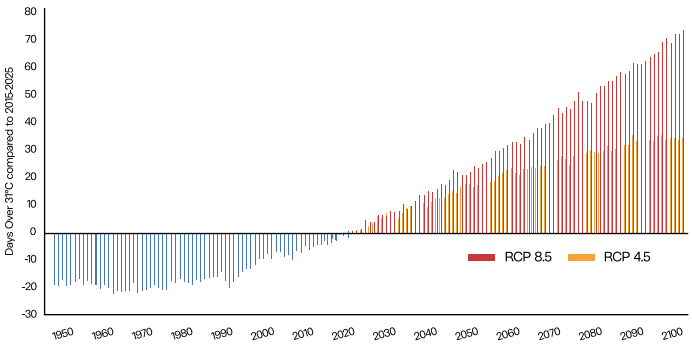
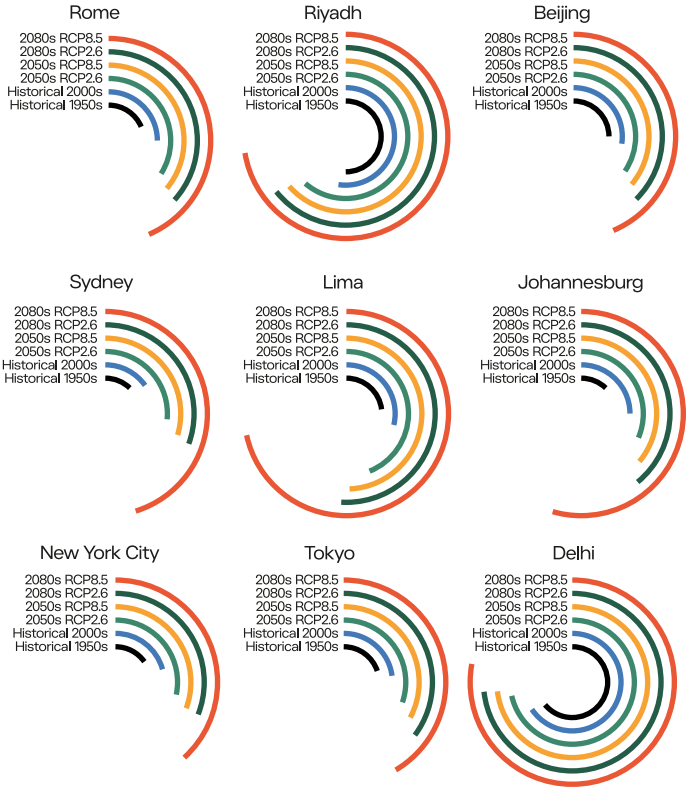


Figure 19 illustrates how the heat risk for tourists is projected to change in a sample of top 100 city destinations. Geographic and seasonal changes in heat risk have important implications for tourism demand patterns,[101] with heat-escape tourism becoming a national strategy in China.[102]

Figure 19
Evolving destination heat risk



Metric: Availability of Air-conditioned Accommodation

Air-conditioning is an important adaptation to tourism heat risk. Analysis of over 240,000 hotel properties worldwide found 76% have air-conditioning (Figure 20).[103] The availability of air-conditioning was lower (64%) for all accommodation types (800,000 properties). Regions with high frequency of HRI exposure and lower air-conditioning availability include countries in northern South America, parts of Central Africa, and some regions of France and Mexico. The growing need for air-conditioning in most of the top 100 city destinations represents an important increase in operating costs,[104] but also contributes to the sector emissions challenge where electricity emission intensity is high (maladaptation).

4.2 Fire Exposure

Metric: Wildfire Exposure of Destinations

Wildfires pose a significant threat to tourism infrastructure, assets and visitation in fire-prone regions (see section 7.1.1 for media coverage).[105] A multi-hazard analysis found wildfires were the second most detrimental type of disaster when measured in economic damage, with resident displacement and recovery major drivers of post-event accommodation demand that continues to disrupt tourism.[106] Wildfire activity and intensity are projected to increase in many regions under climate change,[107] including several major tourism regions. Some of the largest increases are in the European Mediterranean. Figure 21 shows the increase in high fire hazard days under a moderate emission scenario (RCP4.5) for the 2050s and 2080s.[108] The estimated annual cost of wildfires to Portuguese tourism alone is between €35.3 and €63.3 million in 2030, increasing at least fourfold in 2050.[109]

Figure 20
Global hotel properties with air-conditioning

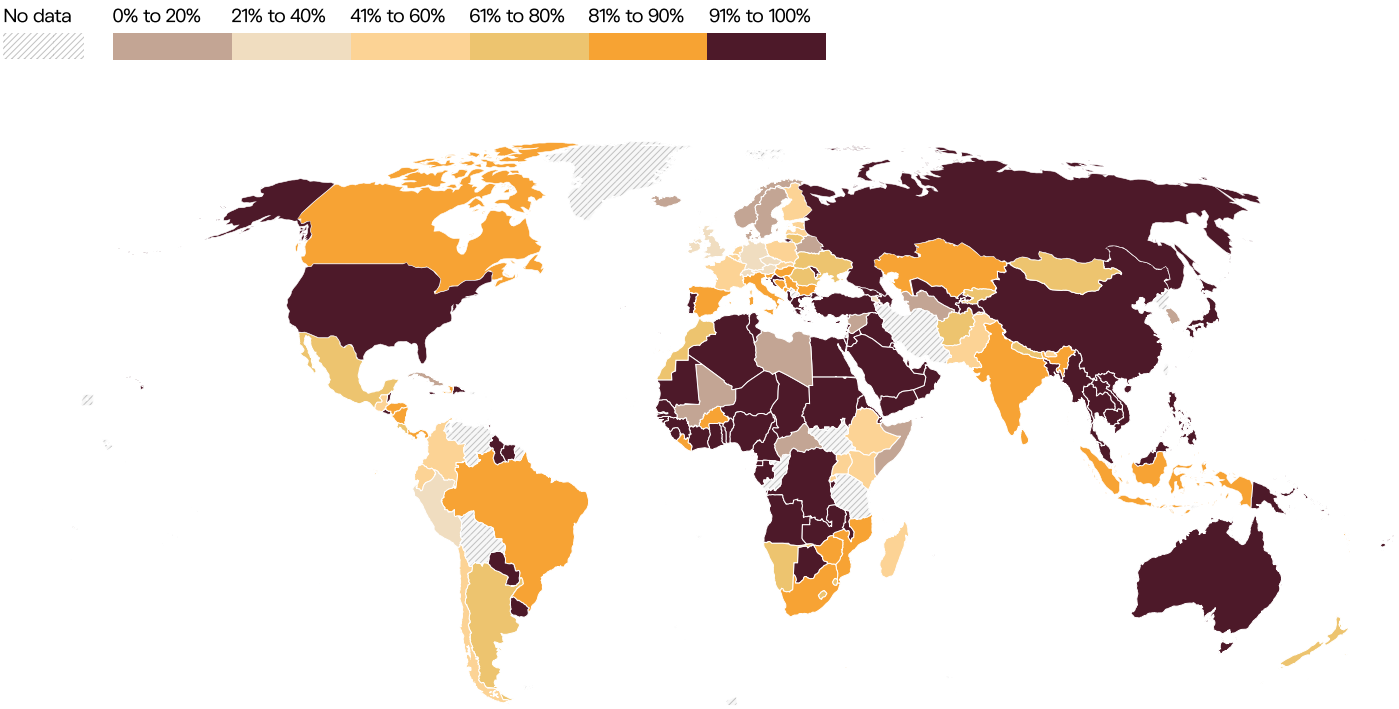
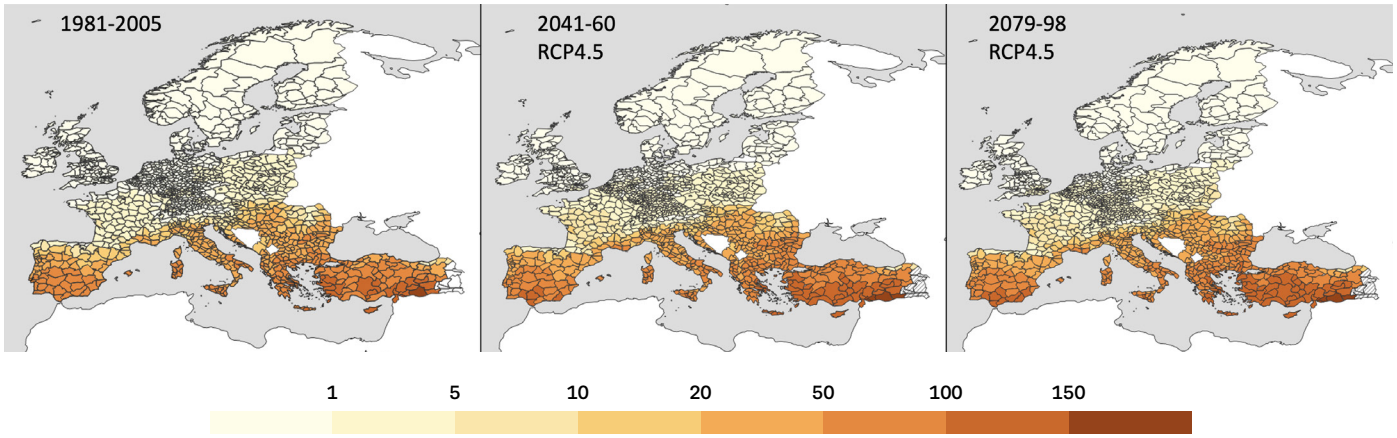


Figure 21
Wildfire hazard days in Europe



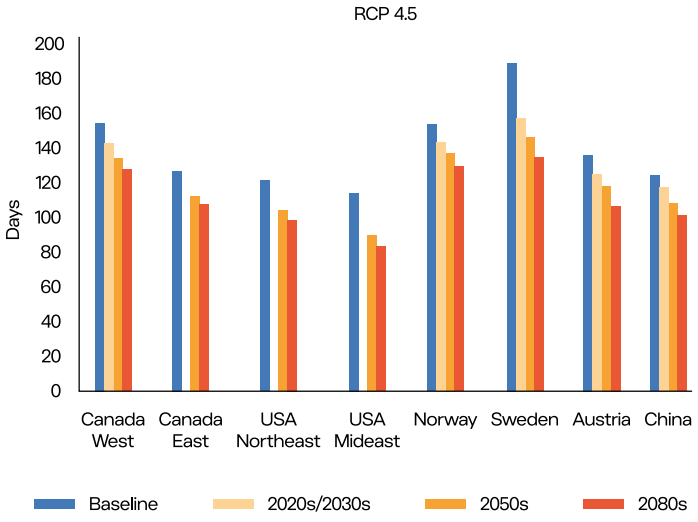
4.3 Slow Onset Climate Impacts

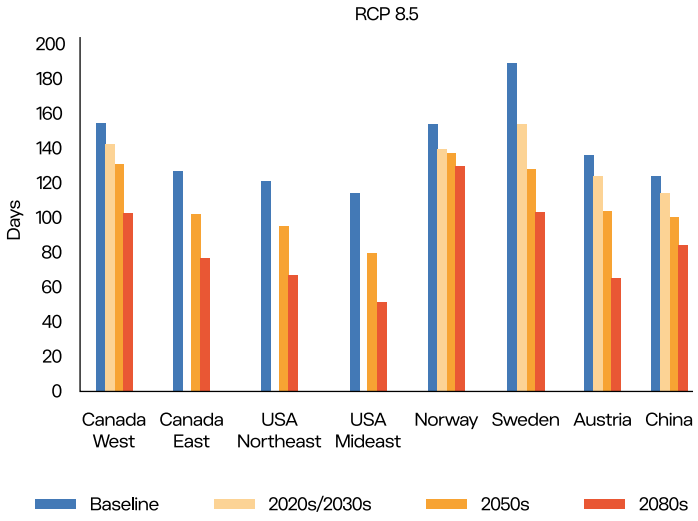
4.3.1 Snow-dependent Tourism Destinations

Metric: Ski Season Length

Warming and decreased snowfall in low-elevation and/or latitude regions[110] has impacted ski resort operations and tourism worldwide.[111] Figure 22 summarises the projected losses in ski seasons across regional markets even with advanced snowmaking in place.[112] Average season losses in the 2050s range from 15% to 22% (low and high emission scenarios) and are more pronounced in the 2080s (20–42%). To limit ski season losses requires substantial increases in snowmaking, with an average increase across all markets of 34–37% in the 2020s/30s, 96–127% in the 2050s and 115–158% in the 2080s.[113] Much higher increases are needed at many individual ski areas in all markets.

Figure 22
Losses in average ski season length for two climate scenarios

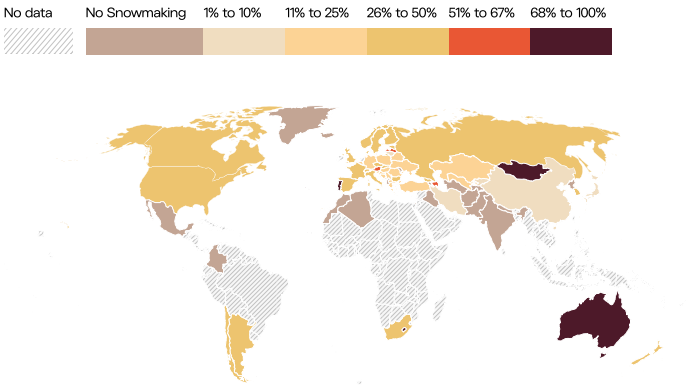




Metric: Snowmaking Adaptation Extent (Percentage of Ski Areas)

Snowmaking has been an integral climate adaptation of the global ski industry for decades and is widespread, with one-third of the 5682 alpine skiing areas globally utilizing snowmaking to some extent (Figure 23). Continued investment in expanding the adaptive capacity of snowmaking is expected.[114] Snowmaking has been criticised as maladaptive because of its substantial energy and water use.[115] However, snowmaking sustainability is highly place-context specific.[116] For example, snowmaking at all ski areas in Quebec (Canada) supports nearly six million skier days and causes the same emissions as only 65 skiers flying a round trip from Quebec to ski destinations in western Canada.[117]

Figure 23
Global snowmaking coverage



4.3.2 Sea Level Rise

Sea level rise (SLR) represents a transformative risk to coastal tourism worldwide, but research on destination level risk remains limited.[118]

Metric: Exposure of Tourism Assets (Resorts, Heritage Sites, Airports) to Sea Level Rise Inundation and Erosion

Coastal tourism assets and infrastructure around the world will increasingly at risk of SLR. Major airports face increased risk of flooding and operational disruptions. In a +2C scenario, 95 additional airports and 866 flight routes are projected to be impacted by SLR, increasing to 144 airports and 1062 flight routes in an RCP8.5 scenario.[119] Several airports are at risk in Europe, North American and Oceania, but risks are highest in South-East and East Asia.

High proportions of coastal resorts in the Caribbean[120] and Thailand[121] are at risk of flooding and erosion damage by late century, with major implications for destination revenue, competitiveness and sustainability. Importantly, while the 2050 or 2100 risk to coastal tourism depends on the rate of local SLR and associated erosion, the nature of long-term SLR means that the impacts of higher emission scenarios will only be delayed.

UNESCO World Heritage sites (WHS) represent outstanding cultural and natural heritage value across generations and are major tourism assets that increase arrivals to countries.[122] WHS are concentrated in coastal areas, making them at risk of SLR. Analysis of 340 WHS found that 51–55% of them would be at risk of partial to complete annual flooding by 2100.[123] Figure 24 displays the SLR risk posed to these sites under a 2100 high-emission scenario (RCP8.5). The losses and damages associated with such impacts on WHS are immeasurable.

Figure 25 shows the potentially devastating flooding risk of the historic city of Ayutthaya (Thailand). Analyses such as these indicate the importance of both horizontal and vertical collaboration between key organisations, including UNESCO, government agencies charged with cultural preservation and urban planning. Furthermore, WHS offer a unique opportunity to raise awareness of climate risk, including GHG emissions, in an integrated approach targeted at both stakeholders and visitors.[124]

Figure 24
2100 SLR Risk of World Heritage Sites

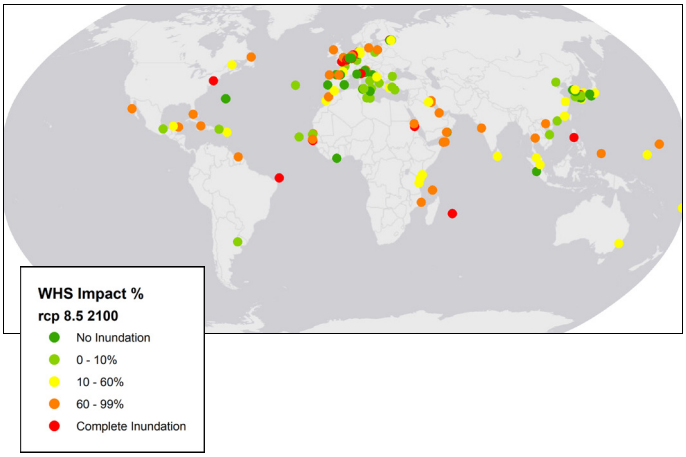
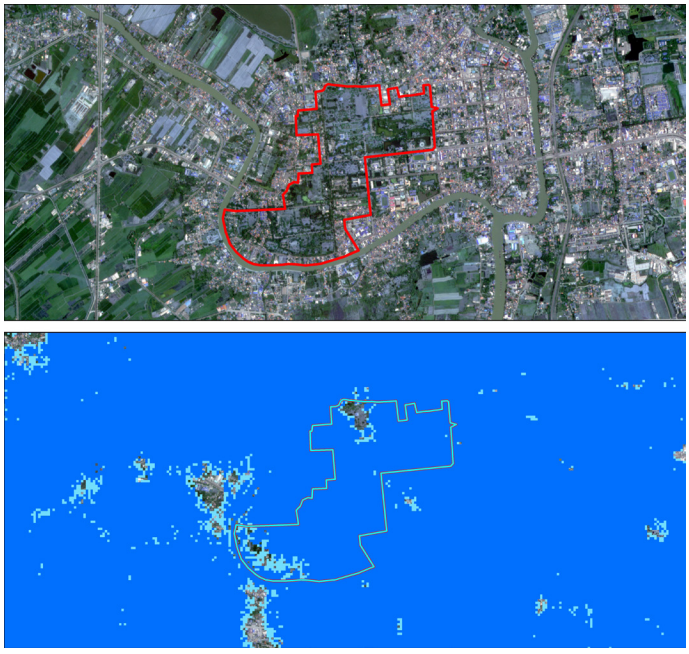


Figure 25
Sea level rise Impact at Ayutthaya, Thailand



4.4 Biodiversity and Tourism

Finding 11

Tourism can be a support mechanism for biodiversity and ecosystem management, although careful management of tourism impacts on biodiversity is required. The continued ability of tourism to support biodiversity conservation requires due consideration of associated GHG emissions from travel, sequestration potentials, and whether tourism to support adaptations such as ecosystem restoration or expanded protected areas are maladaptive.

Biodiversity and natural ecosystems are key attractors for tourism. A 2015 study[125] estimated that terrestrial protected areas alone attract about eight billion visits per year. Of these, 80% are in Europe and North America, but biodiversity hotspots in other parts of the world are also iconic attractions.

Metric: Income Generated from Protected Area Tourism

Protected area tourism generates significant income, of the order of US$600 billion per year in direct in-country expenditure,[126] which is distributed though value chains into local and national economies. Tourism is a vital source of revenue to protect ecosystems, including potential climate adaptation and mitigation measures.[127] In many cases, protected areas continue to exist thanks to tourism. If poorly managed, tourism imposes additional pressure on already stressed ecosystems (cumulative risk). In response, some countries actively restrict behaviour and distribution, and adjust management actions to achieve desired conditions (e.g. the rotation system of National Parks in Thailand).[128]

Climate change is posing a growing risk to biodiversity, and as a result to the attractiveness of some nature-based tourism destinations.[129] The IPCC[130] has reported that all biodiversity hotspots are already being impacted and will increase under all future climate scenarios (Figure 26). The risk of species extinction increases with warming in all climate change projections.[131]

The IPCC recognised the potential of tourism as a key support mechanism for enabling nature-based solutions that provide multiple benefits, including carbon sequestration, restored ecosystem resilience, cultural services and value for nature-based tourism.[132] Some realities of tourism as a mechanism for nature-based solutions remain uncertain. Questions such as whether tourism in the region might still be viable under future climate scenarios, whether emissions from travel to the destination outweigh sequestration benefits and the implications for Indigenous land rights have not been explored.[133] The recent interest in 'regenerative tourism'[134] provides an important opportunity to connect climate action, ecosystem restoration and community wellbeing.

Metric: Extent of Coral Reef Bleaching

Coral reefs are particularly vulnerable ecosystems. Already, about 25–50% of the world's coral reefs have been destroyed, with 60% of remaining reefs under threat. The occurrence of coral bleaching events will increase rapidly over the next decades (Figure 27),[135] which will not only affect tourism, but will impact a wide range of local livelihoods. Research has showed that global reef tourism has an economic value of US$36 billion per year.[136] In places, tourism can contribute positively to coral restoration projects.[137]

Figure 26

Projected loss of climatically suitable areas in terrestrial biodiversity hotspots for a global average of 1.5°C (upper row), 2°C (middle) and 3°C (lower)

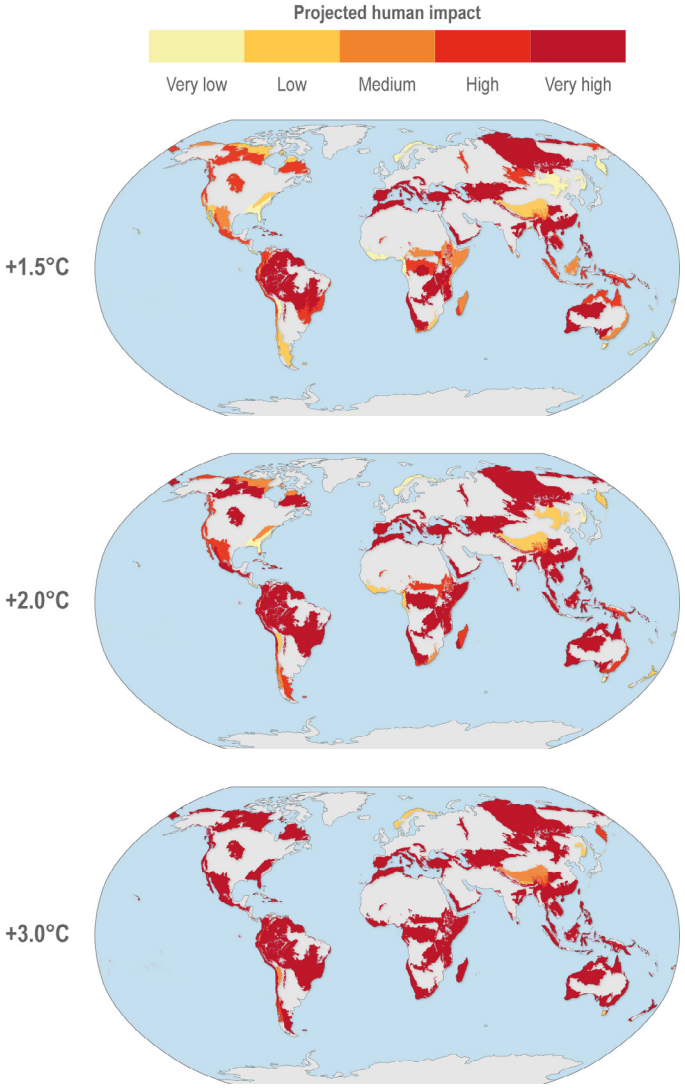
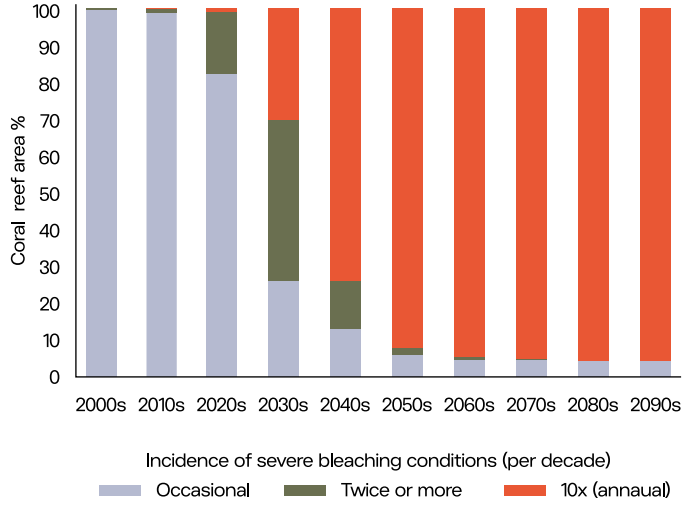


Figure 27

Coral bleaching incidence under future climate change (RCP8.5 emissions scenario)



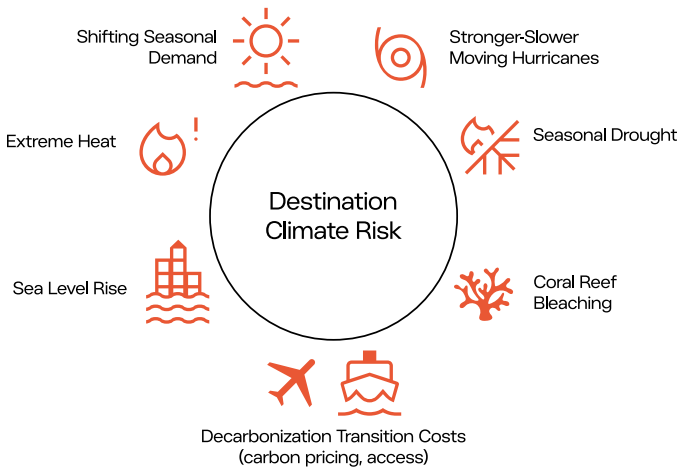
4.5 Integrated Assessments of Climate Change Risks

Finding 12

Assessments of the integrated effects of climate hazards at the destination scale remain very limited, providing an incomplete and potentially under-estimate of risk. More comprehensive understanding of the interactions of multiple hazards as well as from climate change responses is needed to inform effective adaptation.

Assessing the complexity of climate change and tourism interactions is an important gap to inform climate action. Analysis of single climate hazards provides an incomplete and potentially misleading assessment,[138] yet that remains the dominant form of climate risk assessment in the tourism sector.[139] A comprehensive analysis of carbon and climate risks, including timing and potential compounding effects, has not been completed for any tourism destination (at any scale).[140]

Figure 28
Dimensions of tourism climate risk in SIDS



Finding 13

Combinations of high levels of poverty, unsustainable tourism development and multiple climate hazards are undermining prospects of achieving sustainable development goals while exacerbating climate injustice in island and mountain destinations in low- and medium-income countries.

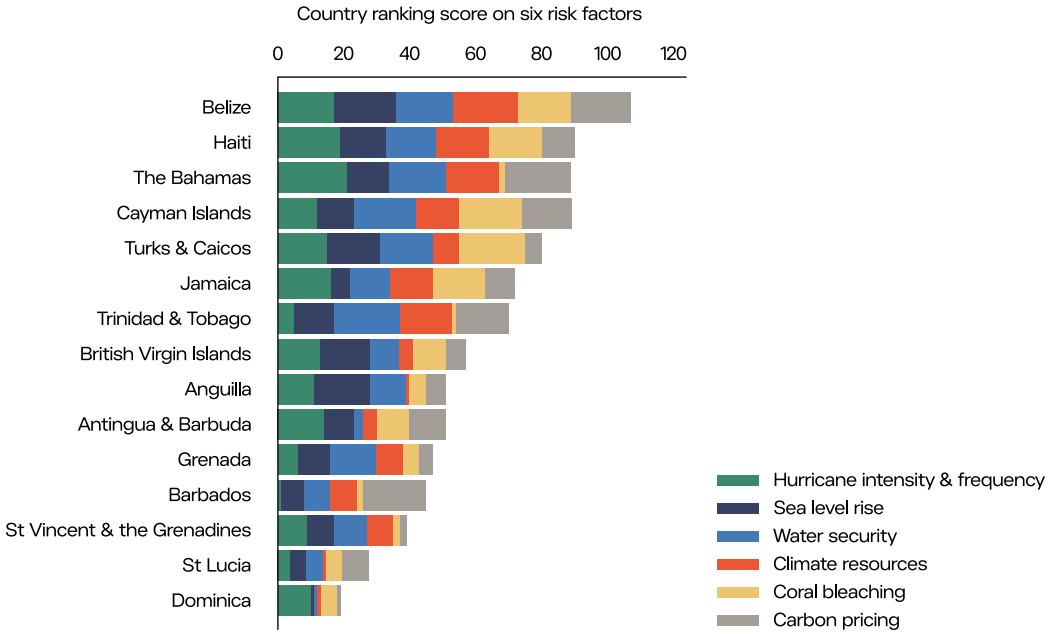
4.5.1 Tourism Climate Risk in SIDS

Small Island Developing States (SIDS) are among the most vulnerable countries to climate change and the most economically dependent on tourism.[141] The Caribbean region is illustrative of the range of climate change impacts that threaten the sustainability of tourism in SIDS (Figure 28).

Figure 29 summarizes the combined threat of six priority climate change impacts identified by the Caribbean Tourism Organization across 22 countries.[142] The results underscore that not all Caribbean countries face the same level of climate change risk, with Belize, Haiti and the Bahamas at highest risk, and St Lucia and Dominica facing the lowest. Insight into the timing and potential interactions of climate hazards and supply- and demand-side responses (mitigations and adaptation) remains limited and a priority for future research. Integrated climate change risk assessments are needed to support policy-makers to develop country and destination-appropriate adaptation strategies.

In the South Pacific, the Pacific Sustainable Tourism Development Framework takes an integrated approach connecting the prosperity of communities, climate action and ecosystem resilience. Since the COVID-19 pandemic, considerable effort has been put into 'rethinking' tourism in the Pacific, empowering local voices and developing a grassroots approach with wellbeing at its core.[143]

Figure 29
Differential climate risk at Caribbean destinations



4.5.2 Climate Risk Interactions in Mountain Destinations

Sustainable mountain development through tourism presents an important opportunity to address poverty alleviation, support economic development more broadly and generate much-needed investment. However, current mountain tourism development pathways combined with multiple cascading climate change impacts are increasing the vulnerability of local people and eroding tourism competitiveness.

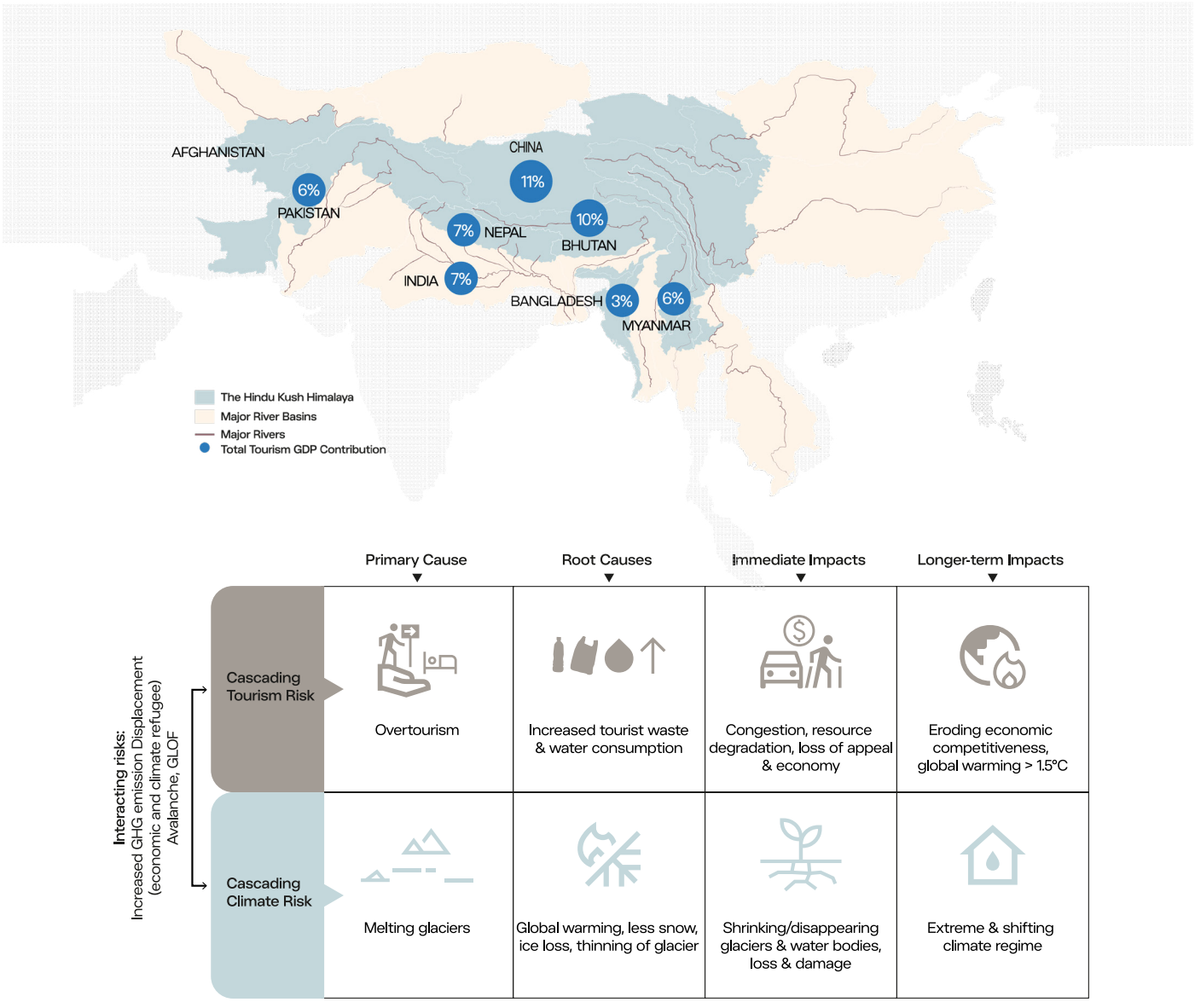
Warming in mountain regions has outpaced the global average and impacted the aesthetic, spiritual and other cultural aspects of mountain landscapes in many regions.[144] Figure 30 illustrates the multiple climate change impacts and complex interactions in the Hindu Kush Himalayan (HKH) region that influence tourism and sustainable development.

Figure 30
Cascading tourism and climate change risks in the Hindu Kush Himalayas[145]

The priority for countries and destinations in the HKH, formalised in the Moving Mountain 2030 strategy,[146] is to promote mountain tourism that advances climate change mitigation and adaptation in an integrated manner to advance sustainable development. Several policy responses have been developed:

- At the country level, Nepal's NAP, under Tourism Natural and Cultural Heritage, identified eight tourism-related projects with a required investment of US$1.8 billion.[147]
- Bhutan introduced a tourism levy (Tourism Levy Act of Bhutan 2020 and 2022), requiring international tourists to pay a Sustainable Development Fee of US$200/night. Regional tourists pay US$14.[148] At present, the levy has been halved to attract more visitors to assist COVID-19 recovery.

At a time when low-income countries are facing a widening deficit in required investment (from a wide range of sources, including development support or direct foreign investment), that will hamper countries' efforts to achieve the 2030 Sustainable Development Goals,[149] tourism development has important value. That value can only be realised if tourism helps to build climate resilience by channelling investment into energy, water, infrastructure, education, capacity-building and strengthened, inclusive governance.



The costs of climate change for mountain tourism are also evident in South America, due to glacier recession. Several types of mountain tourism are being affected: backpacking and adventure tourism; school trips; skiing and biking; canoeing and rafting; and climbing and trekking. For example, as the frequency of icefalls and avalanches is increasing, some climbing routes are becoming more dangerous. Conflicts are increasing among the actors involved, including the community, conservationists and park managers. In 2007, the Pastoruri glacier was the first Peruvian tourism destination closed due to 'adverse climatic conditions'. A quarter of the local community was economically impacted and protested. New policies were negotiated to partially reopen the area.[150]

4.6 Adaptation Planning and Reporting

Finding 14

Insight into the extent, effectiveness (current and future climate), co-benefits and equity of climate change adaptation in the tourism sector is very limited. Improved monitoring and evaluation are important to inform sizeable future investments in adaptation.

With exposure to climate hazards and potential impacts increasing throughout the tourism sector, the adaptation imperative is growing. Foundational to effective adaptation is an in-depth understanding of changing climate hazard exposure and potential impacts on tourism operations, infrastructure, assets and demand. A UNWTO 2021 survey of tourism businesses, destinations and organisations from 131 countries found that fewer than 10% had assessed existing and future climate change risks and vulnerabilities.[151]

Metrics: Tourism Organisations Assessing or Reporting Climate Change Impacts

Evidence of the extent of adaptation in the tourism sector is limited (see also section 5.2 on NAPs).[152] A 2011 study of tourism policy and planning in 44 countries by OECD found that only 12 considered adaptation strategies and that two regarded them as unnecessary.[153] A 2020 review of tourism plans in 12 Caribbean countries found only five mentions of climate change, with very limited information on climate impacts or potential adaptations and none indicating coordination with regional or national climate change lead departments.[154] One of the central barriers expressed by tourism planners in the region was the lack of tourism-specific information on climate change impacts or implications of policy responses at the country or destination scale. Box 10 describes initiatives by the governments of Mexico, Jamaica, and Chile to overcome this barrier and advance destination adaptation.

Box 10 Progress in Tourism Climate Change Impact and Adaptation Assessments

In Mexico, the Ministry of Tourism commissioned climate change vulnerability assessments at 20 priority destinations between 2012 and 2016. Climate hazard mapping, adaptation options and cost-benefit analysis, and evaluation of early warning systems were conducted to build resilience and inform future tourism developments (including where development should be avoided).[155] A lack of local technical capacity (see also section 7.2) to understand the impacts and financing to support prioritized adaptation responses were two key challenges (see also section 6.2).

New tourism strategies in development for Jamaica and Suriname, in collaboration with the Inter-American Development Bank, both include consideration of climate change. Building the resilience of the tourism industry to climate change and reducing the tourism industry contribution to climate change are two key elements of the new Jamaican tourism strategy.[156]

The climate change adaptation plan for the tourism sector in Chile is underway, and was a response to its 2015 NDC commitments. Impacts remain poorly defined due to a lack of sector-specific research. Regional workshops are planned to inform adaptation strategies by 2024 and to improve public–private sector coordination.

Metric: Tourism Organisations Engaged in or Monitoring Adaptation

The 2021 UNWTO survey found 4% of responding organisations of all types monitored and reported on climate adaptation progress.[157] Of the 17% of organisations that indicated they were engaged in adaptation, technical, policy, management and education were the most common actions. As disclosure requirements on physical climate risk and adaptation evolve for publicly traded companies, reporting is anticipated to increase rapidly in the mid-2020s.[158] Sectoral standards on climate risk disclosure that are aligned with financial market requirements are needed (e.g. tourism guidance on the International Sustainability Standards Board – IFRS S2 Climate-related Disclosures [IFRS S2] Standard). Understanding current and future physical climate risks at the destination and property levels will be increasingly important for maintaining insurability. Insurance coverage and cost trends for tourism operators, particularly post-climate disaster, remain an important adaptation uncertainty.

Finding 15

There is increasing consideration of adaptation and resilience building in tourism plans and strategies, but sector-specific actions remain fragmented, near-term focused and unequally distributed across regions and destination types.

Finding 16

Compounding climate hazards and limits to adaptation mean that current forms of tourism will not be viable in some destinations (e.g., ski tourism at low elevations, beach tourism in highly erodible coastlines, desert destinations). Where alternate tourism markets and destination rebranding are not successful, a just transition requires support for those with lost tourism-dependent livelihoods.

As in many sectors,[159] there is an urgent need for improved monitoring and evaluation of adaptation effectiveness (and its limits), scalability, potential and realized co-benefits, and maladaptation.[160] Because the potential adaptation pathways differ widely across destinations, there is also a need for insight into the distributional aspects of adaptation processes in which tourism is involved, including who participates, who makes decisions, who pays and who benefits.[161] Improving the capacity of those working in the tourism sector (e.g. at destination level) to plan and evaluate adaptation measures is essential (see section 7.2).