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The impact of tourism and personal leisure transport on coastal environments: A review

John Davenport*, Julia L. Davenport

Department of Zoology, Ecology and Plant Science, Environmental Research Institute, University College Cork, Lee Maltings, Prospect Row, Cork, Ireland

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Abstract

Coastal tourism started in the 19th Century and has increased in non-linear fashion ever since, stimulated by a combination of developments in transport technology and rising prosperity. Initially, mainly national in character, the introduction of roll-on, roll-off ferries and inexpensive air transport caused an exponential 28-fold rise in international tourism between 1950 and the start of the 21st Century. This review considers the impact of tourism at two levels: (1) that created by the sheer numbers of tourists and their demands ('mass tourism and transport') and (2) that resulting from individual, often novel, forms of transport ('personal leisure transport'). Under (1), the consequences of the construction of coastal resorts and roads, marinas and jetties for habitat fragmentation and reduced biodiversity are described. Next, the effects of large cruise ships (now some 250 in number) are considered, particularly in relation to unregulated pollution and the delivery of substantial numbers of tourists to remote destinations. Thirdly, the literature related to disturbance caused by intertidal trampling by tourists on rocky/sandy shores is reviewed, followed by a section devoted to the unappreciated effects of beach 'cleaning' (i.e. removal of natural strandlines as well as litter) that is practiced throughout the world's sandy beach resorts. Finally, the potentially positive area of coastal ecotourism is considered, but evidence is assembled to highlight the problems associated with too high a demand. Under (2), the impact of a range of personal leisure transport modes is considered. These range from relatively innocuous pursuits (e.g. swimming, surfing, sailboarding and dinghy sailing), to an extremely popular sport (SCUBA diving) that is marketed for its environmentally-friendly nature, yet causes measurable deterioration in the world's coral ecosystems despite good management practices. The impact of motorboats is considered, particularly in the context of transmission of non-native species, while the highly polluting and disturbing technology of 'personal watercraft' is evaluated. Finally, the uncontrolled emergence of new 'extreme sports' (e.g. 'coasteering', kitesurfing) is identified as a future problem.

Keywords: tourism; coastal infrastructure; cruise ships; ecotourism; personal watercraft; extreme sports

1. Introduction

Mass tourism is a modern phenomenon, stemming primarily from the introduction of personal vehicles and motorized mass transport from the mid-19th Century onwards, accelerating particularly after 1945 with the development of passenger airlines. Coastal resorts became increasingly popular as tourist destinations; the benefits of the sea air, sun, water, seafood, beaches, scenic views were the initial attraction. The advent of the availability of new destinations, more adventurous activities and a desire to observe wildlife (birds, whales, corals, etc.) mean that coastal resorts still attract the greatest percentage of tourists every year; 63% of European holidaymakers prefer the coast (EC, 1998). Initially, mass tourism was a short-range phenomenon largely within nation states and, although many tourist areas still get most of their visitors from within the state, mass tourism is now global with tourists from developed countries visiting almost all parts of the globe. Worldwide the number of international arrivals (i.e. arrivals from outside the country) has shown a steady increase from

* Corresponding author.
E-mail address: jdavenport@zoology.ucc.ie (J. Davenport).

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25 million in 1950 to over 700 million in 2002, corresponding to an average annual growth rate of 6.6% and it is estimated that by 2020 there will be 350 million tourists visiting the Mediterranean coastal region alone (WTO, 2004). This substantially underestimates the total extent of tourism as it does not include long and short-distance tourism within countries (Burger, 2002), that is still dominant in many developed countries (e.g. USA).

The greatest ecological threats that mass tourism poses undoubtedly lie in the infrastructure and transport arrangements required to support it, particularly in situations where the numbers of tourists are subject to little control. Physical development of resorts, consumption of fuel by buildings, aircraft, trains, buses, taxis and cars, overuse of water resources, pollution by vehicle emissions, sewage and litter all contribute to substantial, often irreversible, environmental degradation, as well as to dramatic social consequences. However, increasing prosperity in developed countries has also created a worldwide demand for individual leisure transport, from simple walking and swimming to modern phenomena such as use of off-road vehicles (ORVs), self-contained underwater breathing apparatus (SCUBA), personal watercraft (PWCs) and kitebuggies. Many of these individual activities have considerable ecological effects in coastal areas but have tended to be considered independently despite having features in common.

Travel and tourism together are worth around US$ 3.5 trillion per annum and employed 200 million people at the end of the 20th Century. Many developing countries gain significant (sometimes dominant) income from the trade. This is particularly true of islands or countries with substantial coastal tourism: in these cases tourism is often a major proportion of the gross domestic project – Caribbean countries are four times more dependent on tourism than any other area in the world (Gormsen, 1997).

Tourism brings economic benefits to countries, but there are usually substantial socio-economic and environmental costs associated with it. Such costs can affect larger areas that superficially appear more resilient (e.g. Algarve, Portugal) and can be overwhelming for small island resorts. Holder (1988) postulated the 'self-destruct theory of tourism'. This theory states that an attractive natural place may become developed for an upscale exclusive market wanting low-density settlement and willing to pay top prices. Soon other developers move in and competition develops. In order to fill rooms, rates are lowered, standards are proportionately lowered and the place becomes a destination for mass tourism. The elite move on to unspoiled areas. A cogent and cautionary account (Wiese, 1996) of irreversible environmental and socio-economic degradation on the island of Cancún (Mexico) is a good illustration of this phenomenon. Cancún Island is 17 km long and 100–400 m wide with an enclosed shallow mangrove lined lagoon that, before development, held a variety of marine life and was an important nesting site for seabirds and sea turtles. There were several openings to the lagoon. Thousands of unskilled workers moved into the area. Quarries were developed and causeways constructed linking the island to the mainland and restricting the flow of fresh water into the lagoon. Sections of the lagoon were filled in for golf courses and marinas and amusement parks were built. Sewage treatment and the disposal of other wastes became major problems; eventually the exhausted quarries were used as rubbish dumps, polluting the groundwater supplies. After hurricane Gilbert hit Cancún in 1988, tourists were reluctant to return. Hotels reduced their prices and tourist arrivals increased, but these were more budget conscious and unwilling to spend extra money. The income for the country and the local people has been considerably reduced. Somewhat ironically, the hotel complexes of that island were chosen recently (2004) as a suitable site for a World Trade Organisation summit for action against hunger and poverty.

Full consideration of the global environmental impact of tourism (including the worrying contribution of air transport to climate change) is not within the remit of this review, which is concerned only with coastal habitats. The review is divided into two sections. The first is concerned with the effects of various aspects of mass tourism and related transport infrastructure on coastal ecosystems. The second section considers the impact of different types of personal leisure transport on the coastal environment. Both sections draw together material not previously handled holistically. In writing the review the authors have necessarily had to rely to an unusual extent on 'grey' literature (i.e. limited-circulation reports and web-disseminated material). This reflects the sustained lack of financial support for rigorous scientific study of the environmental effects of tourism and transport.

2. Mass tourism and transport

2.1. Coastal transport infrastructure

Tourist resorts require effective transport links. The explosion of car- and coach-based tourism in the 20th Century contributed heavily to the development of extensive road networks throughout the developed world, increasing habitat loss to tarmac and augmenting habitat fragmentation. Many coastal roads were built simply to connect resorts and sight-seeing opportunities. Tourist resorts are also generally characterised by extensive car-parking facilities, taking yet more land, particularly in coastal areas. For example, Turkey has been affected by urbanization with a level increasing from 18.5% in 1950 to about 62% by 2000. Turkish coastal zones constitute approximately 30% of the total land, but coastal populations presently constitute 51% of the total (Burak et al., 2004). Exponential growth of the use of yachts, pleasure trip vessels and water taxis has fuelled marina and jetty development. Such coastal structures change current systems and often profoundly alter the sand supply to natural beaches. Although increased oceanographic expertise, combined with massively enhanced computer-modelling power permits a degree of prediction and amelioration of these effects, a recent study in Israel (Klein and Zviely, 2001) demonstrated that 'predicted' and 'real' effects of construction of the Herzliya marina (including breakwaters designed to minimize erosion) diverged considerably, despite meticulous prior environmental impact planning