

WHEN WATER MEETS TOURISM: AN INTRODUCTION

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1. The Earth, a breakable liquid world

The Earth's image seen from the moon, which the astronauts from Apollo 8 captured for the first time on a photograph in December 1968, is amongst the strongest and most beautiful images produced in the 20th century. The intense blue of Earth contrasting over the dark background of the universe has an extraordinary visual effect; a sublime image that challenges us in remembering something which we tend to forget simply because we inhabit in land: that over 70% of Earth's surface is covered in water.

Remembering some trivial geographic data can help understand until what point water is important in the configuration of the world in which we live in. The Pacific, the largest ocean, stretches over an area of 166 million km², which means that only this ocean occupies a surface greater to all emerged land. The Atlantic is twice as big as the South and North America. In total, all four oceans and the largest seas together occupy approximately 362 million km²; besides that, we also have vast areas of the continents permanently covered by glaciers and ice caps, which occupy 14 million km² just in the Antarctic.

It is estimated that the Earth holds 1386 million km³ of water in its various states – solid, liquid and gas (Clarke and King, 2004: 20). The largest water reservoirs are the oceans, whose basins, with depths averaging between -1330m in the Arctic and -4188m in the Pacific, store 1,351 million km³ of water, which is equivalent to 97.5% of all existing water on Earth. Oceans are the main supply of water vapor in

the atmosphere. Each year almost 503,000 km³ of water is released by evaporation from the oceans, but the most of this water falls back into them (458,000 km³ per year) joining again the source of the Earth's salt water (Clarke and King, 2004). The proportion of water that is found in the gaseous state in the atmosphere is minimal, never attaining 0.001% of all water existent on the planet.

Despite this over abundance of water, the amount available for the consumption of plants, animals and human populations is insignificant. Fresh water, which is essential for life, corresponds to only 2.5% of the Earth's water, or approximately 35 million km³. However, from this small portion, almost 70% isn't accessible; it corresponds to water stored in solid state in the great polar ice caps and as glaciers and perpetual snow in the high mountains and circum-polar regions (Clarke and King, 2004: 20). The other 30% of fresh water, corresponding to 10.5 million km³, is mainly found deposited in underground aquifers, which are reloaded very slowly, and whose water is normally accessed by humans with great difficulty. It is a fact that the superficial aquifers can easily be explored through wells, but the more extensive water tables are found encapsulated in the bedrock located hundreds of meters below ground, where only through modern drilling is possible to gain access – which ends up being expensive and technically complicated. The water that precipitates over continents is also very hard to make use of. Two thirds of the 119,000 km³ of water which fall over continents all over the world are lost through evaporation or absorbed by the soil. On the surface and in the liquid state, directly available for consumption, humans have little water available to them; in lakes and in rivers only slightly more than 100,000 km³ of water is found, which is equivalent to circa 0.3% of the total fresh water in the world (Clarke and King, 2004: 20), but even this water is only partly used by human populations seeming that the largest lakes on Earth and some of the longest rivers are found in inhospitable areas where the climate is very cold (e.g., Lake Baikal, which is the largest fresh water lake in the world, and also the Lena River, both in Siberia) or very hot (the Amazon River, the Zaire River, etc.).

Water is an essential element for life. It is, moreover, the main component of all living existence. Although all the entire biome on Earth retains a residual portion of the existent water on the planet, water is an essential part of the mass of living organisms. A newborn human, for example, has more than 70% of its body mass composed by water, and an adult human about 60%. In the simplest multi-cellular living being, such as fungi and jellyfish, that percentage easily rises to over 80%, possibly reaching more than 95%.

All cellular forms need water. Water is the liquid where the colloid cell particles are dispersed. Being a universal solvent, water ensures the transportation of substances to and from the cells. It is here that absorbed nutrients circulate throughout the organisms, and it is through here also that toxic products resultant from cellular metabolism are expelled. Furthermore, water exerts an essential role in the thermoregulation of living beings. Among the common solvents, water is the one with the highest specific heat value. Thus, the water contained in living organisms keeps almost constant the temperature of such organisms in relation to its environment.

The importance of water for biochemistry determines that, in land environments, the variety and the abundance of living beings will depend on the presence of this element. Biodiversity is minimal in both torrid and frigid deserts, precisely because of the scarcity of water in its liquid form, and is at its maximum in humid environments, such as tropical rainforests. On the other hand, the capacity of producing vegetable mass per unit of surface and time increases also with the availability of both water and heat. It is due to this that the highest crop yields in the world are found in the inter-tropical zone.

The importance of water in human physiology and its relation to the abundance of life explains why, throughout history, humans have always sought to settle themselves in its proximity. Contrary to what is often thought, the aquatic world is not a marginal one, strange and foreign to the world dominated by humans. The hydrosphere did not escape the humanization of Earth; on the contrary, it was itself appropriated and dominated by human populations and actively used by them in their strategies in the expansion and occupation of the planet. The Mesolithic shell middens, found in several parts of Europe, including in the Iberian Peninsula, seem to be proof of this. They show that the oldest human sedentary communities correspond to groups of hunter-collectors which would seasonally establish themselves along the coast, on estuaries and deltas, to live off the catch of mollusks, fish and waterfowl hunting, and thus, to some extent, following an amphibian lifestyle. We also know that the first complex civilizations of antiquity appeared around rivers, among populations that developed sophisticated forms of water management and, thus, enabled their transformation in what K. Wittfogel (1975) called "hydraulic societies". The 'centre' of ancient Egypt, for example, resided on the Nile. Apart from providing water for irrigation of fields and the nutrients for the fertilization of the soil, the Nile served as a way of communication between the Upper and Lower Egypt, between the valley and delta, which allowed the exploit of the

complementarities of these two environments and the guarantee of political unity of the kingdom. In pre-Columbian America, the Aztec civilization thrived with the support of Lake Texcoco. This is another clear example on how the development of complex societies normally implies the mastery of the hydrosphere and the humanization of both land and aquatic areas. The Aztecs 'domesticated' the waters of the lake through a complex levee system which controlled the floods, built tanks and channels for the distribution and collection of rain water, and 'colonized' the very mirror of water with their *chinampas*, a kind of floating beds made from wood, wicker mats and tree branches, filled with mud removed from the lake itself, and fixed at the bottom with wooden stakes and with the aid of heavy stones.

Environmentally incorrect cultural practices, especially a poor management of water resources, may have given rise to the decline and collapse of many human societies in the past, as J. Diamond (2004) has advocated. The Mayan civilization from Yucatan, whose disappearance was most probably due to soil erosion and scarcity of water caused by the deforestation of hills around the cities, is an example quoted by Diamond (2004). Deforestation associated with the practice of intense irrigation may also have been the cause of the decline of the Mesopotamian civilization, once that the deviation of water from its natural channels and the over-exploration of the aquifers will have made lower the groundwater levels, thereby paving the way for the salinization of soils and the consequent desertification of the entire region surrounding the Tiger and Euphrates.

The management of water resources constitutes a crucial aspect in the sustainability of human societies. The possibility of a society thriving and surviving always depended throughout history, at least in part, in the efficiency of the control of water resources and the way these are managed. Despite always being in constant circulation, flowing from rivers into seas, evaporating from seas into the atmosphere, and falling back again on the Earth in the form of precipitation, water exists in limited amounts. The water we have today on Earth is the same as it was 4 billion years ago. Fresh water, in particular, is far from being considered inexhaustible. It is true that through the hydrological cycle there is a part of the water from seas and oceans which every year is desalinated and converted into fresh water, but the speed at which this is done does not accompany the growth of its consumption. The most serious issues involve the exploitation of the aquifers, because what took thousands of years to form can be destroyed in just in a few decades.

Issues relating to water management have always been crucial to human societies. Nowadays these issues not only continue to be decisive but are even considered to be more critical than ever before. Today there are problems at stake that never before human societies had to debate. The population growth in the last two centuries, the large-scale urbanization and the industrialization have created pressures on water resources unparalleled to ever before in history. Pollution is one those problems. In the seas, the concentration of population along the coasts, the contamination of waters via chemical fertilizers, the increased circulation of vessels, accidents, the exploitation of oil deposits, as well as the cleaning of oil tankers at high seas, are some of the factors that have contributed highly in the aggravation of pollution situations. Vast stretches of the Gulf of Mexico, the Baltic Sea and the Black Sea, for example, constitute today 'dead zones', this being, hypoxic areas where the lack of oxygen makes it impossible to have marine life. Pollution associated to the overexploitation of fish stocks by industrial fishing and the overheating of sea waters are today serious threats to the biodiversity of the oceans, claiming some studies that 63% of worldwide fish resources may be at risk (UNEP, 2010: 14).

Perhaps even more serious than the problems affecting the oceans are those involving freshwater reserves. Those problems concern, first of all, the consumption of freshwater, which has been increasing at a high rate not only due to the population growth, but also to the improvement of living conditions. In fact, as populations grow wealthier, eating richer foods, consuming proteins at a larger scale, having a more stringent hygiene care and using cars, washing machines and personal computers, also increases their spending of water. The production of 1 kg of wheat involves, on average, a consumption of about 1000 litres of water, but to produce 1 kg of beef we will need 15,000 litres of water. The production of 1 kg of paper consumes 325 litres of water. Thus, whilst in 1900 each inhabitant on Earth consumed an average of 350m³ of water per year, in 2000 that consumption reached at 642m³ (Clarke and King, 2004: 25).

Food production is the main cause of freshwater consumption in the world. Roughly 70% of freshwater consumption is destined for agriculture, used to irrigate the fields. Apart from that, millions of people throughout the world remain undernourished, especially in countries with water shortages. Thus, much more water is needed to feed the world population. The sustainability of this consumption, however, raises new problems since other new activities are each time competing for its use, being tourism one of them.

S. Soloman (2010: 368) said “Throughout history the ceiling of man’s capacity to extract greater water supply from nature had been bounded only by his own technological limitations”; today, however, “an additional, external obstacle has arisen to impose critical constraint – the depletion of the renewable, accessible freshwater ecological systems upon which all human civilization ultimately depends”. This is why water is today such a crucial issue and why we urgently need to reconsider its governance and management.

2. The tourist experience of waterscapes and liquidity

Throughout history, human beings have established complex relationships with water. Using it to wash themselves, contemplating it, playing and defying it, are some of the expressions and actions that this relationship has assumed. Between the intimate and the social, fear, repulse, anxiety and pleasure are the feelings that have mediated the contact with water, as inseparable from the imaginary of the body. A brief, and necessarily condensed synthesis of the main moments of these relations, indicates two grand transformations: a change within the notion of decency and a change of sensibility in water practices (Vigarello, 1985; Corbin, 1988).

The bath and the therapeutic use of water constitute two of the oldest practices, since in Europe its origins are referred to the Roman period. In the middle ages, public baths are still practiced, although its true *raison d’être* is centred on the festive sociability, which is more or less prohibited, and not on the baths themselves, thus causing a progressive condemnation of this practice. However, the main motive for its ending is due to medical reasons. Throughout the 16th century, everywhere in Europe, the public bath establishments are gradually proscribed, due to the belief that hot water would open the pores and permeate the body, thus allowing for the entrance of the harmful airs of the plague. Corporal hygiene and cleanness practices do not disappear altogether, nevertheless they change. In the higher social strata, ‘dry’ hygiene practices are imposed, requiring the frequent change of garments, frictions and perfumes. If on the one hand the practice of public and private baths recesses in all social structure in virtue of fear, on the other hand, the water is used as an element of ostentation by the aristocracy and royalty: in cascades, fountains and water fests coordinated with fireworks. The tamed water becomes an exhibition which aims to seduce the eye.

By the 18th century, although limitedly and irregularly, a slow transformation of water practices starts to occur on the habits of the

aristocracy, with the bath, ablutions and immersion on water.. The appearance of the hot bath becomes more connected to the pleasure of the contact with water than to hygiene, and it is seen as a mark of distinction and luxury. Recommended in spring and summer, this bath, still confined to aristocracy, is a “seasonal practice, largely elitist and vaguely sensual” (Vigarello, 1985: 86). More than hygiene, the provoked sensations caused by the immersion in water dominate. The new practices are accompanied by medical theoretical work, in which the virtues of hot water are described. A few decades later, doctors and hygienists will defend the virtues of cold water, its body invigorating qualities, both from the moral and physical point of view. By the end of that century, the establishments of river baths, which until that moment have been reserved for therapeutic cures, start to be seen within a tonic and hygienist dimension. At the beginning of the 19th century, some doctors affirm that the sea breeze and the maritime baths, both salted and cold, are beneficial for health, acting as body builders. The argument is even extended as far as claiming that the cold bath contributed to the moral character of the individual, the nation, and even the species. The bath and immersion at the sea, as the most common practice, provokes a mixture of pleasure and of suffocating pain that are on the basis of a new way of conceiving the body (Corbin, 1988).

At the same time, a new sensibility in relation to the sea had been developed. Still, in the 18th century, literary and iconographic representations of the sea emphasise hazardous, repulsive and catastrophic landscapes; a restless scenery. Yet, from the late 17th century, progresses in oceanography and the recess of devil’s presence on the mental history of the west (Corbin, 1988: 30) inaugurate a change on the way of seeing the sea. A long path started to take travellers in search of the sea, seeing it as beautiful and sublime, and contemplating it without fear, enjoying the cheerfulness of the water.

A new harmonious relation between the body and the sea was elaborated and a new pleasure that led to the discovery of the coastline, to the invention of the beach and maritime surveillance was built (Corbin, 1988). Places that until then had not “exercised any attraction for travelling or vacations” (Porter, 1995) started to be part of the emerging touristic circuits

The thermal baths, the hydrotherapies, have suffered a path which is similar to the bath. Practiced since the Romans, thermal baths eclipsed during the middle ages, despite being always understood as a relief for certain diseases. During the Renaissance,

nobles and princes rediscover the thermal waters, using them for healing purposes. It was only in 1750 and 1780 that the European elites have invented the modern thermal sojourn, within a trend that also includes the invention of the watering-places and the "discovery" of the mountain. The novelty resides in the conciliation between the therapeutic and hygienist purposes of the maritime mineral-medicinal waters, the invigorating seaside and mountain air, with a festive sociability dominated by leisure. The British aristocracy transformed the "medical sacrifice of cure into the pleasure of the tour" (Rauch, 1995), with Bath serving as model to the new thermal practices, and as Brighton inventing the beach. The thermal treatments and sea baths occupied the morning of these first tourists. The rest of the day was occupied with excursions, sports activities (the traditional horse riding was joined by new sports such as sailing, tennis and football) and evening concerts, dance and gambling in clubs and casinos. The thermal sojourns became "a place of luxury and languor" (Porter, 1995). With the decline of the hygienist paradigm of the use of water, the attendance of the thermal sojourns declined, and the consumers started to prefer watering places, where the beach was combined with an increasing leisure provision.

Although bathing places ('bathing machines') existed until the 1920s (Travis, 1997 and Chase, 2005), the early 20th century saw the birth of swimming, where the leisure experience covers the therapeutic ends. Plunging baths are substituted by swimming and diving. The pleasure of the exercise is joined by the exhibition of the body, and by a simplification of costumes. The contact with nature has been extended to the defiance of the waves. Between the late 19th century and the late 20th century, still the new practices were found to be socially constricted, although there was a new change. It was the beginning of the discovery of the pleasure of contact with the sand and warm waters of the Mediterranean. The English elite moves to the south of France and to the Italian coasts, the latter having the extra attractive of representing the exotic and responding to the desire of escape from the thermal sojourns and from the beaches of their own country, which were invaded by the peasantry (Porter, 1995). Soon after, the therapeutic virtues of the sun on the prevention of rickets are discovered. The exposure to the sun, which was previously avoided, starts slowly to be part of the habits of the summer tourists. The whiteness of the skin which had been a sign of distinction, gives place to tan (Andrieu, 1988; Ory, 2008). The covered body, especially the hidden feminine shapes gives place to the exhibition of the body. After the WWI, the jersey allows to a change

of the texture of the bathing suit costume and in 1930 a new bathing garment of just one piece that leaves the back nude and allows to a more intimate contact with the water and sand appears (Lavenir, 1999: 291). Gradually, the masculine and feminine bathing suits expose the skin. This was a dramatic transformation that in a later period affected cold weather countries, such as England (Lansdell, 1990: 63 quoted by Chase, 2005: 218). In the period between wars, the discourse that connects “swimming and tanning with health, hygiene and progress” is consolidated (Chase, 2005: 219). The seasonality of the water practice maintains, although the traditional Mediterranean winter season is substituted by the summery attendance. According to Boyer (1991: 47), the birth of the Mediterranean summer is a 20th century invention with a predominantly American origin. The new practices have also become key elements on the construction of social individual identities. The new uses of water will be maintained unevenly distributed by the social framework, as it can be observed on the practices of the élites and of the populace, on the types of bath (dipping, diving, swimming), the early adoption of the modern bathing suit and the beaches and thermal sojourns.

The relations with water can also assume other expressions that are characterized by the absence of direct contact with water, mediated by activities such as fishing, yachting or rowing. Amateur fishing with a cane is a masculine, laypeople activity, practiced between June and September. This activity is often associated to solitude and silence. Practiced on rivers, in small boats, on riverbanks and brooks, it becomes allied to particular emotions, particularly associated with the contemplation of the water, the reverie and some adventures told to friends and family caused by the mishaps of fishing (Corbin., 1995: 405). During the 19th century, it was perceived as an activity that combined hygienic, therapeutic and moral virtues – maritime breeze, tranquillity, getaway from the taverns populace and illicit pleasures. From the beginning of the 19th century, a new trend of sportive fishing appears in England. This trend is inserted on the set of sports practiced by the gentry, demanding a more sophisticate equipment and insisting on the dexterity and on the elegance of the gesture, thus, seeking for agitated waters and movement which contrasts with the inertia and passivity of the traditional fishing. The activities of yachting and rowing contribute to similar transformations. Besides, these new practices, which are initially part of the élite, stimulate the creation of new clubs and associations, the organization of competitions and the edition of specialized publications, which describe the virtues of physical exercise, making recommendations,

etc. At the beginning of the 20th century, the new model socially spreads throughout Europe, giving origin to numerous sportive associations. These and other sports, such as mountain trekking, have developed between 1880 and 1930 under the British influence, connected to a new hedonistic moral that values the body and physical exercise, allowing for the discovery of new sensations with the water and landscapes (Lavenir, 1999: 287).

Modern tourism was born between the end of the 19th century and the WWII, owing its existence to the discovery of the body and to the overcoming of the fear of the sea and mountains, to the elaboration of a hedonistic moral which privileges outdoor living and body exhibition to unrestricted eyes. The democratization of the access to tourism has developed touristic amenities, which in turn has reduced, and even abolished, the possibility of contemplation, of the direct contact with nature. The therapeutic project has led to sea baths and to the disappearance of maritime contemplation, in subordination to entertainment. On the other hand, the ecologic paradigm has developed a new sensibility on the relation with nature. Changes led to the appearance of new criteria of choice by some tourists, namely a greater importance attributed to environmental 'cleanness' and the 'untouched' characteristics of a place in relation to the leisure provisions (Hassan, 2003: 243). A return to forms of tourism in "search of existential realities, to be discovered in the realm of Nature that still had retained some bliss of solitude, sought what was sublime was beautiful, savage and sombre" (Singh, 2004: 4).

Coastal environments are the most obvious place to look for the interactions of water and tourism. On the one hand it is here, in a relatively narrow strip of land that the vast majority of people live, creating enormous pressures on resources, namely on water resources. On the other hand, mass tourism associated with the sea, sun and sand does not show signs of decreasing. The Mediterranean has been for decades the largest tourism destination region in the world (UNWTO, 2010), and what is known as the *balearisation* process, a particular type of rapid and unplanned tourism and urban growth coined in the Balearic Islands, Spain during the 1960s, has produced and still produces in various degrees, disruptions at environment, economic, social and cultural dimensions (Bossevain and Selwyn, 2009).

Waterscapes are nowadays accessible for the tourist utilization of much more people than they were in the past. Within most of the western world, the sea, sun and sand do not create new sensations anymore, or a new relation of the body with nature. It is necessary to

invent new activities that will give place to the experience and affirmation of the self. Partly because of that, people have new forms of living and enjoying waterscapes.

Changes in transport and technology are undoubtedly some of the most important innovations that have affected tourism from the late 20th century, and particularly tourism in water environments. One of the most concrete aspects of these changes is the easier access to remote areas by a larger number of people: river journeys, whitewater rafting, seakayaking or sailing in the White Nile, the Mekong or Svalbard, is no longer only for adventurers (see Buckley, 2006). Improvements in telecommunication equipment, especially satellite technology and coverage, and its easy and widespread access, has also allowed for the expansion of tourism, namely yacht tourism, and the growth in the number of people that venture into faraway waters. The number of people who sail and live aboard yachts and vessels has also been increasing in the past years (Jennings, 2003). Technology advances in kayaking, especially in engineering and design, has allowed for more extreme paddling, such as waterfall descents, opening up remote areas to special interest groups. If some of these areas and activities are still the realm of experts, changes usually follow (access roads, accommodation facilities, and so on). At the same time, as Smedley (1995) demonstrated, advances in technology have also improved and widen the groups of people that can participate in water based activities and tourism: adapted kayaks are now used by disabled and physically handicapped groups.

Advances in navigation technology and undersea exploration have also contributed to the tourist 'conquest' of remote geographical areas and to the emergence of new forms of experience of waterscapes. Especially important was the invention of scuba (self-contained underwater breathing apparatus). Scuba broke new ground for the tourist exploitation of the underwater world. Before the invention of scuba, underwater environments were mysterious and remained roughly unexplored (Orams, 1999). Thanks to scuba, the underwater world could be finally opened up to submarine sport and revealed to the eyes of millions of people around the world throughout photo reports and documentaries, being thus gradually integrated in the geography of tourism. The other face of the coin is that access to scuba, snorkelling and free diving sites has increasingly created new environmental issues (Dimmock, 2007).

Originally created for military purposes, the submarines have been one other medium for the unveiling of the underwater

environments and their use by tourism. Although they are pioneering experiences, in a very early stage of development, we already have nowadays, in various parts of the world, companies that offer day-trips aboard submersibles. Atlantis Submarines Inc. was the first company using commercially the submarine technology in the field of tourism (Orams, 1999). The company began to explore one submersible in Hawaii in the 1980s. The idea has proved so successful that the company now offers underwater trips in several destinations, operating more than a dozen submersibles in the Caribbean islands and Hawaii. In its first 10 years of activity, Atlantis Submarines Inc. received more than 4.5 million tourists and realized a total of about 200,000 dives (Orams, 1999: 19). Symptomatic of this fascination of people and tourists with the underwater world is the growth and development of various underwater hotels, where innovation in engineering and architecture allows tourists to sleep next to sharks and to have a shower in the hotel room while looking and scenes that could only be seen before in movies or in aquariums. Poseidon Undersea Resort in the Fiji Islands, scheduled to open in 2010, is a good example of the mix of sci-fi, water fascination, tourism, and mega tourism projects.

At the same time as large, unsustainable projects emerge in many parts of the world, the growth of environmental concerns is also being felt in the tourist experience and consumption of aquatic environments. The wetlands, coastlines and seas have become, in the last few decades, a focus of great attention for tourists who are interested in bird and cetacean watch. As a result, many regions in different parts of the world have specialized in these tourist products. The whale-watching tourism, particularly, has turned into an industry of great success. Observation currently takes place from a large range of vessels including cruise ships, sail boats and sea-kayaking. Whale-watching is estimated to be present in over 65 countries around the world, attracting upwards of 5 million tourists each year (Orams, 1999: 27).

3. Environmental issues relating to the tourism consumption of water and waterscapes: a brief overview

Knowledge related to the impacts of tourism on water resources is still scarce, and rarely there is a distinction between domestic water use and water for tourism. In fact, "Few countries know how much water is being used and for what purposes, the quantity and quality of water that is available and that can be withdrawn without serious

environmental consequences and how much is being invested in water management and infrastructure” (UNESCO, 2009: 17-18). Thus, there is still a long way to understand measure, plan and achieve sustainable values when it comes to the concepts of ‘virtual water’ and ‘water footprints’. Obviously that when we consider that the growth of surf tourism implies the manufacture and consumption of a whole range of products and services related to this industry (magazines, surf boards, the whole range of fashion components from clothes to equipment), the environmental impacts cannot be reduced to the consumption spaces.

Tourism is highly seasonal, and in many places around the globe peaks occur at the same time as the dry season and at the low points of hydropower production. These also commonly coincide with the times when agriculture needs large quantities of water (see Cavaco on this volume). In fact, a great number of important tourism destinations are located in areas where future conflicts over water supply are highly likely, if not inevitable. Around the Mediterranean Sea, seasonal water demands from the tourism industry increase by an estimated 5%-20% per annum (UNESCO, 2009: 117-118). Yet, daily demands can increase sharply in peak season, bringing many places to unsustainable levels. The consumption of water per tourist varies widely, and may range from 100 to 2,000 litres per capita per day, being infrequently higher than that spent by the local population (Gössling, 2001; Garcia and Servera, 2003). Resorts and tourism destinations must be re-accessed, not only in their location and scale, but also in their design. A case study from Zanzibar shows that as much as 50% of water consumption is related to watering gardens (Gössling, 2001), which, together with swimming pools, account for the majority of water spending in resorts.

One of the leisure activities that is clearly connected to tourism and property development, that implies extensive soil use, that is growing sharply throughout the developed and developing world, and that generates bitter discussions in relation to its use of water (also its use of phytopharmaceuticals, fertilisers and energy consumption) is *golf*. One of the critical aspects here is that golf developments are taking place in locations where water supply is already an issue. In the USA for example, not only large quantities of water is taken from lakes, streams and aquifers annually to keep fairways green (Walsh, 2004), but new golf course development is booming in areas where water availability problems are already common, such as Florida, California, Arizona, Nevada and Texas. The golf industry and large resort companies are aware of criticism made to their massive scale

and resource consumption, and consequently have been adopting environmentally friendly practises, which range from low density construction, micro energy generation, and a highly elaborated discourse and promotion based on the sustainable nature of their projects. Often golf courses are advertised as being totally maintained on recycled waste water. Nevertheless, the pressure and demand for ground water has led in some cases to lower coastal water tables leading to seawater intrusion into coastal aquifers (Burak, Dogan and Gazioglu, 2004; see also Cavaco on examples from the Algarve, Portugal, on this volume). The design of golf courses must change together with people's perceptions of what a golf course is, allowing for narrower fairways and introducing browner patches in order to reduce irrigation needs. On a positive note we should stress that in many destinations, the seasonal patterns of golf tourism demand is on a counter-cycle to that of the 'sun, sea and sand' tourism. In the Algarve (south of Portugal), for instance, the golf peak season is in March and October.

One other leisure activity that goes hand in hand with the development of winter tourism and often with great consumption of water, is *skiing*. Due mostly to climate change, natural conditions are becoming less than optimal for skiing in many places, and therefore there has been a tendency for building second generation ski resorts at a higher altitude due to lower levels of snowing (Switzerland and Austria being the best examples), an increase of snowmaking in older ski resorts, which allows for ski areas to open earlier and close later (particularly in US ski resorts). Snowmaking functions in a similar mode to irrigation systems of golf courses (Jones, Scott and Gössling, 2006). It requires a water reservoir, a distribution network of piping and pumps, and numerous nozzles or guns to spread the snow over the slopes, and it implies a high energy spending (Scott, 2006). Slope change and land contouring has also occurred at some ski resorts.

The global growth of tourism and the ever increasing establishment of new resorts in regions with water scarcity, has led to the widespread use of *desalinisation* treatment plants in various resorts (see Ferreira in this volume). These plants carry a heavy consumption of energy and produce inadequate discharges of pollutants often into the sea. Recent technological advances on wastewater reclamation (using the same reverse osmosis as seawater desalination), if accompanied by a wide public acceptance, can offer interesting solutions for tourism resorts (Brissaud, 2010). Yet, there are many examples worldwide of severe inequalities between resorts which have 'unlimited' fresh water in pools and gold courses due to

desalination treatment plants, and local populations who lack fresh water for the most basic daily needs (see Sarmento 2009 for an example in Cape Verde).

Environmental impacts of tourism on the hydrosphere include other dimensions beyond the problems involved in the consumption of freshwater. Water pollution and the devastation of aquatic and coastlines ecosystems are the most critical. The *cruise* industry is nowadays amongst the major sources of ocean pollution. This is, indeed, one of the tourism segments which has grown at a higher rate in the last few decades. It is estimated that the cruise demand has increased about 1700% since 1970 only in the U.S., the world's largest market in this segment (Ferreira, 2009: 138). The worldwide cruise fleet has been increasing both in number and in size from decade to decade. In their early days, cruise ships could accommodate 750 to 1000 passengers, but new vessels are progressively taking on larger proportions. By the late 1990s, new cruise ships launched by Carnival, Royal Caribbean and Cunard could host more than 3,300 passengers, and more recently, in the first decade of the 21st century, some giant cruise ships with capacity for 7,000 passengers and over 2,000 crew members have appeared (Ferreira, 2009).

The cruise industry is far from being an eco-friendly tourism activity. Firstly, cruise is an energy-intensive activity, with very high consumption of fossil energy and very high CO₂ emissions. A ship, on average, releases 712 kg of CO₂ per kilometre, which means that the carbon footprint of a cruise passenger is 36 times greater than that of a Eurostar passenger and more than three times that of someone travelling on a standard Boeing 747 (Klein, 2009: 2). Besides that, a middle-sized cruise ship on a one week voyage with 2,200 passengers and 800 crewmembers is estimated to produce up to 795,000 litres of black water (waste from ship toilets), 3,785 thousands litres of gray water (water from sinks, baths, showers, laundry, and galleys), eight tons of garbage, circa 500 litres of hazardous waste, and approximately 95,000 litres of oily bilge water (Klein, 2009: 2). Black water is normally filtered, being the liquid component discharged directly into the ocean and the swage sludge incinerated or dumped off the shore. The gray water and the oily bilge water are more frequently collected in a holding tank and discharged, through a screen that filters out plastics, when a ship is some miles from shore. Gray water, however, is able to cause adverse environmental effects because of concentrations of nutrients and other oxygen-demanding materials, and oily bilge water may produce damages on marine life due to the presence of chemicals.

Motorboating and personal motorized watercraft use also grew rather rapidly in the last few decades. The emergence of motorized water sports as a rising tourism activity brought some threats for the water quality and the equilibrium of estuarine, marine and lake ecosystems as well. A large range of environmental impacts can be mentioned (see Richins, 2007). Firstly, there are physical effects. Motorized water sports may heighten the erosion of coastline and riverbanks due to the high speed of watercraft, since it provokes water turbulence and waves (Richins, 2007). Water turbulence motivated by jets and propellers also affects the biology of aquatic environments, as well as the noise has been found to be a trouble to wildlife, specifically bird life. Secondly, we have biological and chemical impacts of the boat engine emissions and other toxic substances released during the watercraft utilization. These substances may contaminate the water, affecting the biodiversity and even the human health (Richins, 2007).

4. Looking for sustainability in the tourism-water relationship: the goal and scope of the book

The year of 2010 seems to be the appropriate time to publish in Portugal a book on water and tourism, since the country is registering major landscape changes in three fronts, all directly or indirectly related to water and tourism. Firstly, the coastal dynamics on the mainland are creating problems to beach users (with various deadly accidents in the Algarve in 2010 due to slope collapse), to businesses (various bars and restaurants were washed away by the sea throughout the winter) and to permanent and second residents (under the Management Plan of Coastal Areas of 2007-2013, several houses have been and are being demolished in an attempt to spatially organise the littoral), at the same time as various coastal municipalities have been investing heavily in creating better leisure infrastructures and mobility (namely wooden walks along sand dunes and new pedestrian accesses to beaches). Secondly, the water levels at Alqueva, in Alentejo – presently the largest European artificial lake with over 1000 kilometres of shores – have just reached their maximum, creating new opportunities for tourism development and threats to environmental sustainability, in a region that has been in economic and demographic decline for the past three or four decades (see Cavaco on this volume). Thirdly, the mega project for building ten new large dams in the country has been presented in 2010, and during the next decade deep changes as well as new opportunities

will emerge in inland regions. This 'grandiose' water control phase, dividing environmentalists, economists and engineers, will certainly attract tourists to the 'back regions', to the newly created lakes, bringing new life to marginalised towns and villages, but also creating pressures on relatively undisturbed spaces and will demand new regulations and planning in order to avoid conflicts between multiple users and various environmental impacts related to increasing visitation numbers.

The challenges resulting from the meeting of water with tourism are enormous. If on the one hand water is increasingly a scarce resource at a global scale, on the other hand tourism relentlessly continues to grow, bringing in many cases important economic benefits, but also carrying with it significant impacts on water resources. This book intends to engage in the discussion of the water and tourism meeting, from the perspectives of spatial planning, water consumption and tourism management, and regarding different practices and discourses that frame waterscapes. Various chapters from different contributors will explore these complex interdependencies.

Ana Sampaio debates the importance of sustainable management of Marine Protected Areas at two different levels: the need to achieve biodiversity conservation and the critical role that sustainable tourism may have in this achievement. While arguing that there is a need to establish a deeper dialogue between the establishment and management of Marine Protected Areas and populations, the author also claims that there is a dearth of studies on the impacts of sustainable tourism on Marine Protected Areas.

Diana Almeida, departing from the assertion that 'people have a natural disposition to be in waterfronts, near water elements', discusses the dynamics of the relationship between ports and cities. In analyzing the contemporary trends in waterfront redevelopment, she highlights the importance of tourism and leisure activities as redefining dimensions of these spaces.

Following similar concerns regarding post-industrial port cities, *Ana Gonçalves* discusses in some detail the waterfront redevelopment case of Cardiff in Wales. She points to the profound and spectacular urban and social transformation and regeneration of this space, creating a new visibility of the city at both national and international levels. The chapter not only illustrates the postmodern reinvention of the city, which triggered tourism growth in a close relationship with water environments, but equally highlights the inequalities that are embedded in many of these redevelopment processes, and the gap between them and truly inclusive cities.

Jorge Mangorinha and *Helena Pinto* focus on the ways in which the thermal heritage of two cities is being used in urban planning and development strategies. By reviewing the most recent strategic urban projects in Chaves and Caldas da Rainha, cities located in northern and central Portugal, respectively, they present a comparative analysis of the relationship between water, cities and thermal heritage.

Eduardo M. S. Ferreira discusses the challenges of developing tourism in water scarce Qatar. Not only this small country located in the Gulf region has become a major global transport hub in the last years, but it is investing heavily in tourism infrastructure, aiming to be one of the world leaders in the hosting of sports' events. While the recent economic success has been translated into population growth and in increasing pressures on natural resources, namely on water, and the author explains, the growth of tourism is creating further threats.

La Vergne Lehmann also focuses on tourism development and water scarcity, and looks in particular to management practices in the tourism accommodation sector. The chapter presents and discusses the results of a survey with tourism accommodation operators in two dry land regions of Western Victoria, Australia, and attempts to identify and understand the motivations behind the people who have taken actions to implement good water management practices.

Claudete Moreira and *Norberto Santos* discuss the importance of river tourism in Portugal, presenting an overall view of the country's potential and mapping of activities already in place. Details of white water activities such as canoeing, canyoning, rafting and hydrospeeding are provided. A particularly important note is made on the launching of a national program for the regeneration of rivers (on similar lines to those existent for urban areas and their waterfronts), which despite being limited to the estuaries of four rivers (Douro, Vouga, Mondego and Tejo), could signal a stronger awareness by politicians and planners to water courses and a further step in the tourism development of Portuguese rivers.

Raimundo Quintal looks at the cultural landscapes of Madeira Island, Portugal, and in particular to the historical construction and management of a long system of irrigation channels (*levadas*) that crisscross the island. These *levadas* are part of the dynamics of the islands' agricultural and agrarian landscapes and presently have an enormous potential in the development of walking tourism. For the success of this enterprise, the author argues, these landscapes and material and symbolic heritage must be managed as an ethnographic resource.

Sara Albino presents a study on Surf Tourism in Portugal, focusing especially on the discourses of surfers and politicians in the coastal town of Peniche, which has branded itself as the 'capital of the wave'. Based on first hand observation and local interviews, the chapter reviews the surf industry idiosyncrasies while questioning the sustainability of this type of sports tourism in Peniche.

Xosé M. Santos Solla establishes a dialogue between tourism and rain, which unlike the sun, the wind, the cold or the heat, is generally perceived as a negative aspect of tourism destinations. The chapter reviews some of the main characteristics of tourism in Galicia, Spain, indicating that tourism planning and tourist authorities have not adapted their actions to the wet climate of the region. Therefore it is here argued that rain should be valorised per se, and tourism products should be constructed around it. To these practices, a complete change in mentalities should take place, which perceives rain as a positive element, and where stormy seas can be viewed with pleasure.

Finally, *Carminda Cavaco* offers an insightful and broad approach to the importance of water as a precious resource that should be used with ethical, social and environmental responsibility. The author highlights the conspicuous growth of tourism, and the consequences of tourism development on agriculture. Using a wealthy range of international examples, the chapter engages also with various challenging situations in Portugal where water meets tourism.

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