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TOURISM AND ENVIRONMENT: PRESSURES OF TOURISM RELATED CONSTRUCTION ACTIVITY ON THE NATURAL ENVIRONMENT OF HOST AREAS- ATTEMPTING A SURVEY IN THE CYCLADES

Ioannis P. Spilanis
University of the Aegean

Olga P. Karayiannis
University of the Aegean

The present constitutes part of a wider research attempt to examine the impacts of tourism on the host areas using a transformed version of the explanatory tool 'DPSR' (Driving Forces, Pressures, State, Response). The Cycladic islands are selected as a case study, and the basic environmental pressure factor examined is tourism related construction activity. Concluding from the data presented, the tourism development paradigms in the study area (3S-tourism hosted in 'conventional' accommodation and second homes), seem new construction intensive. The working hypotheses and limitations of the present research application , reflect weaknesses of the Greek institutional framework, towards understanding and managing tourism impacts, let alone sustainability goals.

Keywords: *tourism, environment, construction, pressures, islands*

INTRODUCTION

The issue of tourism impacts on the host areas constitutes one of the major scientific research fields of the tourism phenomenon. The usual classification of the influences and changes that tourism generates in the receiving areas, categorizes them as economic, social or environmental, although very often, a change may apply to more than one, if not all categories. Focusing on the natural environment of the host areas, the basic environmental modifications due to the tourism activity on the local level, concern a series of parameters in relation to land and building uses, water resources, energy balance, atmosphere, waste generation, biodiversity, landscape, etc. (Mathieson and Wall, 1982)

The present paper constitutes part of a wider research attempt (Spilanis, 2006), to examine and assess the impacts of tourism in the host areas by applying sustainability criteria, adopting the widely used, by international organizations, explanatory tool 'DPSR' (OECD, 1993). Briefly, the aim of the present paper is to record the pressures of construction activity for tourism purpose on the local level, using as a case study the Cycladic islands.

METHODOLOGICAL APPROACH

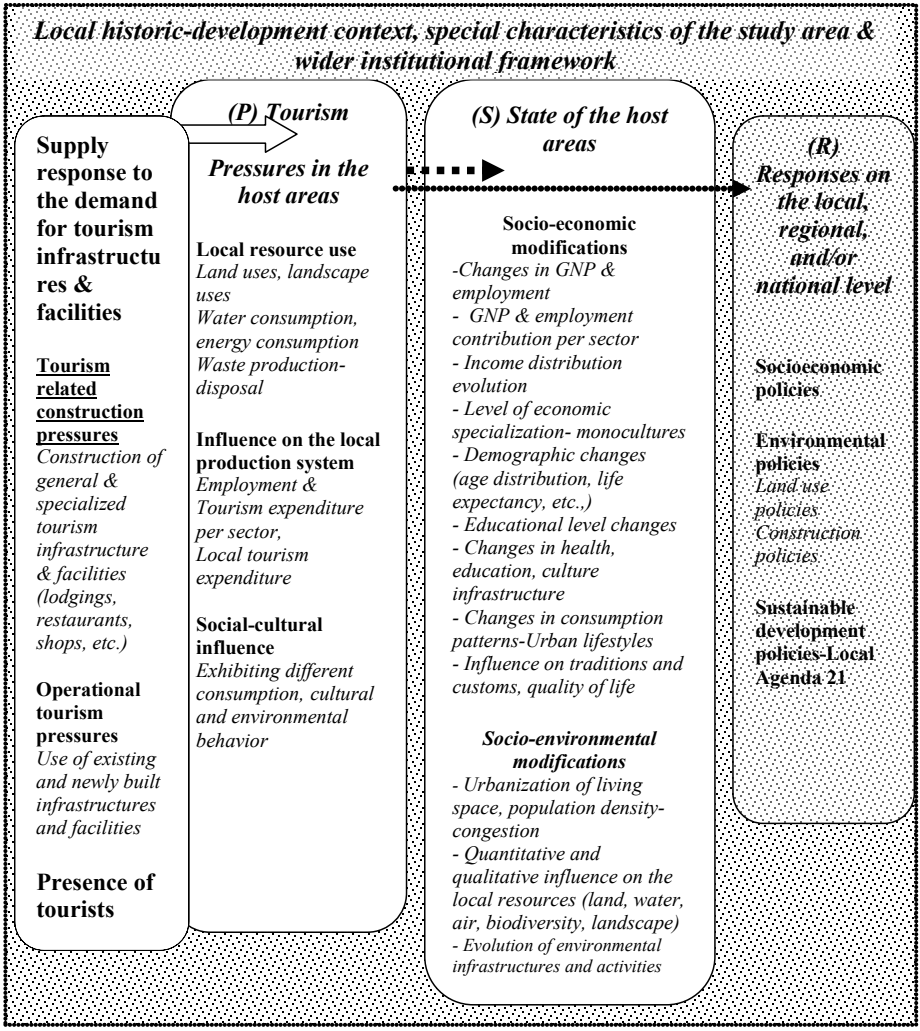
The wider methodological approach proposed, aims to finally produce a sustainability assessment platform on the spatial level. Within this approach, a modified version of the explanatory tool DPSR (driving forces, pressures, state, response), widely used in several forms by international organizations (Organization of Economic Cooperation and Development, European Environmental Agency) (OECD, 1993; EEA, 1999; Spilanis et al., 2005), is adopted.

Reformulating the explanatory tool DPSR according to the tourism phenomenon

The tool is reformulated (diagram 1 below) in such a way, as to express the correlation between the pressures of tourism activities (acting as a driving force), their impacts on the local level, and to consequently record the evolution of the state of the local socioeconomic and environmental systems, taking at the same time under consideration parameters of the local context (special characteristics of the study area and wider institutional framework) as well as policy modifications. In more detail, under the view adopted, tourism demand in the host areas exerts a series of pressures on the local socioeconomic and environmental system (1st and 2nd frame in the following diagram). These pressures are being generated due to the construction activity for tourism infrastructures and facilities on the local level, as well as due to their operation, which in turn is being enhanced by increased tourist arrivals. The pressures in turn, modify the state of the local systems (3rd frame in the diagram). Whichever the local historic, development and special characteristics in the host areas, as well as wider institutional framework (background frame in the diagram), they should always be taken under consideration as timeless 'filters', regulating the extent and level of the above tourism pressures. According to the explanatory tool, the societal response, to tourism impacts (4th frame in the diagram), calls for the modification of

the existing institutional frameworks by adopting appropriate policy measures.

Figure 1. The explanatory tool DPSR reformulated according to the tourism phenomenon



Source : (*Spilanis, 2006), partial modification*

Conclusively, the approach presented can be used as a wider 'study' guide in order to:

i) understand and record modifications appointed to tourism in the host areas,

ii) assess the influence of tourism on the sustainable future of the host areas,

always in relation to the forms of tourism locally developed, as well as special characteristics, either historic, developmental, institutional, of the wider area of interest.

Tourism related construction activity: a subcategory of pressure factors of the tourism phenomenon on the host areas

The choice of examining tourism related construction activity in the host areas, complies with a reasoning that takes under consideration the *growth dynamics* of the tourism phenomenon (tourism facilities growth, growth in the number of tourists), which in turn usually affect the *operational dimensions* of tourism (rise in resources consumption). In order to record and analyze the pressures of tourism activity, it is possible to categorize them (diagram 1, frame 1), as *construction (permanent) character pressures*, deriving from the creation of new infrastructure and tourism facilities, as well as *operational (seasonal) character pressures*, deriving from: i) the operation of the existing stock of facilities during the tourism season, and ii) the presence and activities of tourists. Additional qualitative features of the two pressure subcategories, for example spatial placing and construction style parameters of tourism facilities, the cultural origin, the consumption and environmental behaviours exhibited by tourists, etc., may assign further significance to the pressure factors under consideration.

Aiming in the present to survey the tourism related construction activity, a question that obviously arises is which part of the construction activity in an area can be characterized as 'touristic'. Consequently, matters of *defining the limits of the tourism phenomenon* arise. In relation to this matter, the participation of the exclusively tourism purpose-built facilities, like hotels, rooms to let, restaurants and shops that operate during the tourism season, is obvious. Difficulties occur when in need to categorize construction activity for : i) *facilities of mixed uses* like the ones serving the seasonal population as well as the permanent population

of a host area, *or general infrastructure*, e.g. roads, ports, airports, etc. which also causes extensive changes of the natural space, and ii) *facilities used informally*, like new houses which although stated as primary ones, are being rented occasionally to tourists. Finally, an ambivalent, escaping category of construction activity relating to tourism, is one that derives from *changes of use* of facilities, including facilities initially constructed for non-touristic purposes, which with time, are being transformed as to serve touristic needs or vice-versa.

Following the setting of limits and the categorizations of the 'tourism' construction activity, as well as its qualitative parameters of interest, comes the matter of *recording it with appropriate and accurate statistical data*. This, once again relates to national, regional and/or local institutional particularities and especially ones that concern the statistical systems adopted and applied in the jurisdictions of interest.

Conclusively, within the present paper, an attempt is made to record *the pressure of tourism related construction activity.* Stages that should follow the present research segment, are the estimation of the *changes in land uses*, as well as the extra (considering that the present ones are known) *seasonal demands that the operation of the newly built tourism facilities will pose on the local environmental system* (water, energy consumption, waste treatment, etc.). Finally, of great importance are the factors of *built environment changes (for constructions inside existing settlements)* and *landscape changes (for constructions outside existing settlements),* as they constitute a resource of crucial importance for the host areas. These changes should also be examined in a following research stage, one which would include *qualitative parameters of tourism related construction activity*. All the above research quests, constitute necessary steps in order to acquire appropriate data for sustainability assessment of the host areas.

RESEARCH APPLICATION IN THE STUDY AREA

Concise profile of the study area

The island complex of the Cyclades comprises one of the 52 Prefectures of Greece, and together with the Prefecture of the Dodecanese, constitutes the Southern Aegean, one of the 13 administrational regions of Greece, one of 4 that are completely insular. The great distance from the European core areas, the absence of borders with other European States and the geographical fragmentation of the area, make the Southern Aegean one extremely isolated and particular

European Prefecture (Prefectures of Aegean Islands and Crete: 2006). In a total of 9.837 insular areas (islands, islets, rocks) of the country, the Cyclades come first with respect to the number, with 2.242 (Mergos et.al . 2004), while 24 of the Cycladic islands are inhabited.

Human presence in the Cyclades has been uninterrupted since antiquity, as is proven by the rich archeological findings but also from the extensive agricultural landscape, characteristic of the area (Mendoni et al.:1998) Agriculture, rearing livestock and shipping, have been basic productive activities since antiquity. At the time of their incorporation in the newly established Greek state in 1830 the islands of the Cyclades were densely populated and showed considerable shipping and trading activity (Mergos et al.:2004; Spilanis et al.: 2004). After the Second World War the population shrank , due to migration to big urban centers, however during the last decades it has recovered significantly, due to the employment opportunities offered by the tourism phenomenon, which gradually expanded (Spilanis:2000, Prefectures of Aegean Islands and Crete: 2006; Mergos et.al.: 2004).

Regarding the natural and man made environment of the greater Southern Aegean area, its significance and uniqueness rely on the natural landscape, its diversity, its scale and shape, its flora and fauna as well as the aesthetic, historic and land planning values of the settlements (Prefectures of Aegean Islands and Crete: 2006)

The current population of the Cyclades is according to the census of 2001, 112.615 people (almost 1/10 of the country's in total), recovering since 1980's and approaching the levels of 1950's, when its greatest decline occurred (Mergos et al.: 2004; Spilanis :2000). The majority of the work force is employed in the tertiary sector (about 60%), constantly growing in the recent decades, followed by the secondary sector (about 29%), while the primary sector comes last (about 11%) and is shrinking faster than the National average (NSSG: 2001). In 2005 the Gross National Product per capita in the study area, was 5% higher than the national average, slightly curving since 2003 (NSSG:2005). Nevertheless significant divergence of the above indicators is observed between different islands comprising the prefecture.

The Cyclades island complex, is one of the most popular tourist destinations in Greece, both for Greeks and foreigners, one of the "dynamic" Prefectures with respect to its GNP (Gross National Product) and its rate of change compared to the National average in the period 1980-1990 (Mergos et al, 2004: p119), and one "specialized" in tourism (Spilanis 2000, p166). Regarding the tourism product offered, beach tourism predominates (Salfo et al., 2003). In relation to the rest of the

region, as well as the country in total, a series of parameters like the considerable participation of internal tourism (Greeks) in the area , the small size of lodgings, the considerable percentage of rooms to let and the reduced dependency on tour operators (Papanikos, 2000), indicate a *non organized -"family-business" model of development* .The phenomenon of "second homes", seems to be playing a major role in the area (Karagianni, 2005), an often unnoticed and neglected one by tourism analyses, by increasing, the lodgings, as well as the influx of regular residents-tourists in the area. The most important problems of the tourism sector in the greater area of Southern Aegean, are related to the low quality of the tourism product offered as well as that of the public infrastructure and services, and the inability to diverge from the typical 3S tourism model. (Prefectures of Aegean Islands and Crete: 2006). These problems translate to low tourism expenditure, short duration of visits, as well as intense seasonality (Prefectures of Aegean Islands and Crete: 2006)

Regarding the Greek institutional context of the construction activity in general, the absence of a legal framework regulating land or building uses, along with the institution of 'off plan building', frequently in ecologically sensitive areas, have played a catalytic role in the formulation of the touristic reality in Greece, often contributed to the devaluation of natural and/or cultural resources (Prefectures Aegean Islands and Crete, 2006; Panagiotatou, 1998; CPER et al., 1998; Sifounakis, 2005), and consequently undermined tourism development itself in several destinations. The most important dangers of landscape degradation in the islands of the greater Southern Aegean region, include *de facto* urbanization, created by the uncontrolled touristic development (which led to the expansion of settlements, construction of tourism related infrastructure and facilities, particularly on the coastline), extensive quarrying activities, construction of public infrastructure, as well as uncontrolled waste disposal (Prefectures of Aegean Islands and Crete: 2006)

The institutional framework of monitoring tourism related construction activity in the Cyclades

The application of the methodological tool adopted, dictates the monitoring of *characteristic building parameters* within the scope of impacts, for the Prefecture as an entity, as well as for each island individually, given the different characteristics and evolution of each island. However, the existing institutional framework providing data related to the total construction activity in Greece, does not allow

thorough quantitative and qualitative examination, let alone for the subcategory of tourism construction activity and its qualitative parameters. More specifically, the primary information sources regarding the construction activity in Greece, are: i) *the two censuses, the buildings census*, which provides data in *numbers of buildings*, and *the population and housing census*, which provides data in *numbers of houses*, both carried out every decade and, ii) *the legal construction activity*, monitoring monthly the authorized construction activity (but not necessarily carried out activity), *in numbers of permits, houses and m2,* (derived from the local city planning offices of the country). The above monitoring system seems problematic on three levels:

a) It does not monitor *crucial parameters with respect to the pressures and impacts of construction*, taking into account the particularities of the Greek institutional framework (not determined land uses, inadequate protection of natural and cultural resources, 'off plan' construction), e.g. whether a construction is authorized within or outside city plans, its proximity to areas with high ecological values (Natura areas, or the coast) etc.

b) *The data* from most of the sources (buildings census, legal construction activity) mentioned above *are*, to a great extent, *not complementary,* given the different units of measuring used (number of buildings from the buildings census-number of permits and m2 from the construction activity). The above situation is worsened when monitoring construction activity on the islands, since the available data are not provided for every island separately, but at the municipal level, requiring further processing for the assessment of construction per island.

c) Data from both sources *only partially cover tourism use and furthermore in an inconsistent way*: i) the building census although provides hotel buildings as a separate category of buildings, the unit of measurement-number of buildings- does not allow pressure per island to be accurately revealed, something that depends on the actual size (m2, land cover) of each building and ii) data from the legal construction activity, although provides data for numbers of building permits for hotel buildings, it only provides number of m3 per building permit and only per Prefecture and not at municipality levels, so consequently not per island (for privacy reasons, as was stated by the National Statistical Agency of Greece, upon the request, at November 2008).

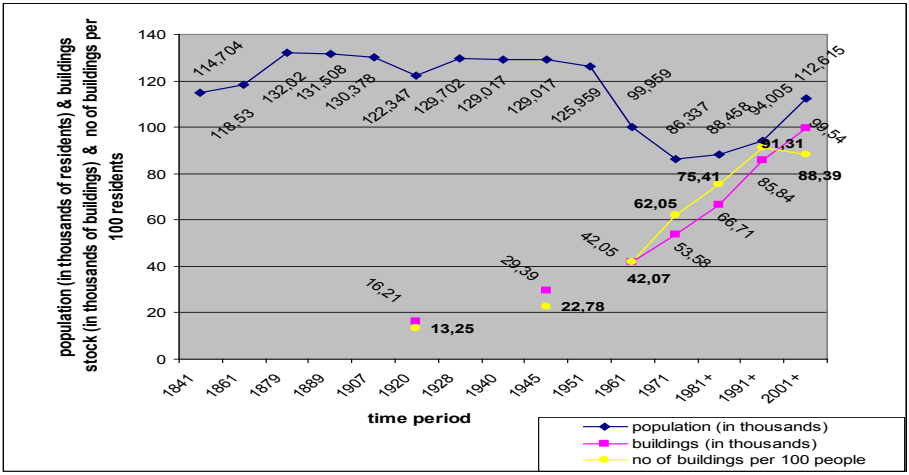
The most important categories of tourism related construction activity in the Cyclades according to the profile of the area, seem to include *hotel and auxiliary lodgings* and particularly the category of *houses*, either privately used summer houses, or for rent or sale. However,

due to the difficulties, mentioned in the previous section, in characterizing construction activity as 'touristic' (mixed uses and informal-illegal touristic use), and lack of appropriate statistical data, as explicitly discussed, calculations can only be done *by approximation*. Consequently, within the following presentation, the categories of construction activity for tourism facilities, lodging, dining, (restaurants, bars, coffee-shops, etc.) and recreation, as well as of tourism infrastructure (e.g. conference centers) or supportive to tourism (commercial and services) will not be examined as a subtotal of the wider construction activity, since it will be assumed that the latter, in the area of interest, to a great extent relates to tourism. Only the category of houses can and will be examined separately, assuming again that within the legal activity data, the houses authorised are to a great extent second-summer homes and houses for rent or sale that either fall in the second home phenomenon, or in the 'conventional' tourism sector, either formally or informally (informal-illegal tourism leases). Finally, the construction activity of general infrastructure (e.g. ports) will not be examined.

Tourism related construction activity in the Cyclades: data presentation

Presenting the tourism related construction activity in the Cycladic islands, for the Prefecture in total but also among the islands, can be attempted on four crossing over levels : 1) in historic terms-examining the evolution of building, in relation to the periods of construction of buildings from 1919 until 2001 (census 2001), 2) in terms of current tendencies-examining the data of legal construction activity for the period 1997-2007, 3) in absolute terms (in m2 of buildings and numbers of houses authorized), and 4) in relative terms (related to the size-area and population of each island). Beginning by examining the evolution of the total construction activity in the Cyclades, in comparison to the equivalent population fluctuation, and the indicator 'number of buildings per 100 residents', in graph 1 below, the basic assumption adopted throughout the presentation that follows, is formulated : a major part of the construction growth (more than doubling of the buildings stock of the Prefecture) during the decades 1960-2001, taking under consideration a less dynamic population growth for the same period (actually a recovery almost at the 1950s level) must be attributed to the tourism phenomenon. The value of the indicator 'number of buildings per 100 residents', is 88,39 for 2001, more than double its 1961value of 42,05.

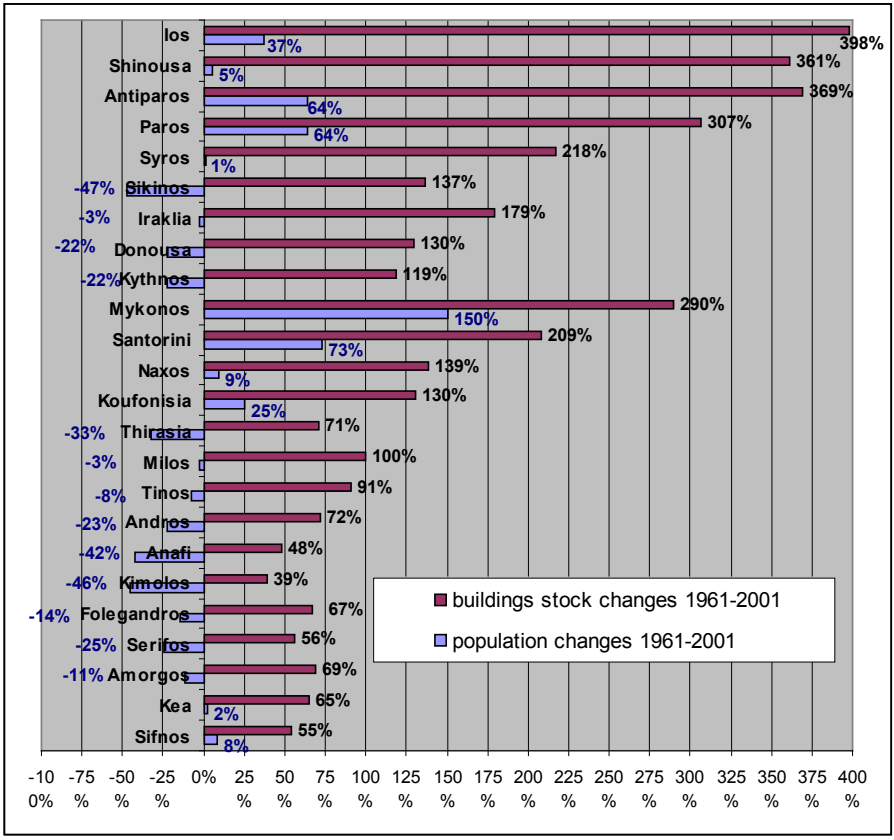
Graph 1. Comparative evolution of population and buildings stock in the Cyclades (1841-2001)



Source: Processing of data by the authors from buildings census 2001 and population census (1841-2001) from (Spilanis et al., 2004)

Consequently, examining the equivalent indicators of population and buildings stock between the decades 1961-2001, in graph 2 below, the islands with the greatest difference between the two trends are being revealed. It becomes obvious that construction, in terms of numbers of buildings, shows significant increase, both in the "traditionally" touristic islands with substantial tourist arrivals, like Ios, Mykonos, Paros and Santorini, as well as in smaller and more recently touristically developed islands like Antiparos, Shinousa, Iraklia and others. The considerable population recovery of some of the traditionally touristic islands, explains their lower ranking in the presented histogram.

Graph 2. Population & building stock percentage changes 1961-2001 in the Cyclades– islands presented in declining order regarding the biggest deviation between population change and building stock change



Source: Processing of data by the authors from buildings census 2001 and population census (1841-2001) from (Spilanis et al,: 2004)

With respect to the building activity following the year 2001, assuming that a construction takes on average 2-3 years after its authorization to complete, the authorised construction activity data from 1997 (3-4 years before the census) until 2007 (most recent available data) are selected and presented. More specifically, the total m2 and the number of houses, based on new construction permits and additions to existing buildings, are presented. It is noted that in both cases, all potential uses

are included (professional, home or other uses). In the tables that follow, the islands of the Cyclades are listed in declining order with respect to the pressures they experience from building, according to the criterion examined, and are roughly categorized in three groups (see bold lines on each table): islands of high, intermediate or low pressures. In table 1 that follows, the numbers of m2 and houses, based on new permits and additions for the period 1997-2007 per island are presented.

Table 1. Indices of building activity per island in the Cyclades during the period 1997-2007 – islands presented in declining order regarding the estimated pressures in absolute and relative terms

island	builidng permits total μ2	no of new houses to be built according to building permits		island	total buildings permit m2 per islands km2	island	total buildings permit m2 per resident (2001)
PAROS	888727	5449		SYROS	6739	SHINOUSA	114
NAXOS	630394	4545		MYKONOS	6426	SIKINOS	98
SYROS	563621	4190		KOYFONISIA	5796	KOYFONISIA	90
SANTORINI	549312	2433		PAROS	4569	KEA	87
MYKONOS	409377	2872		SANTORINI	4552	PAROS	69
TINOS	344969	2595		SHINOUSA	3026	ANTIPAROS	69
ANDROS	303808	2410		TINOS	2108	FOLEGANDROS	62
KEA	209064	1897		ANTIPAROS	2053	MYKONOS	59
MILOS	142101	1375		NAXOS	1616	ANAFI	53
ANTIPAROS	100480	818		KEA	1584	TINOS	48
KYTHNOS	71491	749		SIFNOS	1373	KYTHNOS	43
SIFNOS	69868	786		FOLEGANDROS	1284	SIFNOS	41
AMORGOS	56400	491		MILOS	944	SERIFOS	40
ΙΟΣ	56074	403		ANDROS	800	NAXOS	35
FOLEGANDROS	48879	378		SERIFOS	766	DONOUSA	33
SERIFOS	41174	478		KYTHNOS	704	AMORGOS	30
KOYFONISIA	33039	282		THIRASIA	600	ANDROS	30
SHINOYSA	23540	236		SIKINOS	570	MILOS	30
SIKINOS	23377	233		AMORGOS	467	SYROS	28
ANAFI	14377	155		IOS	453	IOS	27
KIMOLOS	10881	143		DONOUSA	397	SANTORINI	26
IRAKLIA	5583	51		ANAFI	375	IRAKLIA	24
DONOUSA	5355	53		KIMOLOS	305	THIRASIA	21
THIRASIA	3608	50		IRAKLIA	205	KIMOLOS	14
CYCLADES	**4605499**	**33072**					

Source: Karayiannis, 2007

It becomes obvious that in absolute terms, the greatest volume of the construction activity is concentrated in the larger and "traditionally" touristic islands, as well as the islands that due to their proximity to Athens, participate more, in absolute terms, in the "second home" phenomenon (Salfo et al.,: 2003), like Tinos, Andros and Kea. Evaluating the relative pressures that the planned construction activity exerts on each island (total m2 per km2 of land area, and per resident 2001), the initial picture is partially modified. According to the size of each island, islands like Mykonos, Paros and Santorini remain in the high pressure group, topped by Syros (which must be however dealt with as a special case, being the capital of the Prefecture), while smaller islands like Koufonisia, Shinousa and Antiparos move higher up, as well as Tinos. Finally taking into account the population of the islands, smaller islands are established in the high pressure group, probably because of the simultaneous construction increase and population decline, as well as their limited space.

Attempting to partly combine the census data and the authorized construction activity, so as to formulate estimates on the current pressures per island, as well as the prefecture total, it is possible to compare the stock of houses per island in 2001, with the volume of houses authorized between 1997 and 2007. In table 2 that follows, these data are presented and the islands are placed in declining order (2 rankings) regarding the number of new houses as well as a percentage of their stock in 2001. By examining the data, an impressive increase in the total of the prefecture, exceeding thirty percent, becomes obvious. Once again the greatest activity in absolute terms seems to be taking place in the larger and more touristic islands (Paros, Naxos, Syros, Mykonos and Santorini), as well as the islands with considerable "second home"activity. (Tinos, Andros Kea). The greatest construction increase as a percentage of the existing stock in 2001, seems to be taking place in the smallest islands, for reasons already discussed.

Table 2. Estimations of housing stock addition per island in the Cyclades during the period 1997-2007– islands presented in declining order regarding the estimated pressures in absolute and relative terms

	Total of inhabitable houses (2001)	no of new houses to be built according to building permits 1997-2007	% predicted rise of houses per island		% predicted rise of houses per island
PAROS	10582	5449	51%	SHINOUSA	136%
NAXOS	14197	4545	32%	KOYFONISIA	130%
SYROS	12581	4190	33%	ANTIPAROS	86%
MYKONOS	7275	2872	39%	KEA	66%
TINOS	8309	2595	31%	FOLEGANDROS	55%
SANTORINI*	10933	2483	23%	SIKINOS	54%
ANDROS	7423	2410	32%	PAROS	51%
KEA	2869	1897	66%	ANAFI	41%
MILOS	4377	1375	31%	MYKONOS	39%
ANRIPAROS	954	818	86%	IRAKLIA	36%
SIFNOS	2370	786	33%	CYCLADES	36%
KYTHNOS	2370	749	32%	SYROS	33%
AMORGOS	1526	491	32%	SIFNOS	33%
SERIFOS	2329	478	21%	ANDROS	32%
ΙΟΣ	1567	403	26%	AMORGOS	32%
FOLEGANDROS	693	378	55%	NAXOS	32%
KOYFONISIA	217	282	130%	KYTHNOS	32%
SHINOUSA	173	236	136%	MILOS	31%
SIKINOS	429	233	54%	TINOS	31%
ANAFI	382	155	41%	DONOUSA	26%
KIMOLOS	1223	143	12%	IOS	26%
DONOUSA	201	53	26%	SANTORINI*	23%
IRAKLIA	142	51	36%	SERIFOS	21%
CYCLADES	**93122**	**33072**	36%	KIMOLOS	12%
* Thirasia has been include here as well					

Source: Karayiannis, 2007

CONCLUSIONS & LIMITATIONS

The present constitutes an attempt to monitor and evaluate pressures coming from the phenomenon of intense construction activity, tourism being its driving force, in the area of the Cyclades. This attempt was, inevitably, fragmental, dictated by the lack of suitable statistical data, as was demonstrated by the different measurement units that were examined and presented (buildings, m2, houses), as well as the different time scales that the data were (and still are) collected and were hence available for processing.

With respect to the dynamics of the construction activity, especially during the last decade, the largest part seems to occur on the traditionally "touristic" islands, while in relative terms, the pressures revealed seem greater on islands of smaller size and latter tourism development. The

tourism development paradigms in the study area (sea and sun tourism hosted in 'conventional' accommodation and second homes), based on the data presented and previous studies (Karayiannis:2007), seem to belong to a context of intensive construction of 'new' buildings and marginal re-use and renovation of existing buildings. In short, tourism activity in the Cyclades is *new construction intensive,* exerting pressures on the environment (especially by land use changes), affecting not only the townscape but also the landscape, as well as ecologically fragile areas.

POLICY IMPLICATIONS-DISCUSSION

Several surveys and scientific reports, acknowledge the particularities of the Greek institutional framework regarding the construction activity, and especially the institution of "off plan building", as crucially problematic issues of national housing and tourism development in Greece (CPER et al., 1998; Panagiotatou et al., 1998, and others). But then again, it seems that the national construction sector, as such, is still widely being considered and promoted as a major development agent, as was the case after the Second World War (Hemonti-Teroviti, 2001, Getimis, 2000), whereas at the same time, local objections against stronger regulations concerning construction activity in rural areas, are very strong. Acknowledgement of the above on behalf of the national planning authorities should at least enforce statistical monitoring of "off plan" construction activity.

Conclusively the working hypotheses and limitations of the present research DPSR application, regarding which parts of the building activity can be characterized as 'touristic', the lack of appropriate statistical data at the national, regional and local level, as well as the results of tourism related construction activity presented, reveal weaknesses of the Greek institutional framework towards understanding and managing tourism impacts, let alone goals of sustainable development.

REFERENCES

Getimis P. (2000). *Housing policy in Greece, the limits of reformation*. Athens, Ulysses.

European Commission. (1999). *Towards environmental pressure indicators for the EU*. Luxembourg, European Commission.

National Statistical Service of Greece. (1951-1991). Population census, (1997-2007). Legal building activity data,(2001). Population and

housing census, buildings census, (2005), Gross National Product per capita (2001-2005). Http://www.statistics.gr/portal/page/portal/ESYE

Karayiannis, O. (2005). 'New' tourism 'products': Sociological research of views and beliefs on Andros, Unpublished Thesis for Postgraduate Degree in Tourism Management, Patras: Greek Open University.

Karayiannis, O. (2007), Construction activity in the Cylcades the last decades: attempting a survey and assessment, electronic newspaper of the Network of Ecological Organizations of the Aegean, 13th issue. Http://old.eyploia.gr/modules.php?name=News&file=article&sid=816 . Accessed the 10 th of February 2010.

CPER-Centre for Planning and Economic Research and University of Thessaly. (1998). *Summer Houses and Housing Development in Greece*, Athens, (CPER).

Mathieson, A. & Wall, G. (1982). *Tourism: economic, physical and social impacts*. UK, Longman.

Mendoni, G.L. & Margaris, N. (1998). *The history of landscape and local stories,* Centre of Greek and Roman Antiquities-National Research Foundation, Aegean University, Department of Environment, Athens: Hellenic Ministry for the Environment, Physical Planning and Public Works.

Mergos G., Papadaskalopoulos Th., Christofakis M., Arseniadou Ir. & Kalliri Ag. (2004). *Economic characteristics and development strategy for insular Greece.* Athens, Athens Academy, Department of Economic Surveys, Survey no 1.

OECD. (1993). *OECD core set of indicators for environmental performance reviews*. OECD Environment Monographs, No.83. Paris, OECD.

Panagiotatou, El. (1998). *A'& B phases, Summer Houses and Housing Development in Greece.* Athens, National Centre for Social Research and National Technical University of Athens.

Papanikos, G. (2000). *Greek Small and Medium Size Hotel Companies*. Athens, Institute of Tourism Research and Forecasts.

Pearce, G. & Douglas. (1992). Alternative Tourism: Concepts, Classifications and Questions. In V. Smith (Eds.) *Tourism Alternatives: Potentials and problems in the development of tourism* (pp. 16-19), Philadelphia: University of Pennsylvania Press.

Salfo & Coleagues Surveys SA., Enviplan-G.T.Tsekouras & Associates, S. & K. Fotopoulos, Zaharatos G., Tsartas P., (2003), *Tourism Development Survey of the Southern Aegean Region*, Phases A & B, Athens: Greek National Tourism Organization

Sifounakis, N. (2005). *Policy: Planning and Action, the experience of 2000-2004.* Athens, Kastaniotis Publications.

Spilanis, G. (2000). Tourism and Regional Development: the Aegean islands case study. In P. Tsartas (Eds.) *Tourism Development, Multidisciplinary approaches* (pp. 149-180), Athens: Exantas.

Spilanis G. Kizos Th., (2004), *Notes for the Subject :Islands Geography*, Mytilene: Aegean University, Geography Department

Spilanis, G., Kizos, Th., Koulouri, M., Kondyli, I. & Vakoufaris, C. (2005). Scientific survey and methodology: 'Economic, Social and Environmental Footprint'. European Union Program ISTOS, European Regional Development Fund 2000-2006, Action 7.1-Novelty –Sustainability and Local Agenda 21 D.1, Mytilene: Laboratory of Local and Islands Development

Spilanis, I. (2006). Tourism Economic, Social and Ecological Footpring in a Sustainable Perspective. The case of Aegean islands. Paper presented at the IGR-2 Partnerships Day, Beijing.

Prefectures of Aegean Islands and Crete. (2006). Regional Operational Programme 2007-2013 for Crete and Aegean Islands Regions. Http://www.notioaigaio.gr/site.asp?uID=2&section=42

Himoniti-Teroviti, S. (2001). *Researching the evolution of housing the last decades: comments and proposals for the urban areas.* Athens, Centre for Planning and Economic Research.

UNECE. (2006). Kiev report – Draft summary Version of 21-11-2002. p. 6. Http://www.unece.org, Http://search.unece.org/cgi-bin/query?keys=second+homes.

ENDNOTES

1. Excluding the number of houses for which data can be taken both from the housing census (historical data), as well as the legal construction activity (authorized but not necessarily occurring activity).Here write endnotes (if any).
2. According to Pearce: "…in the aggregate, second homes may constitute a very sizeable proportion of total capacity in particular resorts." (Pearce, 1992: p.25). Equivalent remarks regarding the second home phenomenon are stated in a technical review conducted by the United Nations Economic Committee for Europe: "…the growth in the number of second homes during

the 1990s constitutes another major problem: the land area required by such a home, per person, is 40 times that for a flat and 160 times that for an 80-bed hotel (20 times when garden areas are excluded)" (UNECE, 2006).

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Ioannis P. Spilanis (ispil@aegean.gr) is an Assistant Professor at the University of the Aegean, Department of Environment, Department of Environment, Mytilene, Greece.

Olga P. Karayiannis (o.karagianni@chios.aegean.gr) is a PhD student at the University of the Aegean, Department of Business Administration, Inter-departmental Postgraduate Studies Programme in "Tourism Planning, Management and Policy", Chios, Greece.