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Tourism's climate mitigation dilemma: Flying between rich and poor countries

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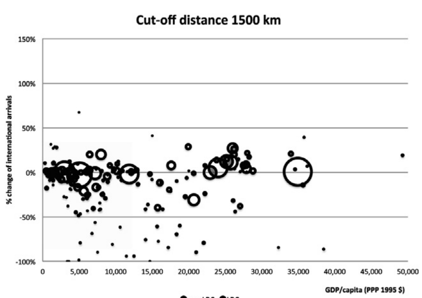
HIGHLIGHTS

- The impacts of climate mitigation policies aimed at reducing tourism transport may be less severe than is often believed.
- Reducing tourism air transport affects poor and wealthy countries equally.
- A reduction in aviation may harm the development of some poor countries but may benefit others.
- Economic compensation for negative cases is feasible.

GRAPHICAL ABSTRACT



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ABSTRACT

Stronger demand for medium- to long-haul air transport is the main driver of the tourism industry's increasing greenhouse gas (GHG) emissions, causing the current development of global tourism to be environmentally unsustainable. Efficiency improvements and biofuel usage are unlikely to maintain pace with the projected growth in transport volume. Therefore, curbing the growing demand for air transport has been suggested as another option for the sustainable development of tourism. However, the political and industry discourse concerning the restriction of air transport tends to label such a restriction as unethical, as such limits would impair the development that tourism brings to poor countries. This paper investigates the possible impacts of air travel restrictions on the least developed countries (LDCs) and non-LDCs by examining global tourism. The impacts on LDCs are found to be 'neutral' on average, with both losses and gains in tourist arrivals. The extent of any losses does not appear to be beyond the scope of possible economic compensation.

1. Introduction

1.1. The sustainable tourism paradox

The 'relationships between tourism and climate change are … likely to be controversial', Becken and Hay (2007, p. 262) concluded after considering the conflicting requirements of tourism as a tool for developing poor countries and as a vector of climate change. There is a tension between climate change mitigation (planet) and poverty reduction (people) in the sustainable development of tourism, and air transport plays a key role in the discussions surrounding both issues (Daley & Preston, 2009; Gössling, Peeters, & Scott, 2008; Peeters, 2009). Air transport is a dominating and increasing factor in tourism emissions, and it is inevitable that both tourism and aviation will need to reduce those emissions (see Section 1.2). The dominating discourse in the tourism and aviation sector is that 'measures taken to reduce air transport emissions

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need to reflect coherence with strategies to reduce poverty and promote development in the world's poorest countries' (UNWTO & ICAO, 2007, p. 1). The industry discourse generally negates the option of reducing air transport to mitigate greenhouse gas (GHG) emissions and assumes that technology will be able to solve the problem (Gössling & Peeters, 2007).

However, several arguments contest this line of thought, citing the international community's commitment to 'hold the increase in global temperature below 2 degrees Celsius' (see for instance UNFCCC, 2009) as a point of departure. Parry, Carter, and Hulme (1996) coined the term 'dangerous climate change' as climate change beyond 2° C above the pre-industrial level (see also Rogelj et al., 2009; Rogelj et al., 2011; Schellnhuber, Cramer, Nakicenovic, Wigley, & Yohe, 2006). So with the term 'dangerous climate change' we always refer to a climate change of less than 2° C. To avoid dangerous climate change an emission reduction of 60%–90% with respect to global emissions in 2000 is needed (Parry, Lowe, & Hanson, 2008; Parry, Palutikof, Hanson, & Lowe, 2008; Rogelj et al., 2011). First, the aviation sector will not fit within such a sustainable future without a reduction in the (growth of) air transport (Lee, 2012; Mayor & Tol, 2010; Rothengatter, 2010), i.e., without changes in travel behaviour (Dubois, Ceron, Peeters, & Gössling, 2011; Peeters & Dubois, 2010). These changes refer to travelling shorter distances and a modal shift to low-carbon transport modes (Peeters & Dubois, 2010). Second, insufficient mitigation efforts will likely lead to severe impacts from climate change on poor countries, resulting in, for instance, reduced agricultural production (Hertel, Burke, & Lobell, 2010), floods, and extended droughts (Mendelsohn, Dinar, & Williams, 2006; Parry, Palutikof, et al., 2008). Third, climate change may also affect destinations and global tourism flows, possibly leading to less (long-haul) travel (Ehmer & Heymann, 2008; Hamilton, Maddison, & Tol, 2005).

Thus far, the consequences of air travel restrictions have not been widely researched, and existing studies are generally incomplete in their coverage of the problem. Some studies use international tourism and a limited number of destinations as their basis (e.g. Gössling et al., 2008; Pentelow & Scott, 2011), and others examine the global level in terms of policy scenarios and generally neglect domestic tourism (Mayor & Tol, 2010). Because domestic tourism often supports a large share of a country's tourism industry (WTTC, 2012), these studies are not fully qualified to discuss the effects of a reduction in travelled distances on poor and wealthy countries. In this paper, we investigate the possible impacts of air travel restrictions on least developed countries (LDCs) and non-LDCs (see list in UN-OHRLLS, 2009) by examining all global tourism flows, including domestic tourism. The impacts are tested by assuming cut-off distances (i.e., one-way travel distances above which there is no (air) travel). One difference between this study and other contemporary approaches is that we assume that trips above the cut-off distance do not simply evaporate but are instead redistributed throughout the remaining markets (see 1.4). By using this approach, we seek to provide crucial input for an important policy discussion that would otherwise remain focused only on the two extreme scenarios. The following sections elaborate on the mitigation of tourism's contribution to climate change (1.2) and the role of tourism in poverty alleviation (1.3). We would like to emphasise that these two subjects are the cause for this paper, not the objective, as further clarified in Section 1.4.

1.2. Tourism's climate mitigation challenge

The contribution of tourism to climate change ranges from 5%, in terms of CO_2 emissions only, to 12% when non-carbon impacts on climate change, primarily caused by air transport, are included (Gössling, Hall, Peeters, & Scott, 2010; UNWTO-UNEP-WMO, 2008). The share of air transport in these emissions ranges from 40% of CO_2 to 75% of all GHG emissions (Gössling et al., 2010; UNWTO-UNEP-WMO, 2008). Tourism emissions are projected to increase for the next several decades (Åkerman, 2005; Dubois et al., 2011; Mayor & Tol, 2010; Scott, Peeters, & Gössling, 2010). Between 2005 and 2035, emissions will increase by a factor of 2.6 (UNWTO-UNEP-WMO, 2008). The emissions of air transport may increase at least until 2060 (Mayor & Tol, 2010). To avoid 'dangerous climate change' and to attain sustainable development, global GHG emissions must be reduced by up to 90% within this century (Parry, Lowe, et al., 2008; Parry, Palutikof, et al., 2008; Rogelj et al., 2011). When the global emission reduction scenario to avoid dangerous climate change is confronted with these increasing tourism emissions, both lines may be crossed by mid-century (Bows, Anderson, & Peeters, 2009; Scott et al., 2010). Thus far, efficiency gains in aviation have been unable to compensate for the growth of the sector (Mayor & Tol, 2010; Owen, Lee, & Lim, 2010; Penner, Lister, Griggs, Dokken, & McFarland, 1999).

The growth of tourism-related emissions is caused primarily by an increase in travel distance because travel distance is increasing more rapidly than the number of guest nights and trips (Peeters & Dubois, 2010; UNWTO-UNEP-WMO, 2008). Tourism volume itself is expected to increase by 3.3% (UNWTO, 2011a) to 4.1% per year (Peeters & Dubois, 2010), whereas the annual growth of air transport is estimated to be 6% (Airbus, 2011). The key role of longer travel distances and the increasing share of air transport in rising tourism emissions is confirmed by a detailed study from the Netherlands (de Bruijn, Dirven, Eijgelaar, & Peeters, 2012). Consequently, it is important to find specific strategies for reducing aviation emissions.

The main mitigation options for aviation include improving aircraft energy efficiency and operational efficiency, using alternative fuels, and buying emission rights from other sectors (several chapters in Gössling & Upham, 2009). These options are also cited by the International Air Transport Association (IATA, 2009). However, the industry acknowledges that technology and operational improvements, including improved air traffic control, less holding, and taxiing are not sufficient to reduce the emissions from global aviation below 2005 levels (IATA, 2009; ICAO, 2009; Sustainable Aviation, 2008). In scientific research, there is also a consensus that although efficiency improvements are important, such improvements are insufficient to compensate for even low projected volume growth (Chèze, Gastineau, & Chevallier, 2011; Lee, 1998; McCollum, Gould, & Greene, 2009; Owen et al., 2010; Peeters & Middel, 2007; UNWTO-UNEP-WMO, 2008). With regard to further reductions, the industry has varying ideas, with biofuels being advocated as the main option (ATAG, 2011; IATA, 2009; WTTC, 2010) and emission trading – buying emission rights from other sectors – suggested by British Airways (2012) and Sustainable Aviation (2008). A more recent publication indicates that biofuels will not be able to provide more than 10% of emission reductions in aviation in the short term (IATA, 2012).

Currently, bioenergy covers approximately 10% of all human energy needs, and biofuels cover approximately 2% of road transport fuel (Edenhofer et al., 2011). Bioenergy potential is estimated to be between 50 and 500 EJ (exajoule: 1018 J) (Edenhofer et al., 2011), compared with approximately 15 EJ for aviation in 2007 (Rye, Blakey, & Wilson, 2010). However, there is a great deal of uncertainty. First-generation biofuels have been strongly linked to conflicts with food production, and the large-scale use of second-generation biofuels cannot be expected in the short term because of economical and technological barriers (International Energy Agency, 2009; Sims et al., 2011; Timilsina & Shrestha, 2011) and a range of other issues, such as availability, indirect land-use change, social impacts, large water footprints, and undesirable GHG balances (Ariza-Montobbio & Lele, 2010; Dray, Schäfer, & Ben-Akiva,