

Fact sheet #5

Climate information for transport and tourism

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Not an official record

By the World Meteorological Organization (WMO), with the International Civil Aviation Organization (ICAO), the International Maritime Organization (IMO), the United Nations World Tourism Organization (UNWTO), the Universal Postal Union (UPU) and other international partners

Many popular recreational activities rely on specific climate conditions. Skiers need good snow cover. Scuba-divers enjoy warm waters with abundant fish and colourful coral, and beach-goers seek plentiful sand, sunshine and calm waters. Many popular sports require adequate watering to keep their playing surfaces green. Tour boats need safe and clear passage, and people require favourable weather conditions for general travel, transport and sightseeing.

Increasing climate variability and future climate changes may shift, and even threaten the sustainability of, many tourism activities, as well as transportation, especially in developing countries, thereby exacerbating losses these sectors are already experiencing due to global economic conditions. Climate information provides essential guidance for informed decision-making. The transport sector is already actively involved in mitigation efforts, and closer interaction with the climate community will strengthen adaptation measures. The transport sector also makes an important contribution to the observation of climate globally through a network of ships and aircraft.

Changes in climate are already affecting the tourism sector, especially destinations that are climate-sensitive. In small island developing states, which often depend heavily on tourism revenue for socio-economic development, any significant reduction in tourism significantly impacts employment and poverty levels. Weather extremes erode popular beaches and endanger coral reefs and

biodiversity. Increased frequency of heat extremes could make beaches in many locations too hot for tourists. Such countries are at risk of sea-level rise as well, which in the short term threatens beaches and coral reef systems and may result in saltwater intrusion into the freshwater system, and in the long term could render their coastlines uninhabitable.

In mountain areas, the ski industry is already seeing its landscape change. While warmer temperatures necessitate extra snowmaking and shortened ski seasons for some regions in Europe and North America, they are presenting new opportunities for snow regions farther north that are less susceptible to changes in snow cover. In yet other northern regions, such as Greenland, tourists are flocking to see glaciers and icebergs — both because the ice masses are more accessible and because of worries that they may disappear because of climate change. The region could experience longer-term climate risks in the future, however.

Northern transport, especially in the Arctic, relies on permafrost and ice roads, which are becoming less reliable with warming temperatures. In 2008, ships were able to navigate the Northwest Passage between Arctic islands without hitting or being blocked by ice for the third consecutive summer. In other parts of the world, an increase in warm extremes could result in more frequent buckling of roadbeds and railroad tracks. Air, water and land routes are all affected by weather extremes.



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Managing the climate risks and opportunities in the transport and tourism sectors requires accurate and reliable climate information. Ski resorts can plan where to build new ski lifts, which last 25 years, based on climate models of temperature changes over 30 years. Coastal resorts can identify spots that are vulnerable to climate change and shore up their

defences. Golf resorts and sporting events can use climate predictions to better manage their water resources. In addition, climate predictions provide advance warning of natural hazards, which gives the full tourism supply chain time to prepare; these predictions also supply critical information for maintaining transport infrastructure.

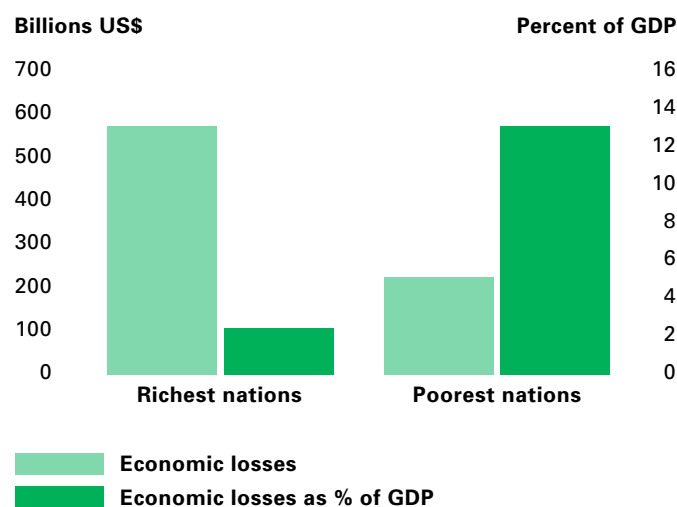
Constructing ski lifts with the aid of climate predictions

Snowmaking is a common climate adaptation already used by many ski areas to address variable snow conditions. First begun in the 1950s in North America, snowmaking has grown worldwide and is capable of extending the average snow season by several weeks. The technique requires a balancing of environmental impacts, as it consumes large amounts of water. Reliable climate information about future vulnerable areas is vital.

Removing water from streams and lakes for snowmaking may reduce water levels at critical times, and this can affect not only human water requirements but also fish and other aquatic life. To prevent such impacts on aquatic ecosystems, some jurisdictions, such as Vermont in the United States of America, have implemented a standard that prohibits water withdrawals for snowmaking when natural watercourses are at or below the average mean

winter flow. Future projected climate warming would increase snowmaking demand, making it difficult for ski areas to survive if they are required to uphold the standard. To help, the Okemo ski area in Vermont has built a water reservoir, in which it stockpiles water during the spring and summer for winter use. The combination of the water standard and the reservoir will extend the sustainability of ski resorts in the area, while at the same time protecting citizens' access to freshwater. Using climate models to manage the reservoirs and inform the snowmaking needs is critical.

Reliable climate information is needed for other adaptation technologies, especially where limited water supplies would inhibit snowmaking. Such techniques include slope contouring and landscaping to retain longer snowpacks and expanding operations into higher elevations where feasible.



Data from 1985-1999 shows that economic losses due to natural disasters are greatest in poor countries, which often rely on tourism as a major part of their gross domestic products.

Source: Adapted from Munich Re

Activities using climate information for tourism and transport

Vermont's adaptation initiative with its ski industry is just one of several projects around the world that are using climate predictions and information in support of tourism and transport planning. A sampling of such recent and ongoing projects includes:

The UNWTO publication, *Climate Change and Tourism: Responding to Global Challenges*, co-sponsored by WMO and the United Nations Environment Programme, discusses the many and varied impacts that climate change may have on tourism worldwide, and it also outlines research and adaptation options to address the issue. The tourism sector interacts with the climate community through the UNWTO Climate and Tourism Information Exchange Service as well.

WMO's Expert Team on Climate and Tourism addresses the impacts of climate variability and change on the tourism industry. It aids the development and use of accurate weather and climate information to make tourism operations more sustainable worldwide.

WMO's World Weather Information Service (WWIS) Website, which is hosted and operated by the Hong Kong Observatory, offers to the international community and the media online access to the latest official weather forecasts and climate information for more than 1 200 of the world's cities as supplied by meteorological and hydrological services worldwide. Links to the corresponding official weather service Websites and tourism boards and organizations are also provided when available. As at 2008, the Website had been expanded to cover six different languages including English, Arabic, Chinese, Portuguese, Spanish and French.

The China Meteorological Administration uses climate information in its transportation and tourism planning. It conducted a climate feasibility analysis, looking at wind patterns and other parameters, for designing the aircraft parking apron and the direction of the runway atop the Criminal Investigation Building of the Beijing Municipal Public Security Bureau. It also provided weather and climate information used in determining the final design of the Wukesong Cultural and Sports Centre for the Beijing Olympics.

In advance of the International Ski Federation (FIS) World Cup in Zagreb/SIjeme, the Croatian Meteorological and Hydrological Service prepared snow baseline conditions and changes to assess their impact on the economically viable operation of the skiing infrastructure and the need for snowmaking. In general, climate studies for the tourism industry in Croatia are performed primarily at the request of the tourism industry or resort operators. Such investigations allow for the prediction of future seasonal or other shifts in the area's tourism.

The Lithuanian meteorological service has prepared the publication *Resorts and Climate* to aid the tourism industry, and it also provides routine climate information for road, rail, air and sea transport.

In Mauritius, the Government is using coastal zone management to reduce local pollution levels to boost the resilience of their coral reefs to environmental change, including more frequent and intense cyclones and El Niño-related weather and climate. The area's reefs are a major tourist attraction for scuba-divers.

In Fiji, resorts are now built at least 2.6 metres above mean sea level and 30 metres off the high tide mark to reduce damages from storm surges and sea-level rise. The building codes are also being reviewed to ensure that infrastructure facilities are designed to withstand the anticipated weather. Individual businesses have evacuation plans, insurance cover, staff training and other policies in place. In 2007, Fiji combined its Ministries of the Environment and Tourism, recognizing the intimate connection between the two areas.

The United States Department of Transportation supports research on the potential effects of climate change on transportation infrastructure. Recent American studies identify the risks to roads, bridges, rail tracks and water passages posed by both cold and warm extremes, as well as flooding and storms. A recent National Academy of Sciences report recommends adaptation strategies, including advance planning for the design of new infrastructure that accounts for projected future climate conditions.

Facts and figures

- More than 1 000 ships and 3 000 aircraft contribute every day to the collection of climate and weather data worldwide. [WMO]
- In a 2004 survey, 80 per cent of managers of mountain biosphere reserves identified impacts on tourism and recreation as a top climate change concern. [United Nations Educational, Scientific and Cultural Organization (UNESCO)]
- The United Kingdom's road network is the Government's single most expensive asset, with the major trunk roads and motorways valued at £62 billion, according to a 2004 report. Climate variability and change pose increased risks associated with flooding from rivers and seas, deterioration of highway infrastructure and changes in road safety, among other projected impacts. [United Kingdom Department for Transport]
- Tourism generated US\$ 735 billion in revenue in 2006, of which US\$ 221 billion, or nearly a third, went to developing countries. [UNWTO]
- The number of ski areas in the European Alps considered "naturally snow reliable" would drop from 609 to 404 — by more than 30 per cent — under a climate model scenario in which temperatures rise 2 degrees Celsius. [Organisation for Economic Co-operation and Development/Abegg and others]
- International tourism growth in the 50 least developed countries increased by 110 per cent between 2000 and 2007, and thus offers one of the main sustainable development opportunities for many developing and least developed countries. [UNWTO]
- In India, 14 per cent of the annual repair and maintenance budget of the 760-kilometre Konkan Railway is spent repairing damage to tracks, bridges and other infrastructure due to extreme weather events such as rain-induced landslides. [Intergovernmental Panel on Climate Change (IPCC)]
- Projected sea-level rises of 18 to 59 centimetres by 2100 would aggravate coastal erosion and saltwater intrusion and lead to the loss of beaches, which could greatly affect tourism in coastal regions. [IPCC]
- The 10-day closure and clean-up following Hurricane *Georges* in 1998 resulted in tourism revenue losses of approximately US\$ 32 million in the Florida Keys in the United States. [United States Environmental Protection Agency]

WCC-3 will initiate actions to enhance climate services for climate adaptation and the management of climate risks and opportunities around the world.

For more on climate and transport and tourism:

Articles on climate and tourism on the WMO World Climate Programme Web site:
http://www.wmo.int/pages/prog/wcp/article/featureart_en.html

UN World Tourism Organization page on climate change:
<http://www.unwto.org/climate/index.php?op=0>

UNEP site on tourism:
<http://www.unep.fr/scp/tourism/>

UNESCO climate change site:
<http://portal.unesco.org/science/>

International Civil Aviation Organization:
<http://www.icao.int>

International Maritime Organization:
<http://www.imo.org/>

Universal Postal Union:
<http://www.upu.int>

The US Department of Transportation Climate Change Clearinghouse:
<http://climate.dot.gov/>

National Capital Commission of Canada:
<http://www.canadascapital.gc.ca/bins/index.asp>

The Global Climate Observing System:
<http://www.wmo.int/pages/prog/gcos/>

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