Impacts will affect tropical beaches and island destinations reliant on seaside and tropical reef tourism and winter sports as low-elevation reefs die and snowfall becomes unreliable.

Extreme and hot weather will affect tourism, but are not yet well understood.

Net global impact of climate change on tourism may not be negative; effects may redistribute tourism revenues among cooler countries with perceived climate advantages.

Adapting to impacts of climate change on tourism is challenging.
Tourism is clearly a climate-dependent sector. Weather conditions affect business in this sector, and general theory on the impact of climate change on tourism has been understood to favor cooler countries over tropical ones (Wall, 1998; Hamilton et al., 2005; Ameling et al., 2007). Yet there are exceptions: experts have suggested that Switzerland may see half of its ski stations become snow unreliable, with the snow reliability altitude rising from 1,200 metres today to over 1,800 metres, effectively stranding large, profitable, and irreplaceable ski zones (Elsasser and Bürki, 2002). Some economists have put forward evidence that the impact of climate change on tourism might result in an overall loss to global welfare (Berrittella et al., 2004). Tourism is currently a fast growing industry, however, and in the near term it is more likely that any impacts would instead trigger redistribution of tourism revenues away from low- and middle-income tropical coastal resorts to other global destinations, in particular high-income countries, which benefit from more pleasant weather as the planet warms (UNWTO, 2012; Harrison et al., 1999). Experts have been unsure about national outcomes for some countries—such as the tourist magnet France—which are exposed to a range of positive and negative tourism-related concerns (Ceron and Dubois, 2004). The full range of possible effects for tourism is large in scale, given the heavy reliance on outdoor recreation and environmental leisure activities (Jones and Phillips eds., 2011). This assessment is anchored in two relatively well-studied concerns: decline of reef-based and low-elevation winter sports tourism (Steiger, 2011; ECLAC, 2011). In this way, the Monitor’s tourism indicator serves to ensure that adequate attention is given by policymakers to the issue of tourism and climate change, despite the lack of comprehensiveness in analysis here, since even through this narrow lens, some countries may experience 1% losses of GDP by 2030.

**Climate Mechanism**

The climate effect assessed here examines only the effects for reef-based and mountain tourism. The degradation and bleaching of coral reefs and a decline of tropical fish stocks is a clear consequence of the steady warming of the atmosphere and oceans (Hoegh-Guldberg et al., 2007). Likewise, climate propelled sea-level rise is leading to coastal erosion, affecting beaches and coral reefs (Nicholls and Cazenave, 2010). Cultural heritage sites around the world’s coastlines are also affected or threatened by this erosion (UNESCO, 2010). These effects penalize tourism that has flourished in places where there is an abundance of coral for diving and related other pursuits (Uyarra et al., 2005; ECLAC, 2011). Other clear effects on tourism are a general onset of shorter, milder winters, long-term glacier decline and a snow-line gradually gaining in elevation in mid- to high-latitude regions (Euskirchen et al., 2006; Kelly and Goulden, 2008). These combined effects entail a slight and gradual degradation of mountain resort offerings, especially in low-elevation areas, which in turn can limit revenues in a high-risk industry (Koenigg and Abegg, 1997; Scott, 2003; Steiger, 2011).

**Impacts**

While the global effect is expected to be cost neutral, losses to affected countries are currently estimated at around 5 billion dollars a year, building to over 40 billion dollars, with an almost double share of global GDP in losses by 2030. Small island paradises such as the Bahamas, the Maldives, and Fiji could cost upwards of 1% of GDP for several of the worst affected small island nations, although the greatest overall losses will be incurred in larger economies such as Egypt, Indonesia, or Malaysia. The effects for winter tourism host countries are expected to be marginal on a national scale, but could be highly unfavourable to mountain communities, which rely on short, peak seasons for the bulk of annual profits. Around 20–30 countries are estimated to experience serious effects; losses are estimated to be redistributed among high-latitude countries where domestic and foreign tourism is expected to improve along with favourable climate change. High-altitude ski resorts may also see surges in demand.

**The Broader Context**

Tourism is a major growth industry globally, due especially to income and population trends that bolster...
VULNERABILITIES AND WIDER OUTCOMES

KPMG identified the tourism sector as one of the industries most vulnerable to climate change, especially in light of physical risks, but also as one of the industries least prepared and therefore most likely to incur losses (KPMG, 2008). Geography clearly plays a role in physical risk, given the emphasis some experts have given to winners and losers in the global tourism industry depending on latitude (Amelung et al., 2007). The risks of coastal and mountain dependent tourist zones are also covered above. The size of the tourism sector and the level of its exposure to climate-related risks are the key determinants of vulnerability. Particularly in small island states, tourism is a large-scale revenue generator, whose remote locations allow unique access to a lucrative global market (Uyarra et al., 2005). Long-term sector decline could damage national income prospects and state expenditure on public goods such as schools, since tourism is an important form of public revenue in popular areas (Archabald and Naughton-Treves, 2001; Gooroochurn and Sinclair, 2005).

RESPONSES

In many cases, adaptation will require a diversification of the value offering of affected market segments. Diversification away from long-term tourism-based risks where possible, and support or rehabilitation programmes to assist worst affected communities. Overcoming the unpreparedness of the sector to address climate stresses through awareness and education at different levels is of vital importance (Scott, 2011). However, the lack of preparedness of the sector underscores fundamental gaps in current response strategies (Scott et al., 2009). A variety of quite costly coastal conservation measures exist to stem beach and coastline erosion, but are unlikely to render such places more attractive to tourists (Klein et al., 2001). Strong environmental protection and sustainable fishing regulations, along with the promotion and expansion of natural marine reserves or mangrove forests can also help to boost local ecosystem resilience against coral and fish stock decline (Hughes et al., 2003; Corcoran et al., 2007). For low-elevation winter ski spots, relying on energy-intensive snow-making can assist to some degree, but would constitute a paradoxical response to the locally felt effect of global climate change on these vulnerable mountain tourist areas (Dawson et al., 2009). More generally, experts have raised concern about the potential for the tourism sector to become a major contributor to GHG emissions in the coming decades (Scott et al., 2010).
CLIMATE VULNERABILITY

Vulnerability measure: comparative losses as a share of GDP in USD (national)

CLIMATE UNCERTAINTY

Limited  Partial  Considerable

COUNTRY  2010  2030  COUNTRY  2010  2030  COUNTRY  2010  2030
Costa Rica -  -
Cote d'Ivoire -  -
Croatia -  -
Cyprus -  -
Denmark -  -
Dominican Republic -  -
DR Congo -  -
Ecuador -  -
El Salvador -  -
Equatorial Guinea -  -
Estonia -  -
Ethiopia -  -
Gabon -  -
Gambia -  -
Ghana -  -
Greece -  -
Guatemala -  -
Guinea -  -
Guinea-Bissau -  -
Guyana -  -
Honduras -  -
Iceland -  -
Iraq -  -
Ireland -  -
Israel -  -
Japan -5 5
Jordan -  -
Kazakhstan -  -
Kenya -  -
Kuwait -  -
Kyrgyzstan -  -
Laos -  -
Latvia -1 1
Lebanon -  -
Lesotho -  -
Liberia -  -
Libya -  -
Lithuania -1 5
Luxembourg -  -
Macedonia -  -
Malawi -  -
Mali -  -
Malta -  -
Mauritania -  -
Mauritius -  -
Mexico -  -
Moldova -1 5
Mongolia -1 5
Morocco -  -
Namibia -  -
Nepal -  -
Netherlands -1 5
Nicaragua -  -
Niger -  -
Nigeria -  -
North Korea -15 150
Oman -  -
Pakistan -  -
Panama -  -
Paraguay -  -
Peru -  -
Philippines -  -
Poland 10 65
Portugal -  -
Romania -1 10
Russia -65 500
Rwanda -  -
Sao Tome and Principe -  -
Senegal -  -
Sierra Leone -  -
Singapore -  -
Somalia -  -
South Africa -60 400
South Korea -35 150
Suriname -  -
Swaziland -  -
Syria -  -
Tajikistan -  -
Thailand -  -
Togo -  -
Tunisia -  -
Turkmenistan -  -
Uganda -  -
Ukraine -5 35
United Kingdom -5 35
United States -1,500 3,250
Uruguay -1 5
Uzbekistan -  -
Venezuela -  -
Vietnam -  -
Zambia -  -
Zimbabwe -  -