



## The Environmental Pressures and Perspectives of Tourism on Coastal and Insular Zone. The Case of Greece

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### ABSTRACT

Tourism is widely known as one of the most enterprising branches of the tertiary sector of economy in many countries. Nevertheless, over the time, touristic activities have resulted in a significant number of environmental implications related directly or indirectly to the coastal and insular area. The paper focuses on the qualitative characteristics of environmental impacts of tourism on the islands, on the grounds that, there are some vital goods which are not amenable to quantification, but concentrate substantial ecological and socioeconomic wealth. The foundation of the methodology is built on the DPSIR assessment framework focusing on the geographic area of Greece. The number of environmental problems caused by the intensive tourist development, such as the depletion of natural resources, the spot and extensive pollution of specific sources and also coastal erosion, lead to a short-term intensive tourism development, which cannot be considered viable in the long run. Finally, it should be highlighted that especially for the tourist sector, environmental asset constitutes the milestone of a healthy socioeconomic development for any country. Therefore, appropriate decision making and measures should take place for the integrated protection of such a precious and vulnerable resource, ensuring its viability both in environmental and economic terms.

### INTRODUCTION

Tourism is widely known that it is one of the most enterprising branches of the tertiary sector of economy in many countries. Worldwide, according to the provisions of the World Tourism Organization, it is expected that the international tourist arrivals will reach the 1.6 billion visitors, in 2020, which indicates an increase of 170% percentage, over the base year 1995 (565 million visitors). Europe is estimated to obtain the largest share of the tourism market (46%), in 2020, with an annual growth rate of 3.1% (UNTWO 2011).

The rich natural characteristics, such as sea, sun and sand, all the relative recreational activities and the unique scenery, that the coastal areas offer, make these regions an attractive destination (Davenport & Davenport 2006, Gormsen 1997). However, this increasing tourist population and the corresponding related activities, inevitably lead to strong pressures on the coastal area (Hall 2001) and a host of environmental problems. The increasing magnitude and expansion of tourism sector, combined with not rationally planning in many cases, which is guided more by the market forces, culminated in an over exploitation of natural resources (Santonocito, n.d). In addition, the high degree of concentration in just a few months (seasonality) strains the waste production rate, the local water and energy resources and the air, marine, urban and coastal pollution (Santonocito, n.d),

as well as the infrastructure of the host area (Mavris 2011).

So, these “invisible but powerful” economic forces determine a spatial and social framework which is far beyond the notion “sustainable tourism development”, since it is inconsistent with the protection and embrace of the natural environment, as internationally envisioned. The combination of spatial problems, quality downgrading and pollution of these receptors as well as the depletion of local natural resources makes it imperative for further study and investigation, especially in a prime touristic country like Greece.

This paper focuses more on the qualitative characteristics of environmental impacts of tourism on the grounds that there are some vital goods (especially in the environmental field) which are not amenable to quantification, but concentrate the ecological and social wealth, which is our obligation to maintain in perfect condition for the imminent generations. As a spatial scale reference, the purely insular regions are studied owing to the fact that these regions concentrate a number of special characteristics and peculiarities and on the other hand, each and every little change in their territory could heavily affect the sustainability of these receptors. Given that these spatial units accommodate a largely growing number of people as well as socioeconomic activities, there is an imperative need for a thorough study on how all these forces could be integrated in a more sus-

tainable way, avoiding any kind of degradation on these highly susceptible areas.

## METHODOLOGY

**The DPSIR framework:** The foundation of the methodology of this paper is built on the DPSIR assessment framework, which has been adopted (in different versions) from many institutions, international organizations as well as research for a variety of environmental subjects. The DPSIR framework provides the opportunity for an integrated study of environmental problems (and not only) focusing on the critical elements (driving forces, pressures, state, impacts, response) and their inter-relationships (EEA 2005, Glyptou et al. n.d., Koulouri et al. 2006, Kristensen 2004, Navarro Jurado et al. 2012, OECD 1993, Spilanis et al. 2009). So, there is a conceivable cycle on which it is attempted to identify the dominant driving forces; the pressures which are exerted on the ecosystems; the affected area and population; the impacts that burden the human and ecosystem health and finally, the planning and adoption of appropriate policies and measures which aim to counteract the implications and maintain the sustainability and quality of resources, regulating the aforementioned dimensions accordingly. From the policy point of view, it should be highlighted, what on the OECD core set of indicators for environmental performance reviews was cited, “in a wider sense, these steps form part of an environmental (policy) cycle which includes problem perception, policy formulation, monitoring and policy evaluation” (OECD 1993).

On the other hand, it should be mentioned that owing to the nature of some dimensions of the study subject, there are, for instance, some pressures with immediate impact or some impacts with rapid response, which could not be classified separately into the exact elements of DPSIR model, so that the cohesion of the paper will be inseparable. The same conclusion could be extracted from the fact that there is a no separation line between several components of a DPSIR model for example between *pressures* and *impacts*. However, it is attempted to classify these dimensions so that we may conceptually be consistent with the DPSIR framework.

**Spatial scale-insular and coastal zone:** Methodologically, it should be highlighted that the analysis is primarily focused on the insular area of Greece and its respective coastal zone, due to the fact that Greece has a large coastline and if we take into consideration the definition of European Commission, which emphasizes that “coastal regions are statistical regions defined at NUTS level 3 with a coastline or with more than half of their population living less than 50 km from the sea” (European Commission [EC], 2014), then we

would incorporate many areas with mountainous and not only coastal characteristics. This fact constitutes a peculiarity of the country on the grounds that Greece consists of a relatively small geographic area with great variety in topography. Hence, the analysis is more concise and is exclusively focused on the coastal zone of islands as well as on vital issues of some other regions with extensive coastal line, which face critical challenges.

## DRIVING FORCES

**Study area-basic characteristics:** The study area is located on the southeast edge of Europe and in the east of the Mediterranean basin (Fig. 1). Three crucial characteristics which determine the Mediterranean islands are the insularity, which means the combination of small geographic size, non existence of substantial natural capital, and accessibility obstacles. The second one is related to the climate peculiarities, such as the prevalence of elongate, hot summers with high degree of drought, paired with a few and severe rainfalls in winter. The last characteristic indicates that the economic base of these areas is strongly depended on the tertiary sector of the economy, and especially in the branch of tourism (Spilanis et al. 2009). In addition, no considerable agriculture sizes are observed along these areas (2009) probably because of the rapid and the growing transformation of land uses at the expense of the primary sector, due to the lower economic added value that characterizes the latter.

The coastline of Greece consists approximately the  $\frac{1}{4}$  of the entire European coastline (EU-25) (Hellenic Ministry of Environment, Physical Planning & Public Works [HMEPPPW], 2006), with an area of 131,957 km<sup>2</sup> and a length of 15,021 km (190,000 beaches), which marks the



Fig. 1: The geographic location of Greece (Wikimedia Commons 2014).

country as the destination with the longest coastline in the Mediterranean Sea (Coccosis & Mexa 2002, Invest In Greece Agency [IIGA] 2013). On the other hand, the insular area is 25,100 km<sup>2</sup> (6,000 islands), involving 19.1% of the total national land area and this proportion is larger when compared with other island countries-except island states, like Cyprus and Malta (Coccosis, Athanasopoulou & Parpairis 2005, IIGA 2013).

The total urbanized coastal area is estimated at 1,315 km<sup>2</sup>, which represents 1.31% of total surface area of the country. Additionally, it should be noted that the density of coastal area is important, as estimated at 88 inhabitants per km<sup>2</sup>, while the average density of the country is 75 inhabitants per km<sup>2</sup> (HMEPPPW 2006). In addition, according to the research data, with spatial reference of Santonocito (n.d.), it should be noted that Greece, for the year 2005, presented 409 tourists per km<sup>2</sup> possessing the fourth place among EU Mediterranean countries, as well as 13.4 tourist presences per 1000 inhabitants which gave the third place for this index (Santonocito, n.d.).

The tourism sector is an important source of income for Greece, however, over the time, touristic activities have resulted in a significant number of environmental problems related directly or indirectly to the coastal and insular areas. These features offer to the country a chance for utilization of national wealth, but also at the same time they pose intense pressure on space and increase the chances of contamination of sensitive ecological areas, from all kinds of human activities.

## PRESSURES

**Land uses change:** First of all, the lack of effective spatial planning, at least until 2002 in Greece, was intensified and made it possible to create uncontrollable situations in coastal areas. The forces of economy and the free market have shaped the spatial development. The inevitable result is the global burden of natural and cultural environment. Most competing land use (residential, tourist) replace the more traditional, i.e. farming, as they are characterized by a higher land value than the second ones and on the other hand, due to lack of spatial planning until recently, many arbitrary structures have altered and degraded the natural environment (Coccosis et al. 2005, Coccosis & Mexa 2002). As a result, rapid and extended urbanization along with the respective transformation of (in many cases, imperturbable) landscapes took place burdening the spatial and natural characteristics of the coastal and insular zones (Tintore et al. 2009). To this point, it should be emphasized the fact that the facilitation of land use changing was indirectly supported by the state intervention, allowing the limit expansion of small settlements (popula-

tion < 2000) for the housing needs. Consequently, this legislative initiative contributed to the increased construction of touristic premises, especially in coastal areas. Surprisingly, in some cases, the building ratio could reach the respective right, which is implemented in the urban areas (Avgerinou-Kolonia et al. 2002).

It is remarkable in a country with such a long coastline, the lack of a specific spatial plan for the coastal zone until recently. Similar problems of design and arrangement of land use occurred in other Mediterranean countries, such as Turkey (Burak et al. 2004), Spain (Garcia & Servera 2003, Yepes & Medina 2005), and other islands (Aguilo et al. 2005). It should be noted that apart from the economic competitiveness of the area, according to Gossling (2002), the whole process of changing usage and land cover is often accompanied by a number of emissions like CO<sub>2</sub>, CH<sub>4</sub> and NO<sub>x</sub>.

**Natural resource stress:** The pollution of coastal areas is due to many factors, including inadequate treatment of sewage and solid waste (HMEPPPW 2009a), e.g. industrial waste, etc. Also, coastal zone pollution is aggravated by agricultural activities (e.g. leaching of agrochemicals products) (Aggelidis & Oikonomou 2005, Coccosis & Mexa 2002) and the effects of eutrophication, a common feature also in other Mediterranean countries (Burak et al. 2004).

Moreover, tourism activity such as hunting, camping or other recreational activities may contribute to the ignition of fires in forests, especially to islands with a high degree of forested areas (e.g. Thassos, Skiathos, Chios, etc.). A crucial factor which could possibly intensify, such phenomena is the expansion of infrastructure (for covering the needs of tourism sector), especially of road network along the forested areas on the islands, a fact that should be seriously taken into account from policy and decision makers (Barbosa et al. 2010, Demir et al. 2009, Gumusay & Sahin 2009). Especially, when forest fires break out and immediately combined with infringement processes, a usual phenomenon at coastal areas, the process of natural degradation is getting more and more severe, keeping a certain distance of what we call sustainable development (HMEPPPW 2008). Concluding, forest protection must be one of the main priorities due to the fact that many forest fires take place in many islands favoring the change of land use from forested to touristic area, especially in the coastal areas (HMEPPPW 2003a, HMEPPPW 2003c).

## STATE

The coastal zone of the country may be regarded as layered, and shares many natural and man-made elements and activities. Firstly, the largest urban centers in the country are situated in this area. Also the majority of the productive activity

(80% of industrial activity, 90% of tourism and related services, 35% of agricultural land) takes place there. Finally, a substantial part of the infrastructure of these activities can be found in this zone (HMEPPPW 2006).

In addition, the issue of the rational tourism management at the most susceptible areas in Greece (islands and coastal areas) must be seriously taken into consideration, especially, if we realize that 65% of total beds and 70% of total nights spent by tourists are mostly allocated in the insular and coastal regions (Regions of South Aegean, Ionian islands, Crete) and to the capital as well as to other major coastal regions (Regions of Attica and Central Macedonia). In addition, the tourism impact can be more conceivable, since all the insular regions are characterized of above 50% occupancy (HMEPPPW 2008).

Although Greece has a great variety of flora and fauna, namely 5,500 flora species, 436 avifauna species, 447 fish species as well as many other species of sea fauna, over the past years a mitigation process regarding vegetation wealth, especially in coastal areas is observed, a fact which should heavily be taken into account for the sustainable development of coastal and insular areas (HMEPPPW 2008). It is also worth mentioning that, the coastal areas are of high ecological value with important species of flora and fauna (e.g. over 300 species of birds) such as the Natura 2000 areas, etc. (Coccosis & Mexa 2002).

**Natural and cultural heritage:** Greece is one of the richest countries in terms of natural and cultural heritage. The comparative advantage of this legacy lies in the high degree of variety concerning the natural and cultural resources. For instance, in the region of Northern Aegean are located plenty of wetlands, fossilized forests, marine ecosystems and many areas which are fully protected by European legislation (Natura 2000, Corine etc.) (HMEPPPW 2003a). It should be noted that a great number of thermometalic springs are located in Ikaria, Lesvos, Limnos and Chios islands, while hot springs are observed in Ikaria and Lesvos islands. In this region, the presence of *Monachus Monachus* sea turtle is observed. Additionally, beyond the natural wealth, in many islands of this region, there are plenty of prehistory, classical, medieval monuments as well as traditional settlements (HMEPPPW 2003a). In the region of the Ionian Islands, there are plenty of natural formations, such as caves, geological formations, waterfalls, the cluster of Ehinadon islands, which are protected by the Ramsar Convention as well as 85 traditional settlements. In this region, the urban planning is relatively absent, allowing the market force to expand and degrade the natural environment; mostly the landscape and the agricultural field. In addition, at the vulnerable area of coastline, an extended construction volume without accompanied

by the respective necessary and supporting infrastructure is observed (HMEPPPW 2004). The insular region of Crete includes 21 archaeological sites, 74 landscapes of exceptional natural beauty, areas which are registered in the NATURA 2000 catalogue and 88 traditional settlements (HMEPPPW 2003c). Finally, the region of Southern Aegean incorporates 212 traditional settlements and many archaeological sites and monuments of global recognition. On the other hand, there are 30 areas which have been proposed to be included in the NATURA 2000 register, about 30 wetlands according to the Greek database as well as landscapes of exceptional natural beauty. More specifically, concerning the forest resources and the need of their integrated protection, this region of islands includes the largest biodiversity in the entire Mediterranean basin (HMEPPPW 2003b).

**Energy:** The field of energy is of crucial importance given that many islands cannot meet their energy needs exclusively from autonomous energy networks, especially in the summer seasons where the demand for energy may be really high. For this reason, alternative source of energy must be exploited totally adjusting to the insular peculiarities. Wind parks have already been constructed in some islands such as Lesvos, Limnos, Chios, Psara, Samos, Ikaria (region of North Aegean) in order to cover the energy deficit as well as to cope with the strong dependence from the continental energy network. In addition, there are perspectives of further exploitation of other energy resources, such as geothermal fields, solar panels, biomass, which are absolutely compatible energy resources with the insular characteristics (HMEPPPW 2003a). In the region of Crete, the energy produced by wind parks reaches 11% of the total energy consumed (HMEPPPW 2003c). On the contrary, the energy produced in the region of Southern Aegean is based primarily on oil. Some other islands are serviced by undersea energy cables, where voltage problems are observed in high season periods. Some wind parks have been established in a few islands, namely, in Andros, Kithnos, Karpathos, while the energy produced by solar panels is in infancy conditions despite of the ideal climatological characteristics of the region. Consequently, plenty of renewable resources are planned to be exploited by this cluster of islands, respecting at the same time the insular and morphological characteristics (HMEPPPW 2003b).

**Water resources and waste infrastructure:** Following the great demand for energy, there is great demand for water resources as well. Hence, the islands have to seek for sustainable water resources. Taking into consideration the particular nature of the geomorphology of islands as well as the ongoing unsustainable practices (water transfer through ships from the mainland), we realize that it is an issue of vital im-

portance which requires immediate action (HMEPPPW 2003, HMEPPPW 2003c).

On the other hand, major problem for many of the islands, constitutes the absence of waste management infrastructure, especially in coastal towns, where there is either no sewer network or wastewater treatment plants (HMEPPPW 2003a, HMEPPPW 2003b), intensifying the pollution implications and degrading the natural and cultural capital of the area at the same time. Definitely, such deficiencies affect the tourism attractiveness and pose a significant risk to the tourist carrying capacity of certain insular areas. Nevertheless, Greece has managed to maintain very high quality of beaches, coastal and lake water. Noteworthy is the long-lasting improvement of quality levels of bathing beaches from 1990 to 2012, according to the standards of European Directive 76/160/ECC, representing coastal bathing waters in compliance with mandatory and guide values at percentages above 93% (EEA 2011, Special Secretariat for Water [SSW] 2013). It should be mentioned that from a sample of 2,149 monitoring points on coastal bathing waters, 2,007 (93.4%) are characterized by excellent quality, 111 (5.1%) of good quality, 25 (1.2%) of adequate quality and only 6 (0.3%) of inadequate quality (SSW 2013).

Concerning the quality of beaches as well as the respective infrastructure, for 2013, Greece is still in second place after Spain, among 49 countries in a global scale, in possession of blue flags, with 393 (12.66%) beaches and 9 marines awarded. For the same year, the municipalities with the majority of blue flags are Corfu (35), Saint Nicolas of Crete (23) and Rhodes (20), while in the upper geographical scale, the prefectures with the most blue flags are Corfu & Chalkidiki (35) as well as Dodecanese (25) (Tratsa 2013).

## IMPACTS

**Impacts derived from the transportation field:** Another important factor, which poses threats on the coastal zone, is the area of transport and entertainment. Apart from the main transportation projects that support tourism, which are rarely justified by similar studies of carrying capacity of the regions (Coccosis 2000, Informative Bulletin of National Association of Engineers of Planning and Regional Development [IBNAEPRD] 2013), there are some special cases that have been discussed at the international level. Cruise ships are contamination sources in the sea, rejecting large quantities of waste. This takes very significant proportions when the waste is untreated, when it is estimated that each passenger produces an average of 3.5 pounds of solid waste per day. If we add to this, the pollution (sewage, hydrocarbons) of ships and many other sea transportation in ports, we may realize the gravity of the situation, as it has been

observed a deterioration mainly in flora and fauna of the marine environment (Davenport & Davenport 2006). This problem is very important, since most hot spots are concentrated near major cities (Athens, Thessaloniki, Patras, Volos, Eleusis Bay, Thermaikos Bay) (Aggelidis & Oikonomou 2005). This situation, in combination with the small hydrodynamic circulation of the Mediterranean, which limits the scope for water renewal, makes the problem particularly acute care (HMEPPPW 1992).

It should not be ignored, the additional problems of crowding in terms of population size/m<sup>2</sup> and motor vehicles. The latter intensifies the air pollution, especially at the urban net affecting the quality of life and attractiveness of popular destinations (Koutrakis et al. 2011). These problems, however, undermine the long-term sustainability of future tourism development, especially to the islands, whose economy, relies on it (Neto 2003).

**Water resources shortage and quality degradation:** A major problem that is manifested in summer with strong local and tourist demand for water is the lack of adequate drinking water and the salt water intrusion in groundwater aquifers, given that especially in islands, there is a shortage of surface water. As a result, significant amounts of water are being transported by tanker, from the mainland of Greece to the islands, in order to cover the deficit. Furthermore, in order to tackle the growing demand for drinking water and irrigation, the acquisition of water through underground aquifers is intensified. Finally, several islands use desalination plants as alternative solutions to the problem. Such solutions, however, are very expensive, but more intensive, though applicable, in many Mediterranean regions with similar difficulties (Garcia & Servera 2003, Koulouri et al. 2006). Consequently, other more sustainable solutions should be immediately adopted, especially on the islands of the Southern Aegean, where the water shortage is acute and the intensified use of the underground water resources has led to the general degradation of this vital resource. This issue is getting greater dimensions due to the fact that there is an acute demand for water supply from both the agricultural and touristic sector, a fact which has led to the extensive salt intrusion of water resources (HMEPPPW 2003b).

**Impacts from waste management deficiencies:** Major problem for many of the islands constitutes the absence of waste management infrastructure, especially in coastal towns, where there is either no sewer network or wastewater treatment plants. The problem becomes acute in the summer season, when urban and industrial waste (without prior treatment) ends in the sea, exacerbating the pollution of these natural receptors. As a result, the islands should seriously deal with a general degradation of surface and underground

water and soil, the visual pollution and the deterioration of susceptible ecosystems, including the human ecosystems (HMEPPPW 2003a, HMEPPPW 2003b).

**Coastal erosion impacts:** Last but not the least, it should be highlighted the fact that, in the wider areas of Mediterranean, desertification phenomena is observed, which stem from degrading soil factors, such as erosion, which is definitely related to environmental and socioeconomic repercussions (Koulouri et al. 2006, Tintore et al. 2009). Representative examples of coastal-beach erosion are located on the Cala Millor (Mallorca, Spain) beach which demanded a total of 60,000 m<sup>3</sup> sand through several years for beach nourishment (Tintore et al. 2009); on Dutch coast which demanded a total of 12×10<sup>6</sup> m<sup>3</sup> sand per year in order to be consistent with safety requirements and confront future consequences which stem from climate change along with other practices, such as expanding dunes in seaward orientation etc. (Horstman et al. 2009); on Costa del Sol (Spain) where beaches had to be re-nourished because of the erosive phenomena induced from industry sector (Navarro Jurado et al. 2012); on the Delta of the River Nestos (Kavala Gulf, Greece); on the Riccione and Misano Adriatico beaches (Italy) where beach re-nourishment is essential for the viability and existence of these beaches etc. It should be underlined that the financial impact could be extremely high depending of course, on the significance of each situation. Indicative economic financial figures of such projects may approach to 3,500,000 Euro and 5,900,000 Euro, which are the amounts that were demanded for re-nourishment projects in Riccione and Misano Adriatico beaches and Tarquinia beach (Italy) respectively (Koutrakis et al. 2011). A fact that would not be ignored in any case is that a detailed study must be conducted in planning coastal erosion measures so that other impacts-derived from this counteracting erosive procedure-will not “migrate” in close areas leading to a vicious circle (Horstman et al. 2009).

## RESPONSE

### Spatial Planning Scales and Approaches

**Spatial and urban planning framework and directions in Greece:** Greece, in order to protect the natural and cultural wealth of the impacts of tourism development, should take drastic solutions. First of all, the country needs to ensure the effective and timely implementation of planning, especially for the coastal area, before the degradation of both, natural and cultural environment has been irreversible. In contrast, they are promoted joint ministerial decisions (15.04.2009) which give the right to local authorities to negotiate directly the concession use of the foreshore and beaches with private individuals, virtually eliminating the

public area. It should be noted that municipalities of the first degree are more vulnerable to custom relationships, since most decisions will not require the approval of the Ministers of Interior and Economics (Technical Chamber of Greece [TCG] 2011). Unfortunately, such practices have been continued up until now with updated legislation, servicing the same purpose (2.5.2013). This issue is considered of vital importance, since spatial planning should compromise and regulate the coexisting of conflicting forces which are paramount in the Mediterranean coastline, such as human and touristic structures, industrial and mobility infrastructures (Mavris 2011), which altogether compose an exploding mixture, given the expected socioeconomic growth in coastal areas. At the same time and at lower planning scale, the integrated regeneration of urban areas (especially at saturated touristically areas) in socioeconomic and environmental terms adjusted to the insular and landscape peculiarities should be beneficial (IBNAEPRD 2013). Additionally, Greece should take advantage of various EU financial tools, such as acquiring funding for promoting innovative projects which are related to the sustainable urban mobility (IBNAEPRD 2013) towards a healthy urban environment relieved from air pollution.

Furthermore, in order to avoid arbitrary touristic structures in prone areas (NATURA 2000, small islands with low degree of development and intact natural environment), there must be strict law enforcement against the construction of premises beyond the predefined city or town limits. Following the above trend, there must be immediate town planning, especially in areas with high touristic demand, so that we can avoid environmental degradation and allowing normal developmental procedures to take place (HMEPPPW 2008). Moreover, the spatial planning should seriously take into account the land changing of forested areas on the grounds that critical problems resulted from this change, such as soil erosion, floods, etc. and provide rehabilitation measures (reforestation, preventative measures etc.) (HMEPPPW 2003b, HMEPPPW 2003c). Additionally, with regards to construction dimension, these processes should follow certain criteria, such as the adjustment to the traditional local architecture and the usage of environmentally friendly materials. Immediate and urgent measures constitutes the rational land use planning, especially at the interface of urban-countryside area targeting to the integrated and conservation of environment and landscape (HMEPPPW 2003a, HMEPPPW 2003b, HMEPPPW 2003c, HMEPPPW 2009b). On the other hand, the effective protection of historical monuments as well as the integration of these buildings to the social and economic web (museums etc.), should be promoted (HMEPPPW 2003a, HMEPPPW 2003b, HMEPPPW 2003c). In this context, the risk of further degradation of the most

attractive but also susceptible coastal areas must be avoided by enacting the planning law, which is translated, beyond others, to the restriction or prohibition of constructing any building outside the town limits, as well as to the development of specific areas that will host certain productive facilities providing attractive incentives (HMEPPPW 2003b, HMEPPPW 2003c, HMEPPPW 2004). Hence, the pattern of compact city should be adopted for these vital areas minimizing the total building stock and the corresponding amount of infrastructure. Therefore, we highly recommend the implementation of such practice which certainly consumes less land, natural resources and diminishes the implications on the natural environment (HMEPPPW 2003b, HMEPPPW 2003c).

In the context of wider collaboration perspectives and in order to cope with the special characteristics of insularity (isolated regions, small productive basis and market) at the same time, insular regions should develop intra and inter-regional relationships between other economic regions inside and outside the country, such as countries of central and eastern Europe, Black Sea and Mediterranean countries, in a range of multiple sectors like tourism-culture, energy, water resources, waste management, economic development (HMEPPPW 2003a). Such cooperation could be of great importance, since these small spatial and economic units (islands) could be really benefited from the interaction and active involvement of various economic production sectors. More specifically, unique traditional local products (Chios mastiha and other agriculture and livestock products of high quality) may respond to the growing touristic demand for such products, strengthening at the same time the small economic base of these areas, rising the employment opportunities and attracting more people to live and work in such quality environment. Thus, the support of creating local associations of small enterprises is promoted, which will fully exploit the local raw materials. This target is absolutely compatible towards a viable economy, fully adjusted to the peculiarities of these regions. Definitely, this cooperation is not limited only to the neighboring countries, but also to the active collaboration between the distinct insular clusters and of course with the continental area of Greece. These interactions will definitely strengthen the economic competitiveness as well as the social cohesion of the study area (HMEPPPW 2008).

Another interesting perspective which is widely promoted in the spatial planning is the turn to alternative and environmentally friendly tourism types, such as agritourism, regional and cultural tourism. These types of tourism have definitely lower environmental impact, since they do not require the development of additional structures and the respective infrastructure (Santonocito, n.d.). Moreover, ow-

ing to the fact that seasonality is restricted here (Santonocito, n.d.), the economic benefits could be dispersed along the broader geographic area (touristic arcs which are interconnecting culture and natural beauty hotspots between several spatial scales-urban, regional, interregional areas etc.) enhancing the socioeconomic cohesion. A fruitful solution for these areas constitute the strong interaction between the diversified tourism sector, the high quality of local agriculture and livestock products which should be the primary providers of tourism demand and the integrated protection and exploitation of the natural and cultural heritage (HMEPPPW 2003a, HMEPPPW 2003c, HMEPPPW 2009a). Hence, complementarity among primary, secondary and tertiary production sector must be considered as the primary target, which in turn, will be enhanced by the growing tourism demand. Furthermore, a more integrated approach for sustainable tourism development requires the construction of the necessary infrastructure and services of high quality which will support the diversified tourism product (hot springs tourism, agritourism, regional tourism etc.). Such a dynamic approach will strengthen the economic base of these areas, the social cohesion and possibly extends the tourist period which consists of a major drawback for the study area (HMEPPPW 2003a, HMEPPPW 2009a). On the other side, with regards to the Ionian islands, it is presented an opportunity for establishment of touristic arc, where coastal areas could be connected with other important touristic destinations which are located on the mainland, in the context of diversification of the tourist product. This diversification will definitely support the least developed areas of the region and lead to some extent to the decongestion of the most developed areas. In addition, they are provided many opportunities for the elongation of the touristic period (HMEPPPW 2004). This opportunity is more obvious for the region of Crete and Southern Aegean, while there is fertile ground for experiencing different types of the touristic product (conference tourism, mountainous tourism, agritourism, athletic tourism, ecological and cultural tourism etc.) at the same spatial unit (HMEPPPW 2003b, HMEPPPW 2003c).

Concluding, from a planning policy perspective, a coherent model should aim to the following guidelines: 1) Modernization of current tourist infrastructures instead of creating new facilities in the most developed areas avoiding the further burdening of the natural and cultural environment. Pursuing of diversification of touristic product and providing the respective high quality supporting services. 2) Regarding the less developed insular areas, the smooth interaction between certain activities (residency, entertainment and cultural activities) and the turn to more viable touristic patterns, favoring alternative tourist products should be promoted. This policy clearly aims to encounter the se-

vere touristic seasonality benefiting the local population producing multiplier effects in terms of income and employability and finally leading to a more sustainable touristic development pattern (HMEPPPW 2003b).

**Spatial and coastal planning approaches-integrated coastal zone management perspective (ICZM):** According to Queffelec, Cummins & Bailly (2009), the appropriate level of enacting coastal planning and management procedures is considered the local or regional level, while Horstman et al. (2009) considered that the coastal strategies that are planned on bigger spatial scales may be more appropriate ground for applying effective coastal defenses in the long run, in light of the variety and trends of local characteristics.

Nowadays, there is an emerging trend of innovative planning of coastal areas, which is known as bioregional planning. As bioregion could be characterized as a geographic area that include the interactions between biotic and abiotic elements, namely flora and fauna, geological and hydrogeological resources, climatological and other environmental characteristics as well as human beings and settlements, and is determined mostly by natural boundaries (Sustainability Now 2013). The competitive advantage of bioregional planning lies in the fact that this kind of planning considers the interaction between land and sea layers as a whole planning unit and also, integrates the ecosystem approach to spatial planning process, ensuring the sustainability dimension to the natural resource management and exploitation (Forst 2009).

Greece should take advantage of an EU important tool regarding the coastal zone, the integrated coastal zone management (ICZM). This tool aims to an integrated long term approach in such sensitive areas taking into account the environmental and socio-economic perspectives. It also promotes participation and coordination of public and private sector, in order to tackle successfully such a difficult and multifaceted task (Clark 1997, EC 2011). This planning tool derived from the urgent need for both integrated protection of marine ecosystem and sustainable exploitation of coastal resources, counterpoising various local socioeconomic interests. Also, it should be underlined, the overall contribution of ICZM to the minimization of environmental (destructive) interactions and impacts which take place in the transition zone between beach and water (Queffelec et al. 2009). Among others, special tools, such as Marine Spatial Planning could be conducive to a rational utilization of natural marine wealth in terms of sustainability (Queffelec et al. 2009), which is consistent and acts in synergy with the ecosystem approach that, "is a strategy for the integrated management of land, water and living resources that promotes

conservation and sustainable use in an equitable way" (Convention on Biological Diversity [CBD] 2013), enhancing the local economy and ensuring the long term reproductive process of these resources which is of eminent importance for the upcoming generations. Concluding, the co-participation of other local stakeholders, such as environmental agencies, sea "industry" representatives and cultural and scientific experts could effectively balance the socioeconomic and environmental dimensions and strengthen the sustainable tourism on coastal and insular zone (Directorate-General Internal Policies of the Union [D-GIPU] 2008). Concerning the ICZM tool, it has been acknowledged about its contribution to the conflicts smoothing between involved partners, both public and private, driving to a more effective decision making, regarding coastal planning and management perspective (Koutrakis et al. 2011). On the other hand, there were some observed cases, where the involvement of multiple interspatial administrative levels was resulted in inadequate coastal management due to coordination and cooperation gap (Tintore et al. 2009). So, in order to cope with these complex problems, Forst (2009) suggests the establishment of a central government agency responsible for regulating and optimizing the cooperation among involved stakeholders for an effective coastal planning and management.

### Spatial and Coastal Planning Tools

For an effective coastal zone management and planning, GIS among others constitute a valuable tool for local and regional stakeholders who may take advantage from their versatility. More specifically, it is provided the opportunity, for instance, to determine the most vulnerable areas (analyzing the dimensions which affect the study area) -coastal hazard, or/and to project the long term shoreline and sand dune evolution according to the prevalent trends and finally to formulate and plan the most appropriate policies and projects beforehand for avoiding undesired, irreversible situations (Rodríguez et al. 2009). In the technology context, GIS incorporated into appropriate Decision Support Systems may effectively contribute to the confronting of forest fires which are provoked from touristic activities on the forested areas, providing the supportive framework for immediate detection and suppression of fires, protecting the ecosystems, human integrity, cultural resources and touristic facilities as well (Bonazountas et al. 2007, Noonan-Wright et al. 2011). Such tools make up valuable aids in promoting effective decision making.

In the same context, an innovative approach is emphasized by Horstman et al. (2009) where the combination of Cost-Benefit analysis and multicriteria analysis could integrate the assessment of the socioeconomic and environmen-



tal repercussions which are paired to every project-strategy, increasing the added value of integrated project assessments in the long-term. The determination of various criteria is certainly dependant on the strategy perspective which may focus on either spatial development perspective, or social acceptance, or sustainability, or financial viability, or other relative with the project perspective. So the corresponding weights are adjusted accordingly (Horstman et al. 2009).

### **Perspective of Adopting Hard and Soft Engineering Tools for the Environmental Protection and the Upgrading of Infrastructures**

Another international common practice of hard engineering which has not yet been implemented in Greece is the beach nourishment. This is a technique that aims to reduce coastal erosion and has been implemented or proposed for a number of areas with positive results (Garcia & Servera 2003, Phillips & Jones 2006, Uyarra et al. 2005, Yepes & Medina 2005). Nevertheless, according to Yepes & Medina (2005) and Tintore et al. (2009), the beach nourishment is a short term solution with high financial weight and an emerging set of environmental issues (water quality, sediment production etc.). However, in terms of sustainability, practices supporting the natural regeneration-if possible and depending on indigenous spatial and biophysical characteristics-of this valuable area should be prioritized, considering simultaneously the corresponding socioeconomic adhered aspects in the long term (Tintore et al. 2009) and decreasing the risk which is correlated with inflexible structures characterized of highly financial value, given that future processes might modify the current perspective and management data (Horstman et al. 2009).

Regarding the infrastructure perspective in the study area and according to the current situation, it could be mentioned that sustainable practices for saving water resources, especially at places where such solutions are of primary importance, like the development of dams and lake reservoirs, so that the shortage of water could be confronted through the exploitation of rainy water (Marinos & Maris 2006). These practices may solve many water-related problems in the long run, like water supplies deficit for drinking and irrigation and saltwater intrusion (HMEPPPW 2003a, HMEPPPW 2003c). However, recurrent monitoring of the coastal water is required in order to prevent any degradation which is due to extensive pumping of underground water as well as to untreated, in many cases, waste disposal (HMEPPPW 2009a). Alternatively, for an effective control and saving of water resources, a stricter water pricing policy could be adopted so that the extravagance of such a valuable resource be minimized, as well as the reconstruction of municipal water pipes, where significant leakage is observed (Kristensen 2004), in

order to maintain the sustainability and quality of water resources. At the same time, greater awareness campaigns should be taken place targeting the sustainable management of this resource, providing incentives for saving, reusing and recycling (HMEPPPW 2003b).

Finally, due to rapidly growing demand of energy, because of the large numbers of tourists in the islands, autonomous energy production plants are considered not viable in the long run. Hence, the insular regions, in order to keep the attractiveness and deal with this growing demand, should be immediately connected with the central energy network of the country along with their energy units in case of extreme conditions (HMEPPPW 2008).

### **Public Awareness**

Another key component constitutes the available general information and the public awareness regarding environmental issues. This can help local authorities to conduct various campaigns on the one side (Garcia & Servera 2003), and on the other side, travel agents can universally sensitize a large part of the population about the negative consequences of the tourism and its practical limitations, such as rational consumption of water and energy etc. (Budeanu 2005). In addition, the strengthening of public awareness concerning ICZM procedures, erosion dynamics and causes as well as coastal proactive structures (either hard or soft structures) is of crucial importance on the grounds that except the population sensitization on these issues, it empowers the social consensus for the design and development of such necessary projects for the sustainability of coastal resources (Koutrakis et al. 2011).

### **CONCLUSIONS**

Greece is a country with rich natural and cultural heritage. This heritage is a comparative advantage in relation to other touristic destinations. The coastal area and the islands, in addition to the rare natural beauty which distinguishes them, gather a large percentage of the population, economic activities and infrastructure in coastal areas.

From the economic point of view, it should be highlighted that beyond the economic profits originated from the touristic activity (growth of local income and employment etc.), when small economies such as islands or coastal areas are directly depended on the tourism sector at the expense of other sectors (primary and secondary sector), then the viability of the economy base is being jeopardized due to small diversification of the local economy (Navarro Jurado et al. 2012). According to the statistical analysis in national and regional (insular) spatial scale, we can conclude that the trend of growing touristic demand and supply is going to be continued

with high rates. Especially, if it is understood that the insular regions concentrate above of 2/3 of the total incoming tourists and accommodation units, we should intensify the protective and regulative mechanisms in order to keep the sustainability for these vulnerable areas. A constructive index for this purpose constitutes the carrying capacity of these small spatial units, we could say a threshold, beyond that an incline of degradation in socioeconomic and environmental terms, for these areas will begin to occur. As a consequence, loss of competitiveness, general and constant decay might happen with irreversible implications on the local population and (natural and cultural) environment. Consequently, there is an imperative need for a thorough protection and real sustainable development of these susceptible areas in order to curb the local population, but also to upgrade the living conditions, rationally exploiting the unique natural and cultural capital.

Therefore, apart from the socioeconomic benefits, arising from the exploitation of these areas, the environmental impacts that accompany tourism development should be seriously taken into account. The number of environmental problems caused by the intensive tourism development in these areas, such as the depletion of natural resources, the spot and extensive pollution of various factors and also coastal erosion, lead to a short-term intensive tourism development, which cannot be considered viable in the long run. Thus, a series of policy issues should be seriously considered, such as, the effective implementation of spatial planning, particularly in the coastal area; the comprehensive study of areas with critical problems and application of ICZM; the development and upgrading of the insufficient infrastructure; the opportunity of beach nourishment so as to avoid areas of severe corrosive effects, but also the general information and public awareness (domestic or otherwise) to the practices and types of sustainable tourism development.

Hence, Greece should implement effective solutions to protect this vital area, both in order to protect the natural and cultural environment but also to promote a long-term sustainable tourism development. The present difficult financial situation is a challenge and how this will affect the overall environmental policy should also be considered.

Of course, the selection of the “degree” of sustainability is an issue of political will and perspective, while each and every national governance body may opt the more beneficial strategy according to historic conditions. Hence, the two options are summarized as “weak sustainability” where the environmental dimension is overshadowed from the economic concern and to “strong sustainability” where the natural resources are considered as irreplaceable and priceless good in the society (Navarro Jurado et al. 2012).

Finally, it is obvious that especially for the tourism sector, environmental asset (including natural resources, landscape scenic and cultural environment) constitutes the milestone of a healthy socioeconomic development for any country. Hence, it would be for the best interest of our planet if we tried to diminish the ecological footprint of the tourism consciously and collectively at a global scale, so that sustainability and socioeconomic development may proceed hand to hand for a better future for us and the imminent generations.

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