



Seaside tourism and urbanisation: environmental impact and land issues

In the context of its tourism programme, Plan Bleu has assessed the sustainability of eleven tourist destinations: Torremolinos (Spain), Cabras and Castelsardo (Italy), Rovinj (Croatia), Alanya (Turkey), El Alamein-Matrouh City-Siwa Oasis resort (Egypt), Djerba (Tunisia), Tipasa (Algeria) and the Tetouan Coast (Morocco). This work has highlighted the severe pressure on natural resources: energy and water consumption that often exceeds production and supply capacities; inadequate infrastructure for the collection and treatment of solid and liquid wastes; urbanisation and artificialization of coastal zones and natural areas that profoundly affects Mediterranean biodiversity.

Water consumption greater than production and supply capacities

A tourist often consumes three or four times more water per day than a permanent resident. In 2009 in Alanya (Turkey), drinking water consumption associated with tourism (5.3 million m³ per year) represented 52% of the district's total consumption. Annual drinking-water consumption levels are very high, especially in international 3S (Sea, Sand and Sun) destinations, due to the way tourists use water, the large number of overnight stays (several million per year) and the

high water demands of tourist amenities (such as swimming pools and golf courses).

Resource unavailability and transfer as a factor for unsustainability

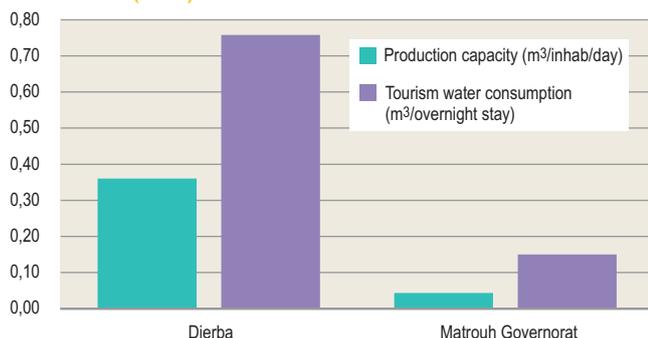
The question of availability and supply is key to understanding the complexity of tourism impacts on water resources. For example, tourism in Alanya (Turkey) consumes 0.40 m³/overnight stay compared with 0.15 m³/overnight stay in Marsa Matrouh Governorate (Egypt). A simplistic approach would lead to the conclusion that tourism in Alanya has more impact on water resources than tourism in the Marsa Matrouh Governorate.

In Alanya, water demand is adequately met thanks to a locally available resource, strengthened by the building of a dam. In contrast, in the Marsa Matrouh Governorate, due to the poor quality of the local water (which is brackish) and the distance from an available resource of suitable quality, water supply for tourism uses two pipelines dependent on Alexandria's distribution network, supplemented by water brought by train and tanker.

Limited efficiency of infrastructure

In Djerba, which must also face up to insufficient water supply in terms of both quantity and quality, a 150-km-long supply network has been built from two sources located in

Fig 1: Drinking water capacity in Djerba and in the Matrouh Governorate (2008)



Source: Plan Bleu, 2011

the Zeuss-Koutine watershed on the mainland (Medenine Governorate), supplemented since 1990 by two brackish-water desalination plants at Zarzis (1999) and Djerba itself (2008).

However, in Djerba, as in the Matrouh Governorate, tourism's high daily consumption rate compared with available resources leads to insufficient infrastructure capacity (Figure 1).

Lack of available water resources leads to an increase in water transfer, whether by road (Egypt) or by increasing the medium production of infrastructure such as pipelines in the summer season, which corresponds to a period of water stress. One solution is to diversify the means of drinking-water production (as with the desalination plants for Djerba).

Desalination and reuse of wastewater: two alternatives to water resources overuse

Alternatives to water resources overuse have already been developed in the Mediterranean, in particular from the 1980s with the installation of desalination plants in island tourist areas such as in Malta, the Balearic Islands, the Canaries and, more recently, Djerba (2008). While the energy consumption of desalination plants is less than that used in resource transfer, energy consumption remains a major issue.

Energy consumption as an issue for desalination plants installation/implementation

Infrastructure for producing alternative water supplies, such as Djerba desalination plants, is energy hungry. For the Mediterranean as a whole, desalination of 30 million m³ per day, would require 5,000 MW of electrical power, i.e. 8 to 10 combined-cycle gas turbine plants or 4 to 5 nuclear power plants.

Even without taking into consideration the environmental repercussions of desalination plants in terms of greenhouse gas emissions and brine discharges, desalination would produce major energy challenges because this energy consumption would be combined with the increase in consumption due to the seasonal peak in electricity demand (tourist and urban amenities).

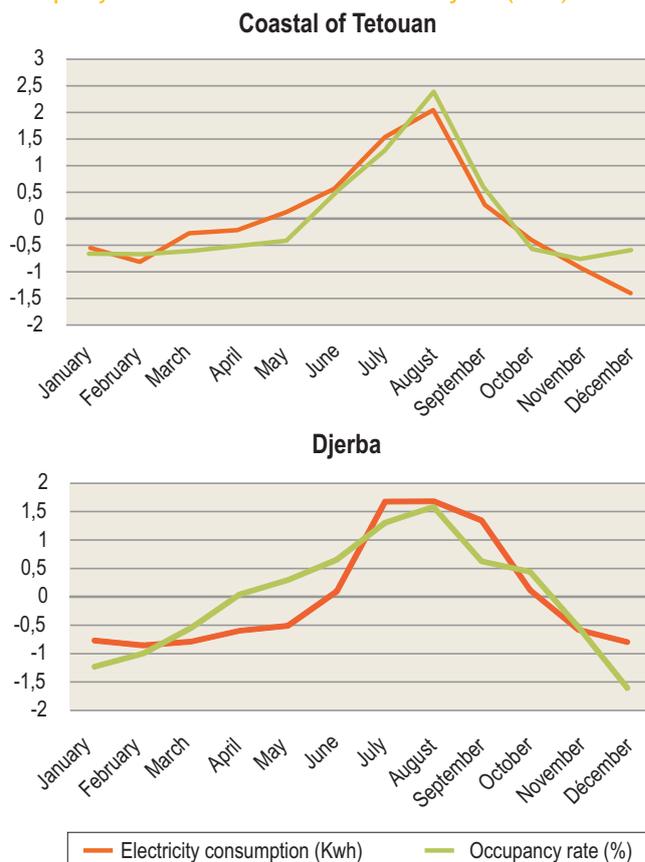
For example, in Torremolinos (Spain), electricity consumption (of which tourism accounts for about 40%) increased by 160% between 1989 and 2008, rising from 124 to 322 GWh per year. In Alanya (Turkey) during the period 2000-2008, total electricity consumption (to which tourism contributes 21%) rose from 199 to 615 GWh, i.e. an increase of 208%.

On the Tetouan Coast (Morocco), electricity demand doubles in the summer. In Djerba, electricity demand triples during the seasonal peak in August (Figure 2).

Installation of wastewater treatment plants, a prerequisite for any reuse

In its report "Water, energy, desalination & climate change in the Mediterranean" (2008), Plan Bleu recommends water resource management via the reuse of treated wastewater, to supplement sea water and brackish water desalination. Recovery and treatment would use less energy, while at the same time membrane, reverse-osmosis and treatment

Fig 2: Seasonality of electricity consumption compared with monthly occupancy rates on the Tetouan Coast and in Djerba (2008)



Source: Plan Bleu, 2011

technologies are similar, so the skills required (employment, training needs) would be complementary.

As a prerequisite, there is much work to be done installing wastewater treatment plants. For example, Torremolinos municipality (Spain) does not have a sewage treatment plant, even though this tourist destination hosts nearly 5 million overnight stays annually. On the Tetouan Coast (Morocco), the 1,372 m³ per day of wastewater produced by tourism is directly discharged into the sea without treatment at two of the three destinations studied (Martil and Fnideq). At the third (M'diq), before being directed into Smir lagoon, wastewater is pre-treated by a sewage plant whose load capacity is greatly exceeded (capacity for 5,000 inhabitants, whereas the population reaches 20 to 25,000 in the summer season).

Investment in sewage treatment would help solve several problems: sanitation and public-health, respecting the marine environment and water supply.

Developing land-use planning to improve urban services, regulate land pressure and reduce the impacts on natural areas

The question of the installation of infrastructure for the collection and treatment of wastewater points back more generally to the question of urban development and provision of essential services.

The thrust of urbanisation due to the construction of "traditional" tourist accommodation (hotels, B&Bs, guesthouses) and the

massive development of residential accommodation that began at the end of the 1990s, has led to land saturation.

Diversification of the accommodation offer and land pressure

At Martil on the Tetouan Coast (Morocco), the construction of residential areas around a golf course in the 1990s led to a multiplicity of construction projects on a coast that was already saturated: only 12.5% of the coastline is still “natural”.

In Torremolinos, the urbanised area accounts for 85% of the municipality’s surface area. On the coastline, which is the only land available due to the municipality’s position between sea and mountain, only 10 hectares have not yet been built on (Figure 3).

Fig 3: Land artificialization in Torremolinos (2007)



Source: Navarro Jurrado, 2011

Urban development, tourism and waste production

The question of whether urban infrastructure is adequate to manage the solid wastes produced is key, due to:

- population growth rates (3.7% in Alanya),
- the increased population density in tourist destinations during the summer season (from 3,300 to 10,000 inhabitants per square kilometre in Torremolinos in August),
- the excessive production of solid wastes by tourists compared with residents and the inadequacy of recycling practices (in Cabras, the mean annual production of solid wastes is 7 kg per overnight stay for tourists, while residents produce 0.5 kg per inhabitant per day).

Lack of investment in the collection, storage and treatment of solid wastes – and the consequent continued use, or even expansion, of unofficial dumps – causes severe problems for public health, including pollution of soils, drinking water resources and sea water.

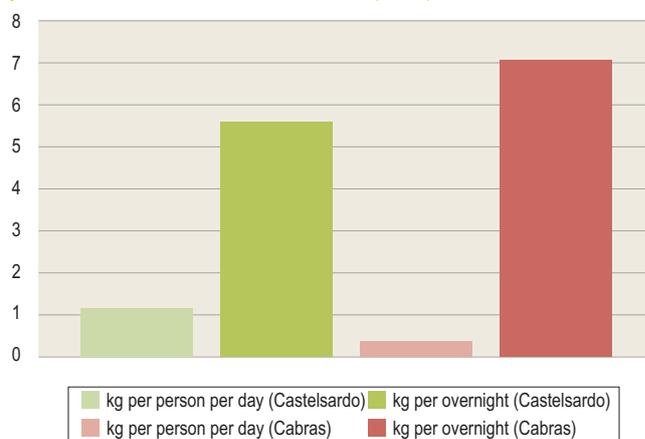
Pressure on biodiversity

Tourism often has irreversible effects on natural areas rich in plant and animal biodiversity:

- the deterioration or destruction of coastal dunes by tourism infrastructure in most countries in the Mediterranean region is reducing plant biodiversity (for example, in Djerba in Tunisia, on the coast of Matrouh Governorate in Egypt and on the beaches of Tipasa in Algeria);
- urban development or drainage of wetlands, which play an essential role in the water and sediment equilibrium of the Mediterranean coastline and host a particularly remarkable biodiversity, is leading to a loss of biodiversity, in particular for migratory birds (Tetouan Coast);
- water-related leisure activities are damaging aquatic plant communities (sea grasses and coralligenous species) and contributing to reductions in the populations of marine turtles (nesting areas) and monk seals (Alanya in Turkey).

As well as land-use planning policies that help conserve natural areas, such as in Rovinj (Croatia), for several years there has been a move towards a “win-win” relationship between tourism and natural sites, in particular in protected areas which have developed programmes for welcoming the public (Sardinia). Conservation of the natural qualities of protected areas benefits the development of tourism and, in return, tourism can help support the conservation of protected areas.

Fig 4: Tourist production of solid wastes compared with resident production in Cabras and Castelsardo (2008)



Source: Plan Bleu, 2011

Recommendations

First of all, the impact of tourism on the environment in terms of land pressure, consumption of natural resources, production of liquid and solid wastes, and threats to biodiversity, can be reduced by: 1) compliance with current regulations; 2) drawing up of national regulatory frameworks that can be applied at regional and local levels; 3) implementation of incentives, in particular for energy conservation, reducing water consumption and recycling solid wastes.

Secondly, drawing up local-level strategies regarding infrastructure would help respond to the problems both of the mismatch between supply and demand (for water and solid

wastes) and of resource availability (load capacity). With regard to drinking water, even where current infrastructure means that drinking water needs are met, at least for a time, it is essential to invest in upgrading the facilities and diversifying supply sources. Investments could be made for the collection and treatment of wastewater, with a view to its reuse for maintaining amenities and green spaces.

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