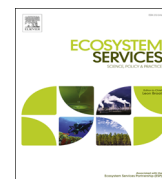




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Bermuda's balancing act: The economic dependence of cruise and air tourism on healthy coral reefs



Pieter van Beukering^{a,*}, Samia Sarkis^b, Loes van der Putten^c, Elissaios Papyrakis^{a,d}

^a Institute for Environmental Studies (IVM), Faculty of Earth and Life Sciences (FALW), VU University, Amsterdam, The Netherlands

^b Department of Conservation Services, Government of Bermuda, Bermuda

^c Social and Sustainability Innovation, SunIdee, Amsterdam, The Netherlands

^d School of International Development, University of East Anglia, Norwich, UK

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ABSTRACT

Although Bermuda has to date managed to achieve equilibrium between tourism and coral reef conservation, this delicate balance may be threatened by the growth and changing face of the tourism industry. This may result in negative impacts on the coral reefs and services provided by this valuable ecosystem. The reef-associated value to Bermuda's tourism industry was determined, distinguishing between the added value of cruise and air tourism. Economic valuation techniques used were the travel cost method, the net factor income method, and the contingent valuation method. Results show that coral reef value to tourism in Bermuda provides an average annual benefit of US\$406 million. Although, cruise ship tourism has been responsible for more than half of the total number of visitors in Bermuda, cruise ship tourist expenditures directly benefiting the island's economy amount to only 9% of air passenger expenditures. Moreover, the producer surplus for air visitors is twofold that of cruise ship passengers. Despite this low added value of cruise ship tourism in Bermuda, there is a strong drive to accommodate the ever-larger ships built by the cruise industry. Several options have been proposed for the upgrading and re-aligning of existing shipping channels to enable safe and smooth passage; these may lead to environmental impacts, which may in turn affect reef-associated tourism revenue to the island. This study recommends the integration of Bermuda's coral reef value into Cost Benefit Analyses of proposed channel upgrades compared to the "business as usual" scenario.

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1. Introduction

Bermuda, a 55 km² land mass in the middle of the Atlantic Ocean (32°N, 64°W), is densely populated (1145 people per km²), and has experienced tremendous economic growth over the last quarter of a century due to two main industries: international business and tourism. Bermuda is an attractive tourism destination, due in part to its excellent infrastructure, easy access, and natural beauty. In 2000, although visitor numbers were lower than what they are today, Bermuda ranked first among all tropical islands worldwide on the basis of tourism density (i.e. the number of tourist days divided by the total land area) (McElroy, 2003). Tourism accounts for an estimated contribution of \$658 million to Bermuda's GDP, or approximately 12% (Bermuda Department of Statistics, 2011). In 2013, around 580,000 tourists visited Bermuda, of which 340,000 came by cruise ship and 240,000 arrived by air (Bermuda Department of Tourism, 2014).

* Corresponding author.

E-mail address: pieter.van.beukering@vu.nl (P. van Beukering).

Although cruise tourism was initially characterized globally by its rapid speed of development and noted for more than two decades of high growth levels, the North American market on which Bermuda depends has demonstrated a slower rate of growth, with a decline in its share of the global cruise activity in terms of both passenger numbers and spend (Weeden et al., 2011). The sector's continued commissioning and bringing into service ever-larger ships, able to offer extensive range of facilities and onboard activities is evidence of the sector's competitive nature and emphasis placed on sales promotion. However, one of the challenges faced by the cruise sector concerns the destination's ability to cater for larger ships. The pressure placed on Bermuda as a destination port to accommodate the changes in the cruise ship industry challenges the delicate balance between maintaining a crucial tourism industry and preserving its natural marine environment. The island has to date managed to achieve such an equilibrium, yet it is questionable whether this equilibrium will remain in face of the perceived need to accommodate the cruise sector.

More specifically, the Ministry of Public Works is considering the upgrade of Bermuda's shipping channels to allow safe passage

for the cruise lines currently servicing the island and for the newer, larger Quantum class of cruise ships. The scope of potential impacts resulting from infrastructure development and cruise ship operations on Bermuda's environment include the direct destruction of reefs for enhanced passage, indirect impact from dredging activities on surrounding reefs and seagrass meadows (Lewis et al., 1985), pollution and sedimentation of shipping channels (Jones, 2011), increased potential in grounding of boats, and lastly a longer term repercussion on both sectors of the tourism industry, as quality of visiting experience declines with poorer reefs (Sarkis, 1999; Price, 2006). For these reasons, attention needs to be given by decision-makers, not only to understanding the potential implications from environmental and socio-economic perspectives, but also in terms of how it might affect the current air tourism market.

Against this background, an immediate concern for Bermuda's marine ecosystem is the lack of "formal" procedure for assessing developments that impact the coral reef system surrounding the island. The current study addresses this by providing a tool for incorporating environmental considerations in policy-making, and informs decision-makers on the dependence of tourism on a healthy environment. The specific objective of this study is to analyze and quantify the economic contribution of Bermuda's coral reefs to tourism, distinguishing clearly between cruise tourism and air tourism. This study contributes to the analysis of the relationships between the quality of the coral reef environment, the volume of cruise and air tourism, and the value of cruise and air tourism directly contributing to the island's economy. The study is novel in its approach as it aims to determine the importance of coral reefs for the cruise and air tourist industry and for its visitors through perception and valuation surveys. Especially for cruise tourism, this addresses an issue that constitutes an important hole in the literature (Johnson, 2002). Therefore, the study provides a sound tool for the long-term conservation of natural resources and helps to identify and implement more sustainable policies and activities, thus balancing environmental, social and economic goals.

The paper is structured as follows. Section 2 describes the environmental and economic context of the tourist industry in Bermuda. Section 3 explains the methodology developed for this study involving surveys applying various valuation techniques (i.e. contingent valuation and the travel cost method). Section 4 shows the results of both surveys highlighting the differences between the cruise tourism and the sector targeting air visitors. Section 5 concludes the paper and formulates policy recommendations for the long-term conservation of Bermuda's valuable marine resources.

2. Background

The environmental issues of tourism are complex, more so than those in many other industries. Tourism production and consumption both have either positive or negative environmental consequences. At the same time, tourism activities are often affected by the quality of environmental resources (Tribe, 2011), a dilemma also faced by Bermuda's tourism. Bermuda is a destination to both cruise and air visitors. As shown in Fig. 1, cruise tourism surpassed land-based tourism in 2006, when just over 336,000 tourists arrived by cruise ships as compared to 220,000 by air (Teye, 2006), and continues to grow at around 5% per year (Bermuda Department of Tourism, 2007a). This became the turning point in a major shift from air visits to cruise visits; air arrivals peaked in 1987, constituting 76% of total tourism (476,859 visitors) at this time, but declined to 36% in 2011 (236,038 visitors), contrasting with the increase contribution of cruise tourism (63%) to total

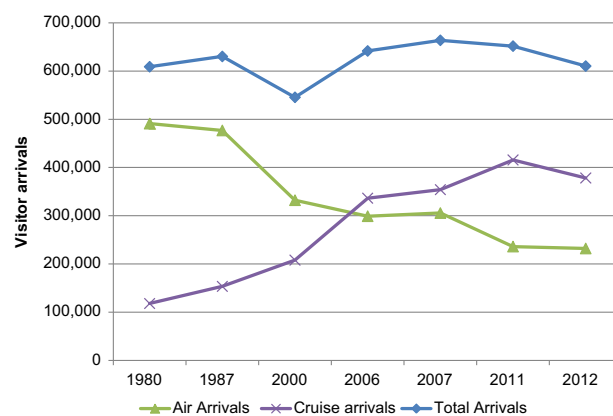


Fig. 1. Visitor arrivals in Bermuda for the period 1980 to present.

visitor arrivals (415,711 visitors, in 2011). This shift has had a major impact on the whole sector, creating an imbalance between air and cruise arrivals with repercussions on the hotel supply which decreased by 44% (Bermuda Department of Tourism, 2012).

Reasons for the decline of air arrivals may not be directly associated with increases in cruise arrivals, however, Bermuda's carrying capacity in terms of the number of tourists per day is a limiting factor in both the total number of arrivals and in the evaluation of an optimal tourist strategy. Bermuda's capacity was first established at half a million visitors annually, based on physical carrying capacity levels (Clark, 1997). Next, a 3-year policy was put in place by the Ministry of Transport of Bermuda, setting a passenger limit of 6000 passengers per day (Sarkis, 1999). Subsequently, Price (2006) reported that Bermuda's policy allowed for a maximum of 10,000 cruise visitors per day in 2005. The underlying basis for the daily maximum set forth by Bermuda's policies is unclear, and although carrying capacity is a straightforward concept, arriving at a realistic quantitative estimate is difficult. As shown in Table 1, the fact remains that the total visitors to residents ratio has been increasing since 2008, directly reflecting the increase in growth rate of 19% for this sector. Bermuda ranks 7th out of 21 Caribbean Islands with respect to the penetration ratio (Price, 2006), but more importantly these authors ranked Bermuda 1st in terms of the density ratio indicating that there are more tourists-days spent on Bermuda per square kilometer of land area than any of the other 20 Caribbean islands examined. Note that in order to obtain a tourist density ratio equal to the median of the islands examined, Bermuda would have to reduce its number of tourist-days by approximately a factor of 10. Although it is unknown whether the other islands are within sustainability limits, it appears that Bermuda has been facing more visitor "pressure" per square kilometer than other Caribbean islands (Price, 2006).

2.1. Cruise ship tourism in Bermuda

Bermuda has been a popular destination for cruise ships since the early 50s, mainly as a result of its proximity to the Eastern seaboard of the United States. There are three ports, St. Georges, Hamilton and Dockyard, with four main shipping channels (North and South, Two Rock Passage and Town Cut). The majority of cruise ships calling Bermuda until 2004 were relatively small cruise ships (length and beam less than 692 ft and 100 ft respectively), berthing initially in Hamilton and St. Georges, and later in all three ports. The re-development of the former British Naval Dockyard as a dedicated port for Panamax and Post-Panamax ships was completed in 2005. At this time, larger ships, including

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