Land Use Policy 28 (2011) 792–804

Contents lists available at ScienceDirect

Land Use Policy

journal homepage: www.elsevier.com/locate/landusepol

Urban and tourist land use patterns and water consumption: Evidence from Mallorca, Balearic Islands

Angela Hof[a,*], Thomas Schmitt[b,1]

[a] Landscape Ecology/Biogeography, Geography Department, Building NA 5/128, Ruhr University Bochum, Universitaetsstrasse 150, 44780 Bochum, Germany
[b] Landscape Ecology/Biogeography, Geography Department, Ruhr University Bochum, Universitaetsstrasse 150, 44780 Bochum, Germany

ARTICLE INFO

Article history:
Received 24 August 2010
Received in revised form 11 January 2011
Accepted 16 January 2011

Keywords:
Per capita water consumption
Tourism
Mallorca
Second homes
Garden irrigation
Swimming pools

ABSTRACT

The island of Mallorca is the main Balearic resort and sustainable water management is a key challenge for the economic and ecological sustainability of tourism as the main economic activity. The critical water supply situation on the island is being exacerbated by the extension of the tourist base to so-called "quality tourism". Since the mid 1990s, low-density residential tourist land uses associated with second homes and more affluent urban dwellers have spread around existing mass tourist urban centres. Increasing water consumption for outdoor uses (gardens, swimming pools) is a direct consequence of this development. Available water consumption data mask the impact of residential tourism on water consumption levels. The objective of the present paper is to compare per capita water consumption in quality tourist, mass tourist and residential urban areas, and to provide quantitative information on the magnitude of water consumption by gardens and swimming pools as water-related leisure structures. The analysis combines water consumption data with a land use geodatabase at the sub-parcel scale, a detailed population inventory, and an estimate of pool water use. The results show that quality tourism produces higher water consumption levels per capita than mass tourism. Garden irrigation is the single main cause of the high water consumption in quality tourist areas and accounts for more than 70% of these areas' total consumption in summer. But even in mass tourist and residential areas, garden irrigation accounts for up to 30% and 20%, respectively, of total water consumption in summer. Individually owned swimming pools cause an additional average water consumption of 22 litres/person/day. The proliferation of swimming pools and lavish 'Atlantic' gardens may turn out as one of the biggest threats to sustainable water management on the island of Mallorca and in other tourist destinations adapting the quality tourist model.

Introduction

At a time when the already critical water supply situation in the Mediterranean is expected to be exacerbated by climate change, mature tourist resorts are extending their tourist base to activities that increase permanent water demand for facilities and leisure structures (golf courses, spas, aquatic parks, swimming pools and irrigated gardens). This is the context and debate to which the present paper contributes a timely case study that highlights the contribution of residential tourism to the increasing water demand in the residential domestic sector. The case study is best put into perspective by reviewing some of the major challenges posed by climate change with respect to the water and tourism issue and by reviewing the developments that have rejuvenated the tourist industry in many Mediterranean resorts in the last two decades. While land use patterns that increase permanent demand for water are spreading, the necessity for more efficient water demand management becomes obvious. This is one of the major challenges posed to land use policy in the immediate future in Mediterranean tourist resorts and urban areas where more disperse settlement patterns evolve.

As a vibrant sector of economic growth in the Mediterranean, tourism becomes a priority issue with regard to sustainable development and climate change mitigation and adaptation. A general concern in the Mediterranean is water availability, and increasing water shortages as a consequence of climate change are expected (Hein et al., 2009; Iglesias et al., 2007; Scott and Becken, 2010). Tourism is one of the development pressures that coincide with the necessity to manage decreasing water resources more efficiently. Many resorts will have to cope with increasing water demand and tourist flows, rising temperatures, and more droughts. The water

* Corresponding author. Tel.: +49 234 32 23375; fax: +49 234 32 14180.
E-mail addresses: angela.hof@ruhr-uni-bochum.de, angela.hof@rub.de (A. Hof).
[1] Tel.: +49 234 32 28377; fax: +49 234 32 14180.

0264-8377/$ – see front matter © 2011 Elsevier Ltd. All rights reserved.
doi:10.1016/j.landusepol.2011.01.007

reservoirs are already under pressure and water supply increasingly relies on desalination and reuse of treated water. These developments turn water management into a major challenge for Mediterranean countries and the tourism sector (European Commission, 2009; Hein et al., 2009; Iglesias et al., 2007). Spain in particular is experiencing a tourist and second home boom that increases permanent water demand for facilities and leisure structures, thus the country's tourism sector is increasing its vulnerability to climate change. Paradoxically, this diversification and upgrading of the tourist product and the promotion of off-season tourism are identified as climate change adaptation strategy for the tourism industry (Hein et al., 2009; Iglesias et al., 2007). In economic terms, quality tourism is seen as a strategy for further sustainable growth of "sun and beach" destinations reaching life-cycle maturity (Bardolet and Sheldon, 2008). This discussion shows that at a time when the challenges posed by climate change for the Mediterranean tourism sector are becoming obvious, there are information and knowledge gaps with regard to the impact of tourism on water resources. Water consumption by the tourism sector is not well documented by statistics at present. More complete information on water demand of tourism and its different sub-sectors (second homes, facilities, activities, etc.) is needed by state and local authorities to define priorities for water conservation or demand management programmes. Also, tourism business will benefit from such information in terms of cost savings or risk reduction (European Commission, 2009; Scott and Becken, 2010).

The following discussion focuses on the Balearic island of Mallorca in Spain because this island is presently beginning to experience the problems that many Mediterranean resorts probably will have to face in the near future. Mallorca amply illustrates the transformation of the economy, society, and environment of Mediterranean tourist resorts, including the recent upgrading and diversification of the tourist product observed elsewhere in the western part of the Mediterranean. Moreover, the island exemplifies the need for holistic land use policy and water demand management in the face of the challenges to the supply of water resources for the continued viability of the tourism industry (Essex et al., 2004; Kent et al., 2002).

With a record of attracting more than 4 million tourists annually since 1986, Mallorca is the main Balearic resort and one of the most successful tourist destinations in the Mediterranean. Tourist numbers doubled in the mid 1990s and stabilised at more than 8.4 million visitors annually since 2004 (CITTIB, 2009). The annual average growth rate of 6.7% in tourist numbers between 1960 and 2009 mirrors this development. The major coastal mass tourist resorts on Mallorca were built up in the sixties, during the first international tourist boom, and experienced major demographic and economic growth. These resorts saw twenty years of irrational expansion, based on unbridled construction to the detriment of the seaside, water and other natural resources. A tourism crisis affected the whole Balearic Islands in the late 1980s. Economic developments in the origin countries coincided with rising relative costs of tourist activities and lodging capacity grew faster than tourist demand. In Mallorca, the visitor volume growth rate dropped from 8.3% (1981–1987) to 2% (1988–1992). However, the loss of tourist attractiveness, a drop in tourist consumption, and in the long run a fall in investment was considered to be more severe. The diversification of promotion and provision of high-quality services came into focus. Mallorca was first to embark on the development of a new tourism model that ultimately gave the main Balearic tourism regulations of today the common baselines of "quality of life" through territorial planning and "tourism sustainability" through the provision of appropriate services for demanding customers (Bardolet and Sheldon, 2008; Schmitt, 2007). Since the mid 1990s, the extension of Mallorca's tourist base by the proliferation of second homes, golf courses, and yacht tourism has been marketed under the term "quality tourism". The key drivers for this innovation and the turn from a pioneer of mass tourism to a pioneer of a more diversified tourism model were decrees, policies and programmes that were initiated and implemented by the stakeholders in the Balearic tourism industry. The relevant policies started in the 1990s with planning and zoning and landscape protection, and moved toward controls of further land and coastal development in the 2000s (see Bardolet and Sheldon, 2008, for a detailed chronological overview on tourism land use policies in the Balearics). On the island of Mallorca, the 1991 "Moratorium Law", the 1995 "Regulatory Plan on Tourism Supply" (POOT) and the "New Tourism Law" in 1998 were landmark policy decisions of the Autonomous Community of the Balearic Islands. The 1995 "Quality Plan" was the first global plan to focus strategies and actions on higher quality tourism markets and products. Some authors interpreted this development as a move toward a more sustainable, "quality" type of tourism (Bardolet and Sheldon, 2008), while others highlighted the added environmental strains caused by this new tourist boom (Schmitt and Blàzquez, 2003). The quality tourist model creates additional demands on water supply and quality, thereby exacerbating the island's critical water supply situation. In particular, the growing water consumption in the domestic residential sector has been identified as a critical stressor on the island's scarcest resource. The domestic residential sector has grown as Mallorcan urban residents have become more affluent from the tourist boom and as Mallorca has attracted residential tourists who have built second homes, often with high housing standards (Essex et al., 2004; Kent et al., 2002; Schmitt, 2007; Schmitt and Blàzquez, 2003). The shift to urbanisation and second homes is also reflected by the growth of 14.6% in residential capacity while the tourist accommodation capacity only increased by 2% from 2001 to 2008 (OST, 2010). Urban water consumption on Mallorca increased by 30% from 1998 to 2007 (OST, 2010), when the official resident population grew by 27.7% (IBESTAT, 2010).

The municipality of Calvià is a paradigmatic example for the new emphasis on quality tourism (Fig. 1). Calvià accounts for 4.4% of the island of Mallorca's surface area and covers 60 km of coastline. The traditional mass tourist base has been extended by attracting residential tourists and the building of second homes. Calvià has a proportion of over 60% second homes and ranks among Santanyí, Alcudia and Andratx as the most attractive coastal municipalities, which is reflected in soaring real estate prices. Increasing water consumption for outdoor uses (gardens, swimming pools) is a direct consequence of this development (Schmitt, 2007).

The influences of similar tourist land use patterns on water demand have been studied in Benidorm and on the Alicante coast (Rico-Amoros et al., 2009). The highest water consumption figures were found in tourist areas with single houses that had gardens and swimming pools. The absence of a pool and a garden results in a two to three times lower mean consumption per household, per capita and in the month of maximum water consumption (Rico-Amoros et al., 2009, p. 499). Mallorca's situation is similar: in addition to mass tourism with its associated infrastructure, seasonal peak of water consumption, and influx of tourists, a more individual tourist landscape with a more residential character has developed. Low-density urbanisation spreads around existing mass tourist centres (Fig. 1). Consequently, water consumption is strongly influenced by water uses for gardens and swimming pools and these water demands create additional water consumption peaks in the season of low rainfall and high evapo-transpiration (Essex et al., 2004). Apart from the high water demand of golf courses and agriculture, this tourist land use pattern contributes to the rising water consumption on Mallorca. However, the magnitude of this contri-