
Comparative Analysis of Carrying Capacity Indices for the Central Aegean Islands*

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Abstract:

The tourist industry is one of the most important economic activities in Greece. The country receives over 14 million visitors per year. In an era where tourism is one of the fastest growing sectors of the developing countries the competition with existing tourism destinations, such as Greece, will intensify. Greece has enjoyed increasing numbers and revenues from tourism due to the unique environment both natural and man-made making it a high profile tourist destination. However, it is already clear, that the uncontrolled growth of the industry can bring serious environmental and social problems, leading to a decline in the quality of tourist product and services provided. Such negative effects can be controlled and reduced using environmental and tourism indices to estimate the impact of tourism and other businesses on the environment. The purpose of this paper is to apply the principles of coastal environmental management for the Islands in the central Aegean Sea islands via the carrying capacity assessment methodology in order to develop environmental performance indicators necessary for formulating a novel sustainable development policy proposal for Greek tourism.

Key Words: Banks Tourism Carrying Capacity, Tourism and Environment, Tourism Development, Destinations and Environment

JEL Classification: L83, Q01, Q51, Q56, R58

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1. Introduction

Greece depends heavily on the tourist trade, as tourism is the main economic activity in Greece. The issue for a long term viable development in the Greek islands, is to find a creative and hopeful perspective through the carrying capacity assessment indicators. Sustainable development and its quantification procedure with specialised measurement instrument, consist a vital element for the environmental condition of the Greek destinations; as the tourist product is a blend of ecological, social and economic sub-systems^{4,5}. For that reason an adapted amount of sustainable indicators is selected and a comprehensible methodological guide for their use is created, aiming to reliable measurement of selected parameters that are considered to be important for our region. We believe that using this approach, the local societies and the stakeholders involved as well, are able to understand the size of impact on the existing and mainly not renewable resources, in order to proceed with strategic planning and terms of sustainability for their future developmental course. The natural environment is crucial to the attractiveness of almost all travel destinations and recreation areas⁶. Coastal and marine areas are also important recreation resources for local residents as the tourists who spend much time with marine activities⁷. Coastal zone management is emerging as a deep concern of governments⁸. Through this study and its results the researcher will try to determine the destination status in order to improve tourism and suggest a plan, that will help these islands to become more competitive as tourist destinations. Carrying capacity assessment has become an indispensable tool for formulating policy and strategies in the tourist industry worldwide⁹. Countries and regions with considerable natural and cultural resources look towards tourism when stimulating their sustainable development activities¹⁰. The contribution of tourism sector to development needs to be clearly explained to allow countries to invest into tourism.

⁴ Briassoulis H., Policy and Practice, Sustainable Development and its indicators: Though a (planner's) Glass Darkly, *Journal of Environmental planning and Management* vol. 44(3), 409-427, (2001)

⁵ Zannou V, 'Guide of Socio-Economic Studies for the Integrated Management of the Water Environment' (1999)

⁶ Farrell B., Runyan D., Ecology and Tourism, *Annals of Tourism Research*, (1991)

⁷ Needham M., Szuster B., Situational influences on normative evaluations of coastal tourism and recreation management strategies in Hawai'i, *Tourism Management* 32, 732-740, (2011)

⁸ Charlier R., De Meyer C, Tourism and the coastal zone: The case of Belgium, *Ocean and Coastal Management* 18, 231-240, (1992)

⁹ Prokopiou D.G., Tselentis B.S., Bousbouras D. and Toanoglou M. «Carrying capacity assessment in tourism: The case of Dodecanese archipelago» *The Ravage of the planet*, First International Conference on the Management of Natural Resources, Sustainable Development and Ecological Hazards, Dec.2006 Bariloche, Argentina Wessex Institute of Technology UK- University of Siena,

¹⁰ Jarmozy U., Sustainable tourism development: ingenuity in marketing strategy, Sustainable Tourism III International Conference, Malta 2008, Wessex institute of Technology UK- The Compluence University, Spain

Tourism is considered as a development factor¹¹ as is probably the best example among human activities in which the linkages between environmental quality and economic prospects are evident [12]. Tourism is a part of a general strategy towards sustainability there is little agreement on, or evidence of, how to achieve this.

2. General Characteristics

The Cyclades are located at the south part of the Aegean sea. The Cyclades comprise about 200 islands and the major ones are: Amorgós, Anáfi, Ándros, Antíparos, Dēlos, Íos, Kéa, Kimōlos, Kýthnos, Mēlos, Mykonos, Náxos, Páros, Folégandros, Sérifos, Sífnos, Síkinos, Sýros, Tēnos, and Thēra or Santoríni. Most of the smaller islands are uninhabited¹³. Ermoupolis, on Syros, is the capital town and administrative center of the former prefecture. The islands are peaks of a submerged mountainous terrain, with the exception of two volcanic islands, Milos and Santorini (Thera). The climate is generally dry and mild, but with the exception of Naxos the soil is not very fertile: agricultural production includes wine, fruit, wheat, olive oil, and tobacco. Cooler temperatures are found in higher altitudes and mainly do not receive wintry weather. Samos was a prefecture in Greece, consisting of the islands of Samos, Ikaria and the smaller islands of Fournoi Korseon. In 2011 the prefecture was modified and the territory is now covered by the regional units of Samos and Ikaria. Its capital was the town of Vathy, in Samos. Cycladic islands represent one of the most popular destinations in Greece which is highly dependent on tourism. The purpose of this study is to examine the image Cycladic and Samos region islands, by analysing the of the interactions between tourism and environment by examining environmental indices¹⁴. The population of Cyclades is mainly concentrated in Syros (19.870) Naxos (18.988), Thira (13.960), Paros (12.853), Andros (1.009) Mykonos (9.320) Tinos (8.574), the other islands' population is under 4.000. Samos' population is 33.814 and Ikaria's 8.312. There is only one town with more than 10.000 thousand people, the Capital of Cyclades, Ermoupoli. (approximately 15.000)

¹¹ Ntibanyurwa A., Tourism as a factor of development, Sustainable Tourism II International Conference, Bologna 2006, Wessex institute of Technology UK - The Complence University, Spain

¹² Priestley G.K., Edwards J.A. and Coccossis H., Sustainable Tourism-Europoean Experiences, Cab International 1996 page ix

¹³ www.wikipedia.com

¹⁴ Prokopiou, D.G., Tselentis B.S., Bousbouras D and Toanoglou M. «Sustainability indicators and their role to destinations' Strategic development» Sustainable tourism as a factor of local development Conference, Monza, Italy 7-9/11/2008

3. Tourism Development

Tourism development started mainly at 1980. In 1977 the islands with more than 5 hotels were: Andros (15), Ios (8), Milos (5), Mykonos (17), Naxos (18), Paros (20), Syros (14) and Thira (9) and Tinos (17). In Samos there were at the same time (20) hotels¹⁵. Massive tourism development in all the Cyclades and Samos islands started after the 90s. Tourism product of Cyclades is based in a very unique environment, as the local architectural style, the sandy long beaches, the traditionally builded hotels, the nice restaurants with marvelous food the hospitable people. Samos region islands are different, the natural and environment and the unique human environment of Ikaria are the competitive advantages.

4. Ports and Airports

Ports: In the islands, there are thirty three (33) ports that connect with the other islands and the mainland of Greece.

Airports: Eight airports are operating in these islands, as three of them are international Mykonos, Thira and Samos, the other airports, in Syros, Paros, Naxos, Milos and Ikaria are regional.

Table 1. Beach impact factor and beds per kilometres in Cyclades islands

MUNICIPALITY	TOTAL TOURISM CAPACITY (BEDS) 2010 ¹⁶	BEDS /SQ KM	HOTEL BEDS/ KM OF BEACH	DESTINATION MANAGENT SCHEMES	TOTAL TOURISM CAPACITY (BEDS) 2005 ¹⁷
SYROS ISLAND					
ERMOYPOLI TOWN	2927	0,56	5226,78	NO	769
POSIDONIA	2260	4,8	470,83	NO	763
ANO SYROS	1281	2,8	457,5	NO	580
AMORGOS ISLAND	3395	8,5	399,41	NO	298
ANDROS ISLAND					
KORTHIO	197	3,5	56,285	NO	-
YDROYSA	3371	15,2	221,77	NO	860
ANDROS TOWN	1307	4,2	311,19	NO	395
THIRA ISLAND					
THIRA TOWN	16010	18,6	860,75	YES	8478
IA ISLAND	1021	5,8	176,03	YES	716
THIRASIA ISL	44	2	22	YES	38
IOS ISLAND	4333	9,48	457,06	YES	2129
KEA ISL	942	9,2	102,39	NO	295
KITHNOS ISL	963	15	64,2	NO	246

¹⁵ Greece Hotels 1977 Le chamber des Hotels de Grece, Athens

¹⁶ Actual data collected from Hotel Unions and Municipalities

¹⁷ Official data from Hellenic Statistics Authority

Table 1. Beach impact factor and beds per kilometres in Cyclades islands (cont'd)

MUNICIPALITY	TOTAL TOURISM CAPACITY (BEDS) 2010 ¹⁸	BEDS /SQ KM	HOTEL BEDS/ KM OF BEACH	DESTINATION MANAGENT SCHEMES	TOTAL TOURISM CAPACITY (BEDS) 2005 ¹⁹
MILOS ISLAND	4393	20,5	214,29	YES	968
MYKONOS ISL	18926	10,3	1837,47	YES	8881
NAXOS ISLAND					
NAXOS TOWN	4000	18,5	170,64	NO	3821
DRYMALIA	595	6,8	87,5	NO	96
PAROS ISLAND	18063	22,5	802,8	YES	6473
SERIFOS ISLAND	400	7,1	0	NO	306
SIFNOS ISLAND	2317	4,62	501,51	YES	832
TINOS ISLAND					
TINOS TOWN	2495	3,2	779,68	NO	1794
EXOMBOURG	773	6,3	122,69	NO	43
PANORMOS	312	1,2	260	NO	0
ANAFI ISLAND	724	5,41	133,82	NO	0
ANTIPAROS ISL	2343	7,3	320,95	NO	343
DONOUSA ISL	500	2	250	NO	0
IRACLIA ISL	230	1,5	153,33	NO	0
KIMOLOS ISLAND	228	7,5	30,4	NO	0
KOUFONISI ISL	1761	2	880,5	NO	107
SIKINOS ISLAND	240	1,11	216,21	NO	37
SCHINOUSA ISL	443	3,6	123,05	NO	58
FOLEGADROS ISL.	2592	1,95	1329,23	NO	0

Table 2. Beach impact factor and beds per kilometres in Samos district islands

MUNICIPALITY	TOTAL TOURISM CAPACITY (BEDS) 2010	BEDS /SQ KM	HOTEL BEDS/ KM OF BEACH	DESTINATION SCHEMES MANAGENT	TOTAL TOURISM CAPACITY (BEDS) 2005
SAMOS ISLAND					
VATHI	5034	18,95	265,64	NO	3905
KARLOVASI	1219	4,4	277,045	NO	1230
MARATHOKABOS	2790	8,95	311,73	NO	930
PYTHAGORIO	5556	9,05	613,92	NO	3801
IKARIA ISLAND					
AGIOS KYRIKOS	896	5,25	170,6667	NO	124
EFDILOS	316	2,8	112,8571	NO	191
RACHES	932	1,55	601,2903	NO	322
FOURNI ISLAND	364	6,6	55,15	NO	0
THIMENA ISL	8	1,2	6,66	NO	0

¹⁸ Actual data collected from Hotel Unions and Municipalities

¹⁹ Official data from Hellenic Statistics Authority

Table 3. Tourism capacity history in Samos district islands²⁰

	2010	2002	
SAMOS ISLAND	14,599	16,968	
IKARIA ISLAND	2,144	3,024	
FOURNI ISLAND	364	351	

Table 4. Tourism capacity history in Cyclades islands²¹

	2010	2002	
MYKONOS	18,926	14,734	
THIRA	17,031	22,660	
PAROS	18,063	17,804	

Table 5. Beach impact factor (illegal buildings incidents per km of beach)

ISLAND	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
IKARIA	0	0	0.10	0.10	0	0	0.10	0	0	0	-
SAMOS	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.14	-

Table 6. Beach impact factor (marine pollution incidents per km of beach)

ISLAND	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
IKARIA	0	0	0	0	0	0	0	0	0	0	-
SAMOS	0,01	0,01	0	0,07	0	0	0,07	0	0	0,07	-

²⁰ Tourism organization of Samos Prefecture, 2010

²¹ Papanikoli E., Kretsisi M., Study for Tourism in Mykonos, (in Greek) Mytilini 2004

Table 7. Beach impact factor (illegal buildings incidents per km of beach

ISLAND	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
SYROS	-	-	-	-	-	0	0	0.12	0.12	0	0.12
AMORGOS	0	0	0.11	0	0	0.11	0	0	0.11	-	-
ANDROS	-	-	-	-	-	-	-	-	-	-	-
THIRA	0.04	0.04	0	2.33	0.04	0.12	0.12	-	-	-	-
IOS	0.10	0	0.10	0	0.10	0	0.10	0	0.10	0	0
KEA	0.10	0	0.10	0	0	0	0	0	0	0	0.10
KITHNOS	0.06	0	0.06	0	0.06	0	0.06	0	0.06	0	0.06
MILOS	0	0	0	0	0.19	0.24	0.04	0	-	-	-
MYKONOS	-	-	-	-	-	-	-	-	-	-	-
NAXOS	0	0	0	0	0	0.03	0.19	0.07	-	-	-
PAROS	0.16	0.16	0.16	0.16	0.16	0.16	0.16	0.16	0.16	-	-
SERIFOS	0	0.14	0	0	0	0	0	0.28	-	-	-
SIFNOS	0.21	0.21	0.21	0.21	0.21	0.21	0.21	0.21	-	-	-
TINOS	-	-	-	-	-	-	-	-	-	-	-
ANAFI	-	-	-	-	-	-	-	-	-	-	-
ANTIPAROS	0.13	0.13	0.13	0.13	0.13	0.13	0.13	0.13	0.13	-	-
FOLEGANROS	0	0	0	0	0	0	0	0	0.51	-	-
KIMOLOS	0	0	0	0	0	0	0	0	-	-	-
SIKINOS	0	0	0	0	0	0	0	0	-	-	-

In table 8 we present the relation between illegal building incidents with beaches length- km) as in table 9 the marine pollution incidents per km of beach.

Table 8. Beach impact factor (marine pollution incidents per km of beach) in Cyclades islands

ISLAND	2000	2001 ²²	2002	2003	2004	2005	2006	2007	2008	2009	2010
SYROS	0.07	0.07	-	-	-	-	-	-	0.24	0.36	1.34
AMORGOS	0	0	0	0	0	0	0	0	0	-	-
ANDROS	0	0									
THIRA	0	0	0	0.04	0	0	0	0.04 ²³	0	0	0
IOS	0	0	0	0,10	0	0	0	0	-	-	-
KEA	0	0.10	0	0.10	0	0	0	0	0	0.10	0.10
KITHNOS	Insignificant amounts										
MILOS	-	-	-	-	-	-	0.04	0	-	-	-
MYKONOS	Insignificant amounts			-	-	-	-	-	-	-	-
NAXOS	0	0	0	0	0	0.03	0.07	0.03	-	-	-
PAROS	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	-	-	-
SERIFOS	0	0	0	0	0	0	0	0	-	-	-
SIFNOS	0	0	0	0	0	0	0	0	-	-	-
TINOS	-	-	-	-	-	-	-	-	-	-	-
ANAFI	0	0	-	-	-	-	-	-	-	-	-
ANTIPAROS	0	0	0	0	0	0	0	0	0	-	-
FOLEGANDROS	0	0	0	0	0	0	0	0	0	-	-
KIMOLOS	-	-	-	-	-	-	-	-	-	-	-
SIKINOS	0	0	0	0	0	0	0	0	0	0	0

Table 9. Waste management and noise nuisance in Cyclades islands

	URBAN WASTE TREATED	GARBAGE	SEA WATER INTRUSION INCIDENTS	NOISE NUISANCE
ERMOYPOLI TOWN	100%	NLS	NO	1
POSIDONIA	UC	NLS	YES	1
ANO SYROS	20%	NLS	NO	0
AMORGOS ISL.	UC	IS	NO	0
KORTHIO	UC	LS	NO	0
YDROYSA	UC	LS	YES	0
ANDROS TOWN	UC	LS	NO	0
THIRA TOWN	95%	LS	YES	2
IA	90%	LS	NO	2
THIRASIA ISLAND	0	LS	NO	0
IOS ISLAND	90%	NLS	YES	1
KEA ISLAND	0	IS	YES	1
KITHNOS ISLAND	0	NLS	NO	1
MILOS ISLAND	0	IS	NO	1
MYKONOS ISLAND	98%	NLS	NO	1

²² Tselentis BS - Prokopiou DG, "Environmental Management of Port Oil Terminals", International Conference Rhodes 2002, Wessex Institute

²³ Shipwreck of a cruise ship in Gulf is Fira (very serious incident)

Table 9. Waste management and noise nuisance in Cyclades islands (cont'd)

	URBAN WASTE TREATED	GARBAGE	SEA WATER INTRUSION INCIDENTS	NOISE NUISANCE
NAXOS TOWN	0	IS	NO	2
DRYMALIA	60%	IS	NO	0
PAROS ISLAND	70%	NLS	YES	2
SERIFOS ISLAND	70%	LS	NO	0
SIFNOS ISLAND	12%	IS	NO	0
TINOS TOWN	0	IS	NO	1
EXOMBOURG	0	IS	YES	0
PANORMOS	0	IS	NO	0
ANAFI ISLAND	0	LS	NO	1
ANTIPAROS ISLAND	0	IS	YES	1
DONOUSIA ISLAND	0	IS	NO	0
IRACLIA ISLAND	0	IS	NO	0
KIMOLOS ISLAND	0	IS	NO	0
KOUFONISI ISLAND	100%	IS	NO	1
SIKINOS ISLAND	0	IS	NO	0
SCHINOUSA ISLAND	0	IS	NO	0
FOLEGADROS ISL	0	NLS	YES	1

Table 10. Waste management and noise nuisance in Samos district islands. Maximum amount for each municipality (noise nuisance)

MUNICIPALITY	URBAN WASTE TREATED	GARBAGE	SEA WATER INTRUSION INCIDENTS	NOISE NUISANCE
VATHI	11%	NLS	NO	3
KARLOVASI	62%	DE	NO	1
MARATHOKABOS	8%	DE	NO	0
PYTHAGORIO	38%	NLS	NO	1
AGIOS KYRIKOS	0	NLS	NO	0
EFDILOS	25%	NLS	NO	0
RACHES	0	NLS	NO	0
FOURNI ISLAND	1	UC	NO	1
THIMENA ISLAND	0	IS	NO	0

Notes: LS:Landfill sites for municipal waste,RLS: Landfill sites for residual municipal waste (after recycling),NLS:Landfill sites for municipal waste non attending to 1999/31/EU,IS:Illegal sites for municipal waste,DE: Destroyed

Table 11. Total arrivals in 2010 and 2007

ISLANDS	PORTS		DOMESTIC FLIGHTS		INTERNATIONAL FLIGHTS	
	2007	2010	2007	2010	2007	2010
SYROS	337,450	266,547	3,612	6,796	0	0
AMORGOS	6,2955	58,384	-	-	-	-
ANDROS	348,422	270,571	-	-	-	-
THIRA	546,625	527,936	167,242	161,553	192,042	181,746
IOS	73,696	103,595	-	-	-	-
KEA	165,864	145,516	-	-	-	-
KITHNOS	76,423	66,727	-	-	-	-
MILOS	135,519	77,473	18,121	18,049	0	0
MYKONOS	596,212	439,504	106,690	100,219	104,901	111,136
NAXOS	380,551	330,020	10,908	10,112	2,167	766
PAROS	590,742	501,879	21,079	20,532	0	0
SERIFOS	69,480	61,132	-	-	-	-
SIFNOS	25,725	99,530	-	-	-	-
TINOS	627,347	413,481	-	-	-	-
ANAFI	8798	11,399	-	-	-	-
DONOUSA	7,539	7,913	-	-	-	-
IRACLIA	6,094	6,782	-	-	-	-
KIMOLOS	25,725	8,893	-	-	-	-
KOUFONISI	25,930	31,580	-	-	-	-
SHINOUSA	8,512	9,431	-	-	-	-
SIKINOS	8,925	32,739	-	-	-	-
SAMOS	138,164	101,551	105,823	94,025	132,228	108,882
IKARIA	94,464	76,804	12,714	12,419	0	0
FOURNI	14,989	14,591	-	-	-	-
THIMENA	624	2348	-	-	-	-

5. Conclusions

The data presented in Table 1 indicate the major municipalities where this indicator highlights serious coastal pressures on the coastline. From Ermoupoli Town 5226,78 (with tourists per km of beach), Mykonos (1837,47) and Folegandros (1329,23). concentrates the most serious pressures at the coasts. Paros, Antiparos and Syros has serious pressures from illegal buildings incidents and marine pollution incidents (tables 5,6,7,8). Urban waste management (solid and liquid) on the islands is characterized by lack of efficiency regarding the waste treatment in the cities as Samos/ Vathy, the city of Tinos and the city of Naxos. The population of these cities is 6,000 inhabitants for each approximately. . That causes serious problems for the tourism industry of these places. Moreover It is interesting to note that other smaller settlements do not even have a complete urban waste collection network.(see tables:9 and 10)The data presented in Table 6 indicate that the passenger arrivals in charter flights in Samos airport has 19% decrease as in the

airports of Cyclades islands the arrivals has smaller decrease. The data presented in Table 9 and 10 indicate the major municipalities where this indicator highlights serious noise pressures at the massive tourism districts as Paros, Thira Ia and Vathy. Regarding fresh water consumption (tables 9 and 10), the demand is increased during the summer months as in all over the island. Some islands they deal with sea waters intrusion incidents in the drinkable water sources. The Greek municipalities do not manage its destination needs with specialized management schemes. Only some islands implement specialized know how from scientists or specific companies. (Tables 1 and 2).It is obvious that island destinations have to focus on their traditional and authentic characteristics in order to be able to implement a strategy for sustainable development. They need to have an integrated approach to their tourism resources in order to optimize the use of the competitive advantages for their promotion²⁴. These approaches can be referred from specialized destination management organizations which will involve all local shareholders. Most of Greek municipalities do not manage their destination needs with specialized management schemes. Several islands implement specialized know how with strategic planning .from scientists or specialized companies. (Tables 1 and 2).

6. Criteria scoring evaluation

In table 12 we present the results from the above indices regarding the highest rates of environmental impacts, combined with the level of tourist arrivals and the destination management.

Table 12. Criteria scoring

HOTEL BEDS/ KM OF BEACH	5226,78 ERMOUPOLI	1329,23 FOLEGANDROS	1837,47 MYKONOS	860,75 THIRA TOWN
DESTINATION MANAGENT SCHEMES	33 MUNICIPALITIES WITHOUT			
BEACH IMPACT FACTOR /ILLEGAL BUILDINGS PER KM OF BEACH	2.33 THIRA ISLAND	0.21 SIFNOS	0.19 NAXOS	0.16 PAROS
BEACH IMPACT FACTOR / MARINE POLLUTION INCIDENTS PER KM OF BEACH	1.34 SYROS			

²⁴ Blain C., Levy S., Brent-Richi J.R. Destination Branding: Insights and Practices from destination Management Organizations, *Journal of Travel Research*, Vol 43, May 2005, Sage Publications

URBAN WASTE TREATED	16 MUNICIPALITIES WITH 0% COVER			
GARBAGE	12 MUNICIPALITIES WITH ILLEGAL SITE FOR MUNICIPAL WASTE			
NOISE NUISANSE	3 VATHY	2 THIRA TOWN	2 IA	2 PAROS
FERRIES PASSENGER ARRIVALS REDUCTION	TINOS 35%	SAMOS 28%	MYKONOS 27%	ANDROS 22%
AIRPORTS INTERNATIONAL ARRIVALS REDUCTION	SAMOS ISLAND -19%	THIRA -6%		
AIRPORTS DOMESTIC ARRIVALS REDUCTION	SAMOS 11%	MYKONOS 6%	PAROS 5%	THIRA 4%
TOURISM CAPACITY REDUCTION	SAMOS 14%			
SEA WATER INTRUSION INCIDENTS IN DRINKABLE WATER SOURCES	9 MUNICIPALITIES			

- **Samos island:** Has the greatest reduction in tourist arrivals, in hotel capacity as does not have tourism destination management. That means that Samos confronts serious destination problems.
- **Vathy;** Has serious noise nuisance problems
- **Ermoupoli;** Has serious coastal pressures on the coastline (marine pollution incidents as tourists per km of beach)
- **Thira:** Has the highest amount of illegal buildings and other illegal constructions on the coasts.
- **Andros, Tinos, Anafi and Mykonos** port authorities did not answer the questionnaires for its coasts
- **Vathy, Tinos, and Naxos** towns with more than 7 thousand inhabitants each do not any urban waste treatment plants

7. Proposals

Sustainable tourism must be developed in the islands, as well as in all destinations²⁵. The conclusion is that the saturated areas can progress towards developing quality and alternative tourist services. Areas that are not yet massively developed, should not necessarily develop in the same extend as the major tourist attraction areas, but should, at this stage of development, plan ahead in order that

²⁵ Prokopiou D.G. and Tselentis B.S. 'Proposals for sustainable development and environmental protection for the island of Rhodes', Rhodes 2003, Publication: Rodiaki 27 -5-04 (in Greek)

policy development and implementation, lead to a truly competitive and environmentally sound business.²⁶The target is a combination of typical and alternative tourist model related to the local community needs and the unique environment. Despite their relatively small area, all the islands have an exceptionally rich nature, with a greatly varying landscape, natural habitats, flora, fauna and vegetation²⁷. Tourist development must target in a combination of the classical tourist model and the alternative tourist activities, as the environments, both physical and human is unique: 1. Ecotourism : Footpaths, wine roads and climbing, 2. Diving, 3. Archaeological paths 4. Museums, 5. Traditional villages, 6. Cultural tourism related with Orthodox Religion traditional events and 7. Tourism as cultural attractions in order to extend the tourist season²⁸. Tourism industry must be extended by supporting winter time charter flights²⁹. Completion of urban waste treatment plants and network, appropriate garbage handling (urban garbage treatment - olive oil press residuals management), restriction of illegal buildings at cities and coasts, control of hotel's urban waste management systems.

8. The project of the Tourism Organization of Samos Prefecture

Samos Prefecture Organization of Tourism was founded in 1996. Since January 2009 was operated with a new management group. The president of the Organization was the Prefect of Samos Dr E.Carlas as Manager of the Organization was Mr M.Toanoglou a hotel owner and destination consultant from Rhodes . The assistant manager was is D.G. Prokopiou a Phd candidate in tourism from University of Piraeus. The aim of OTONAS was to identify the competitive advantages of the region and clarify the current status concerning tourism and hospitality on the 3 island sub destinations (Samos-Ikaria -Fournoi).

Additionally many efforts were focused to the participation of the main stakeholders. The aim was for everybody to understand that tourism should be the policy priority. As tourism is the main economy factor. They main activities of the

²⁶ Prokopiou D.G., Tselentis B.S., Bousbouras D. and Toanoglou M. Carrying capacity assessment for the Greek islands of Kalymnos, Kos and Rhodes, Sustainable Tourism II International Conference, Bologna 2006, Wessex Institute of Technology UK - The Complulence University, Spain- 'Rodiaki' news 2006

²⁷ Prokopiou DG -Tselentis BS Bousbouras D. and Toanoglou M> "Environmental impacts caused by the tourist industry in Elafonisos Island and the Neapoli district, Greece" ECOSUD 2007, Sixth International Conference on Ecosystems and Sustainable Development, Organised by: Wessex Institute of Technology, UK -The University of Coimbra, 4 – 6 September 2007 Coimbra, Portugal

²⁸ Prokopiou DG, MBA Dissertation: "Regional Investment Study for Kos and Rhodes islands", University of Piraeus, 2005.

²⁹ Tselentis B.S., Prokopiou D.G., Tourism carrying capacity assessment and the environment: the case of Crete. International Conference on Ecosystems and Sustainable Development, Alicante 2011

2 year project of OTONAS under the mentioned management scheme were:
1. Identifying the potential resources that could improve the competitiveness of the region and improve the image to the tourism markets. 2. Selecting a 2-3 new foreign tourism markets and implement strategic promotion to open the destination in those new markets (e.g Russia, France etc)

3. Improving the image and the promotion in the existing tourism markets with specific actions (roadshows, workshops, join activities with tour operators, better participation at tourism exhibitions, etc) 4. Involving of the destination in wider (EU and International) programs that could lead on the islands in a higher level of organizing and competitiveness. It is true that the main difficulty of that program was the lack of common understanding and perception of the involved shareholders. In many cases political options of individuals or authorities were blocking decisions with common benefit. The policy of the management team was many times consumed on efforts that were focused in "training" and "education" of the involved parties in order to improve their tourism mentality and the whole destination awareness. Now as yet, Samos do not have a management scheme and tourism is not governed by a specific establishment organization or from a contract with a destination management company.

References

1. Briassouls H., Policy and Practice, Sustainable Development and its indicators: Though a (planner's) Glass Darkly, *Journal of Environmental planning and Management* vol. 44(3), 409-427, (2001)
2. Zannou V, 'Guide of Socio-Economic Studies for the Integrated Management of the Water Environment' (1999)
3. Farrell B., Runyan D., Ecology and Tourism, *Annals of Tourism Research*, (1991)
4. Needham M., Szuster B., Situational influences on normative evaluations of coastal tourism and recreation management strategies in Hawai'i, *Tourism Management* 32, 732-740, (2011)
5. Charlier R., De Meyer C, Tourism and the coastal zone: The case of Belgium, *Ocean and Coastal Management* 18, 231-240, (1992)
6. Prokopiou D.G., Tselentis B.S., Bousbouras D. and Toanoglou M. «Carrying capacity assessment in tourism: The case of Dodecanese archipelago» *The Ravage of the planet, First International Conference on the Management of Natural Resources, Sustainable Development and Ecological Hazards, Dec.2006 Bariloche, Argentina* Wessex Institute of Technology UK- University of Siena,
7. Jarmozy U., Sustainable tourism development: ingenuity in marketing strategy, *Sustainable Tourism III International Conference, Malta 2008*, Wessex institute of Technology UK- The Complence University, Spain
8. Ntibanyurwa A., Tourism as a factor of development, *Sustainable Tourism II International Conference, Bologna 2006*, Wessex institute of Technology UK - The Complence University, Spain
9. Priestley G.K., Edwards J.A. and Coccossis H., *Sustainable Tourism-European Experiences*, Cab International 1996 page ix
10. www.wikipedia.com
11. Prokopiou, D.G., Tselentis B.S., Bousbouras D and Toanoglou M. «Sustainability indicators and their role to destinations' Strategic development» *Sustainable tourism as a factor of local development Conference, Monza, Italy 7-9/11/2008*
12. *Greece Hotels 1977* Le chamber des Hotels de Grece, Athens
13. Actual data collected from Hotel Unions and Municipalities
14. Official data from Hellenic Statistics Authority
15. Tourism organization of Samos Prefecture, 2010
16. Papanikoli E., Kretsis M., Study for Tourism in Mykonos, (in Greek) Mytilini 2004
17. Tselentis BS - Prokopiou DG, "Environmental Management of Port Oil Terminals", *International Conference Rhodes 2002*, Wessex Institute
18. Shipwreck of a cruise ship in Gulf is Fira (very serious incident)
19. Blain C., Levy S., Brent-Richi J.R. *Destination Branding: Insights and Practices from destination Management Organizations*, *Journal of Travel Research*, Vol 43, May 2005, Sage Publications
20. Prokopiou D.G. and Tselentis B.S. 'Proposals for sustainable development and environmental protection for the island of Rhodes', *Rhodes 2003*, Publication: Rodiaki 27-5-04 (in Greek)
21. Prokopiou D.G., Tselentis B.S., Bousbouras D. and Toanoglou M. Carrying capacity assessment for the Greek islands of Kalymnos, Kos and Rhodes, *Sustainable Tourism II International Conference, Bologna 2006*, Wessex institute of Technology UK - The Complence University, Spain- 'Rodiaki' news 2006
22. Prokopiou DG -Tselentis BS Bousbouras D. and Toanoglou M> "Environmental impacts caused by the tourist industry in Elafonisos Island and the Neapoli district, Greece" *ECOSUD 2007, Sixth International Conference on Ecosystems and Sustainable*

Development, Organised by: Wessex Institute of Technology, UK -The University of Coimbra, 4 – 6 September 2007 Coimbra, Portugal

23. Prokopiou DG, MBA Dissertation: “Regional Investment Study for Kos and Rhodes islands”, University of Piraeus, 2005.
24. Tselentis B.S., Prokopiou D.G., Tourism carrying capacity assessment and the environment: the case of Crete. International Conference on Ecosystems and Sustainable Development, Alicante 2011