Sustainable Tourism Indicators:
Pilot Estimation for the Municipality of Hersonissos, Crete.

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Abstract

The topic of the present research is the pilot estimation of sustainable tourism indicators for the Municipality of Hersonissos in Crete. Indicators definition is based on the principles of sustainable development. Data sources, their format and functionality as well as limitations imposed by them regarding indicators estimation, are elements of this research. Moreover, indicators were examined in terms of their functionality, resulting in certain cases, in the definition of surrogate indicators in order to compensate the lack of data and complement their meaning respecting the needs of the application area.
1. Introduction

In the last ten years after the publication of “Our common future” (W.C.E.D., 1987) sustainability has become a prominent concern in the development literature and has been applied in all fields of economic activity. In tourism, the concept of sustainability has been initially established as a notion that there is a need to account for the interrelationships between tourism and the environment, that there must be a compromise between the various conflicts and that planning must be exercised in such a way so that the long term viability of the industry is safeguarded. Since then, academic debate has grown and different considerations on what the term implies as well as the means of implementation have been developed. However, the interpretation of the term remains vague not to mention the implementation methods.

One of the problems that arise when applying the concept of sustainability to tourism is that there is not any exact and accepted methodology for measuring it. One way of accomplishing this is through the use of indicators. Although several indicators for sustainable tourism have been proposed no effort has been made to propose or estimate indicators for existing destinations. The focus so far has been on proposing and estimating indicators for new destinations, that is tourist resorts in the early phases of their development, rather than existing ones.

In a previous work Farsari and Prastacos (1999) have proposed a set of sustainable tourism indicators based on the principles of sustainable. The aim of the present research is to perform a pilot study and attempt to estimate these indicators for the Municipality of Hersonissos in Crete, Greece. This application has an explorative role on the existence of a framework for indicators estimation, as well as, to explore the applicability and functionality of the proposed indicators on the pilot area.

More specifically, the goal is to identify potential data sources, their format and their adequacy in order to determine which indicators can be easily estimated and are meaningful for planning. The next goal is to investigate whether the proposed indicators are functional, in other words whether they could serve on a local application scale or there is a need for complementary or surrogate indicators. The
overall objective of this research effort is to develop a framework for tourism development evaluation that follows the sustainable development prerequisites.

2. Sustainable Tourism Indicators

Indicators have been used for many years to provide with brevity and clarity parameters which might be of interest. Although they have been used for many years, particularly in describing the state of the economy, their use has mushroomed recently because of the need to compare and monitor changes through time.

On their advantages could be included the immediacy on the presentation and evaluation of different parameters, the guideline on matters which are considered to be important and therefore should be taken under consideration in planning and the developmental process, and the comparableness of the results. Their functions are several and include description of a situation, identification of potential problems, support to decision making, and monitoring and evaluation of actions taken (U.N., 1998; World Bank, 1997).

However, their use is not without problems; too often lack of data affect their selection and can result in indicators which are rather general and not very meaningful for planning purposes. Their use can be also considered subjective both in respect their choice and their evaluation once they have been estimated. As Meadows (1998) points out this subjectivity is stronger with the qualitative ones rather than the quantitative ones.

Sustainable tourism indicators are a tool which could be used for sustainable tourism development. Resulting from the expansion of the notion of sustainability and the need to implement it in practice, indicators are being developed for evaluating choices which are being made during the developmental process and impacts made upon the natural and socio-economic environment. They provide a framework for evaluating existing situation, as well as, future developmental activities in the field of tourist services production.
**Indicators for existing destinations**

The development of sustainable tourism indicators for existing destinations necessitates special approach. This is because they are to be applied in areas where tourism development is at an advanced stage, and usually tourism is associated with mass tourism. These areas have developed most of the necessary infrastructure and networks and have specific problems, which are the result of many years of tourism development. Overcrowding, poor planning and saturation phenomena are typical problems in most Mediterranean resorts which have been developed for several years. Of course the particularities of each country, region or resort should not be underestimated and should be taken into account when defining the appropriate indicators.

Existing literature on sustainable tourism indicators (WTO, 1993; 1995) has focused on the definition / estimation of indicators for newly developed destinations. In these places sustainable tourism planning has been an issue since the very early stages of their development and the proposed indicators are defined and monitored continuously. The early definition and continuous evaluation result to better organized available data that permit the monitoring and comparison of various parameters before, after and during the developmental actions, as well as, to a differentiation of the parameters to be measured which would be of interest. Additionally, these indicators focus on destinations located in developing countries where there are substantial differences on their natural and socio-cultural environment, on organizational and infrastructural matters compared to developed Mediterranean destinations.

Hence, although there is definitely common ground between existing and new destinations when considering sustainability there is a need for research efforts focusing on identifying indicators for existing destinations. In this research the effort is to identify such indicators for Mediterranean destinations.
3. Application in the Municipality of Hersonissos

*Short description of Hersonissos*

The municipality of Hersonissos is located on the north coast of Crete, about 25 km from Herakleion, the capital and largest city of Crete (Figure 1). It is highly accessible through the main entrance gates of the island: the port and the airport of Herakleion, and is also very close to the archeological site of Knossos and other points of interest. The municipality consists of five communities, namely Limenas Hersonissou, Hersonissos, Potamies, Abdou, Gonies and Kera. Limenas is the coastal part of the municipality and is the area where tourism is concentrated. Part of Hersonissos is also on the coast, while the other three areas are located inland and have a strong agricultural profile.

Until the mid sixties the economic activity was almost completely in agriculture. However, since then, the situation has changed dramatically. There is an enormous shift to the service sector and tourism is nowadays the predominant activity (YPESDDA, 2000).

Hersonissos is one of the most popular destinations in Crete. In 1999 there were almost 20,000 hotel beds, representing about 18% of all hotel beds in Crete and 3% of the total of Greece. Thus, it is quite clear the importance of tourism in the area as both an economic activity and a factor of environmental and socio-cultural changes. Hersonissos was selected for the pilot estimation of sustainable tourism indicators because it is representative of existing destinations in Greece and in the Mediterranean region broadly speaking. Moreover, the local government is well organized and it was anticipated that datasets would be available for indicators estimation.

It should be stressed that each country –or even each region- has its own features concerning the administration and the characteristics of its tourist product, its environmental and socio-cultural settings. However, it is believed that the present
Methodology followed for the definition of indicators

The Pressure-State-Response System (PSR) proposed by OECD (1994) is the best known framework for the definition of sustainable development indicators and the one which was later adopted –slightly differentiated in some cases- by different international organizations. This system proposes three kind of indicators: a) pressure indicators which refer to activities having an impact on the environment (UN, 1998); b) state indicators which describe the current situation of the issue (pressure) to be measured (WTO, 1996); and c) response indicators which measure action and policies taken to changes in the state of sustainable development (UN, 1998).

The approach chosen in the present research for defining the indicators for sustainable tourism is to relate them to the principles of sustainable tourism (Farsari and Prastacos, 1999). According to this methodology indicators are proposed for each principle. The set of principles proposed by WWF & Tourism Concern (1992) was chosen to guideline the definition of indicators. The result was a set of indicators for each principle representative enough to cover the different parameters which each principle may include. The set of indicators defined on the basis of this approach are focused on the needs of existing destinations in the Mediterranean region. Although, some of the indicators proposed are similar to those identified in the three categories mentioned above, it is believed that the methodology followed assures that the indicators are persistent to the notion of sustainable development while there is an emphasis on the response actions for sustainable tourism management.

The later is of major importance in existing destinations as they have an established situation resulting from an era when holistic approach and responsible management were not considered. Therefore, for existing destinations the actions and policies taken towards a more sustainable form of development is the key to overcome the accumulated undesirable conditions of the past. Finally, tourism is examined as an integral part of the interrelations that take place between different sectors of the
economy and the society, as a result although considering tourism indicators, tourism would not be examined in isolation to the rest of the activities.

From the list of proposed set of indicators a selection was made for this pilot study based on their representativeness and suitability for application in Hersonissos. Potential data availability was another factor that influenced indicators choice. Several indicators could not be estimated since there no data were available. In these cases, as well as in situations where it was considered that some parameters were not taken fully into account, new indicators where proposed in order to replace or supplement the ones suggested in the original study.

The spatial level, local, regional or national, was another factor considered during the definition and the selection of indicators. This was addressed because some impacts of tourism are localized, while some other affect the whole region and not just the municipality examined. Some of the indicators proposed can be applied on both local and regional level while others address only one of the two. Regarding the Municipality of Hersonissos, although it is perceived as a local application, the broad area which it covers –rising from the unification of the former communities- suggests the use of indicators suitable for measuring sustainability at the regional level.

**Data sources**

Identifying the appropriate datasets was a serious problem since no organized databases were available on the Municipality or the contacted organizations. The main sources of information were:

- The finance, public works, environment offices of the Municipality and the development company of the Municipality,
- Private companies responsible for garbage collection and the management of the wastewater treatment plant,
- Regional Energy Agency of Crete,
- National Statistical Office of Greece,
- Ministry for the Environment, Physical Planning and Public Works, Water Quality Department,
- National Tourism Organization,
Information on the demographics of the area and the training seminars were obtained from the “Athena 91” (Prastacos and Kogxylakis, 1998) and “Antheia” (Loulakis & Manioudakis, 1999) databases respectively. Both of these databases were developed by the Regional Analysis Division of FORTH.

Other potential data sources could be the Employment Office for Hotel employees, Agricultural Cooperatives, the Ministry of Agriculture and other professional associations.

4. Proposed indicators and their estimation

One major problem that was encountered was related to the lack of times series on most available datasets. It would have been preferable if all indicators were estimated for the same year and also for several years in order to measure the changes through time. However, this was not feasible as data were available for different time periods, resulting to indicators estimated for different time.

The results of the indicators estimation are shown in Table 1. Indicators are grouped according to the guiding principle in order to clearly present the definition methodology, as well as, the thematic field on which each one refers. Undoubtedly, some of the indicators refer to more than one thematic field and therefore they can be found in more than one principles. Likewise, there is a notional overlapping in some of the principles resulting in some cases in a joint examination.

Table 1 includes information on the results of the estimation, the data available and some comments on the functionality and the characteristics of each indicator. For the sake of completeness indicators which could be not be estimated because of the lack of data, but which were considered significant are included as well. It is hoped that in the future data will become available so that they could be also estimated. Although, data availability was considered when choosing indicators and thus influenced their
selection to some degree, of major importance was the persistency on the notion of sustainable development. Therefore, despite the possible need for “better” indicators, it is believed that the present methodology and the approach followed are contributing to the establishment of a framework for the definition of sustainable tourism indicators.

One issue that must be stressed is that choice and evaluation of indicators is closely tied to the criteria used for defining sustainable development. That is indicators have a meaning for planning purposes only after what constitutes sustainable development has been defined. This becomes more clear if one was to consider the issue of the extension of the tourist season.

The extension of the tourist season was one of the issues which came into question during the definition and estimation of indicators –an issue often discussed in every tourist destination in Greece. According to the Mayor of Hersonissos the effort of prolonging the season during the winter months did not succeed in Hersonissos during the two years this initiative was undertaken by local entrepreneurs, merchants and the local authorities. The reason appears to be the intensity of work during the season –7-9 months in Crete while most of the tourist businesses are small to medium family character entrepreneurships- which results to an unwillingness to work with small if any profits for a couple of “winter seasons” until the market becomes established. Moreover, it could be argued that these 3-5 “winter” months offer the chance to locals and their families to rest and strengthen their family, friend and social relationships, contributing in this way to the conservation of the social and the cultural nets and thus, to sustainability.

Another issue related to the length of the tourist season is the seasonality of employment. Seasonal employment with all the economic and social implications is considered to be a negative aspect. However, it should be examined in combination to the total annual income of the residents and the possible complementary occupation during the winter months. Although no income data are available there is a perception that incomes in Hersonissos exceed the regional average. Most residents in the area during the “summer” months are employed in tourism related jobs, while in the winter months most are involved with agriculture in their own farms (olive trees mainly). In
this way, it could be argued, that traditional activities as well as the diversification of local economic activities are supported.

Thereupon the need for the determination of the parameters considered to be essential for implementing sustainable tourism development should be clarified. Case studies at a local scale could have a significant contribution on this direction as they are focused on specific issues which generalization misses.
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<thead>
<tr>
<th>Αρχές</th>
<th>Indicator</th>
<th>Estimation</th>
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<tbody>
<tr>
<td></td>
<td>The term “resources” includes natural resources (water, energy, landscape, biodiversity etc), as well as, socio-cultural resources. For natural resources, water and energy are the key concerns for sustainability since both are extensively used by the tourism industry in the host areas. Additionally, in the Mediterranean area these two resources are in scarcity. Biodiversity is examined on the third principle “Maintaining Diversity”.</td>
<td></td>
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<td></td>
<td>Renewable resources (solar, wind, etc.) used in tourist accommodations as a percentage of total fuels used</td>
<td>No available data In general, 8-10% of electric consumption in Crete is generated from wind farms while 20% of total energy consumption is generated from biomass. The Chairman of the Hotel Association of Crete estimates that 90% of tourist accommodation have established solar collectors for warm water and some have established photovoltaics (covering approximately 5% of their energy needs)</td>
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<td></td>
<td>Number of tourist businesses in the area which have renewable energy sources compared to all tourism businesses in Crete</td>
<td>9/30 = 0,3 (1996-2000) Compared to the ratio of beds in Hersonissos / beds in Crete which is 0,18 indicates a good proportion for Hersonissos</td>
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<td></td>
<td>Amount of water recycled as a percentage of total water that could be potentially recycled</td>
<td>N/A data A Waste treatment plan is under construction. Once operational 100% of the waste water will be treated and used for irrigation in agriculture. Many of the hotels treating their waste water use it for watering their gardens</td>
</tr>
<tr>
<td></td>
<td>Water consumption per tourist (or bed or night)</td>
<td>N/A data The Chairman of the Hotel Association of Crete estimates that: Hotels 250 lt/bed/day Rooms for rent 150 lt/bed/day</td>
</tr>
<tr>
<td></td>
<td>Energy consumption per tourist (or bed or night)</td>
<td>N/A data</td>
</tr>
<tr>
<td></td>
<td>Ratio of water consumption for domestic, tourist and agricultural use</td>
<td>The available data do not permit to distinguish the consumption between the different uses</td>
</tr>
<tr>
<td></td>
<td>Existence of procedures for continuous monitoring of the quality of water supply</td>
<td>A computerized system has been installed from the University of Patras which detects the concentration of chlorides in the water and consequently intercepts the water pumping from certain drill when it is raised. This is the only monitoring taking place while no systematic measurement of various parameters is contacted.</td>
</tr>
<tr>
<td>Existence of procedures for continuous monitoring and measuring of the quality of the swimming water</td>
<td>Sea water quality is sampled in 10 of the 55 beaches, that is about 1/5. Timing of samplings follows EU regulations (two samplings per month during the swimming period and one sampling before the start of the swimming season)</td>
<td>Similar to the previous one</td>
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<tr>
<td>Number of samplings of swimming waters exceeding safe limits, as these are defined by the EU</td>
<td>In 1999 results obtained were good</td>
<td>It is a measurement of the quality of the swimming water related to EU standards and time</td>
</tr>
<tr>
<td>Ratio of beaches with Blue Flag awards</td>
<td>5/55 (\rightarrow) 1/10 (approximately)</td>
<td>It is an indication of the quality of swimming water (more general than the previous one) and of the beach management as well as rising environmental awareness of the visitors</td>
</tr>
<tr>
<td>Square meters of beach (park or other site) per tourist (average and peak)</td>
<td>N/A data</td>
<td>Indicates the dominant perception on landscape as a natural resource as well as the quality of tourist experience</td>
</tr>
<tr>
<td>“Open” space as percentage to that built for tourism infrastructure</td>
<td>N/A data</td>
<td></td>
</tr>
<tr>
<td>Ratio of “winter” to “summer” population</td>
<td>(6620/49720 = 1/7.5) “Summer population” = peak season. Source: Municipality</td>
<td>It is an indicator of the pressure on the environment and the society</td>
</tr>
<tr>
<td>Number of bars/discos per population</td>
<td>1 bar per 350 residents (population = peak season)</td>
<td>It is an indicator of the pressure on the environment and the society</td>
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<tr>
<td>Number of employed females per 100 of employed males</td>
<td>30 In Limenas the indicator is just 24 Source: Census Data 1991. There is a need for more recent data as well for different periods than one every ten years or even better for different periods within the same year. Comparing this indicator to the corresponding for the Region of Crete as well as to each community of the Municipality on its own appears to be very low</td>
<td>It is an indicator of the pressure on the environment and the society</td>
</tr>
<tr>
<td>Rate of population growth</td>
<td>1961-1971 = -15.7% 1971-1981 = +56.6% 1981-1991 = +42.7% 1961-1991 = +88.4% Limenas has a substantially greater growth rate than the other communities; some communities have negative growth rate. Since Limenas is the main tourist attraction in the area it could be argued that the retaining—in a period of abandonment of the Greek countryside— and even raising of the population in the area is the result of tourism development.</td>
<td>Measures population retention</td>
</tr>
<tr>
<td><strong>Unemployment rate in the off-season periods</strong></td>
<td><strong>A surrogate for this is the following indicator</strong></td>
<td><strong>This is an indicator of both social and economic well-being</strong></td>
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| **Municipality’s unemployment compared to Region’s unemployment** | Municipality’s unemployment = 3,36%  
Region’s unemployment= 5,54%  
MU / RU = 0,6  
Source: Census Data 1991. Once more there is a need for more recent data as well for different periods than one every ten years or even better for different periods within the same year. However Limena’s unemployment is one of the lowest among the municipality’s different communities. | This is an indicator of both social and economic well-being |

### 2. Reducing over-consumption and waste

This principle has a two-fold dimension: a) saving the resources from over-consumption and b) reducing the pressure on the environment resulting from the waste disposal and treatment. Focus is given on sustainable practices used and responsible behavior.

#### Summer / winter waste generation

| Limenas (1997-1999)  
March – May= 25-30 tn/day  
June– Sept.= 40 tn/day  
Oct.– Nov.= 25-30 tn/day  
Dec.– Febr.= 6 tn/day  
Hersonissos  
1,5 tn/day in “winter” time  
10-12 tn/day in “summer” time  
Abdou-Gonies-Potamies-Kera  
2 tn/day all year around  
Municipality of Hersonissos (2000)  
July– Sept.= 60 tn/day *  
*except August = 80 tn/day  
Winter /summer waste production = 1/7 approximately (peak season) proportional to population raising  
Meaningful when compared to other tourist areas or to measure the success of waste reduction policies. |
| Winter /summer waste production = 1/7 approximately (peak season) proportional to population raising Meaningful when compared to other tourist areas or to measure the success of waste reduction policies. |

#### % of materials which can be recycled and receive this kind of treatment

Recycling took place just in Limenas during the period 1997-1998  
1/6/97 – 31/12/97 = 10,05%  
1/1/98 – 31/8/98 = 11,64%  
This an indicator of action taken towards reduction of the waste generated (less impacts on the environment) |

#### % of water recycled

As in the previous principle  
Same indicator as on the first principle
| Number of hotels, restaurants and other places offering tourist services which have enacted environmental sound systems for eliminating over-consumption of resources and waste generation as a percentage of all establishments | N/A data | Indicates action taken by the tourism businesses for reducing pressure on natural resources |
| % generated solid waste treated with the landfill method | 0 Under construction. Will be in use by 2003 | These two indicators reflect the two extremes (positive and negative) of solid waste management. The Municipality of Hersonissos can be found somewhere in-between. |
| % generated solid waste in dump | 0 | |
| % of wastewater receiving treatment | N/A data Within the next months when facility will be in use potentially all the urban wastewater generated in the area could be treated | It is a measurement for responsible and sustainable wastewater management |

3. **Maintaining diversity**

Diversity is a multifaceted aspect which includes biodiversity, socio-cultural diversity as well as, diversity in terms of products offered to the tourists. The later is examined on the next principle. Focus is given on protection actions and research taken.

| Number of special interest natural sites under protection Vs to those without any protection | “Koumarodasos” has been identified by the Ministry of the Environment as area of nesting of wild animals but no action has been undertaken in this direction | It is an indication for action taken |
| Number of special interest cultural sites under protection Vs to those without any protection | N/A data | It is an indication for action taken |
| Number of endangered/threatened species on the region | No one known The occurrence of harrier eagles in Rosa’s gorge is speculated without any further exploration | This is a measurement for the pressure posed and the need for action |
| Number of research projects concerning the area’s natural environment | 12 natural interest sites have been identified in the area. Studies were prepared by the Forestry Department for 4 of them and there is one more study currently under preparation. These 4 studies were at the Mayor’s request in order to act as the basis for their recreational development rather than a mean of protecting them in itself. No study has been carried out by an established educational or research institute. | This is an indicator for the interest for the natural environment |

4. **Integrating tourism into planning & Marketing tourism responsibly**

On this section are examined jointly two principles – “Integrating tourism into planning” and “Marketing tourism responsibly” - as marketing is a part of integrated tourism planning.

<p>| Tourists perception for the place they are visiting – questionnaire based | N/A data There is a research (SETE, 1995) which included a few relevant questions but with a small sampling and no extended questionnaire related to this subject. | This indicator reflects the existence of planning and responsible tourism marketing |</p>
<table>
<thead>
<tr>
<th>Indicator</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of different products/activities supplied locally</td>
<td>There are no specific data concerning this indicator but the common observation of the recreational activities offered such as water sports. No data available from some organization on new forms of tourism developed in the area.</td>
</tr>
<tr>
<td>The 4 following indicators can be considered surrogates</td>
<td></td>
</tr>
<tr>
<td>% of beds operating during winter</td>
<td>0</td>
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<tr>
<td>It is a measure of the diversification on the product offered as well as of the extension of the tourist season.</td>
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</tbody>
</table>
| Number of beds in accommodation with conference facilities as a percentage of the municipality’s bed capacity | I1 = 29,6%  
I2 = 20,9%  
I3 = 21,3%  
I1 = as a percentage of all MAIN tourist accommodation offered in Municipality of Hersonissos  
I2 = as a percentage of ALL types of tourist accommodation offered in Municipality of Hersonissos.  
There is a problem in I2 as available data concerning tourist accommodation have some inconsistency (rental rooms data are available for the year 1997 while conference facilities and main accommodation data for 1999)  
I3 = as a percentage of all MAIN tourist accommodation in Crete.  
It is a measure of the capacity of the accommodations offering conference facilities |
| % of municipality’s conference capacity to that of the Region            | 20,9%  
This is a measure of the capacity of conference facilities offered on the area |
| % of short term courses in new forms of tourism compared to the short term courses offered in tourism in general | N/A data in a local scale  
32 / 97 = 0,33  
(1990-1999)  
Data for the Region of Crete  
This indicator is more meaningful on a regional –or even on a national scale- since it is not easy to differentiate between the area where training took place and the area of work  
It is an indication of policy for future development |
| % of tourists having booked in four major T.O.                          | N/A data in a local scale  
According the Chairman of the Hotel Association of Crete it is about 50-60%  
This indicator is more meaningful on a regional scale  
It measures the dependence of the market on promoting and selling tourism |
| Existence of legislation or zoning regulations determining the land use and the impregnated tourist areas | There are some studies but nothing has been enacted yet  
It is an indication of planning for development and environmental protection |
| Existence of research concerning the area’s sustainable development     | A study was prepared in 2000 by the University of Cincinnati  
This indicator reflects the awareness on developmental issues however, it does not provide that action is taken|
| 5. Supporting local                                                      | Supporting local economy is believed to be essential in any economic activity. Issues such as over-dependence on tourism and revenues for the locals should be under consideration.                                                                                                                                                                                                                                                                                                                                                                                                  |
### Economies

<table>
<thead>
<tr>
<th>Indicator</th>
<th>Value</th>
<th>Source</th>
<th>Notes</th>
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<tbody>
<tr>
<td>Employment in tourism as a percentage of total employment</td>
<td>65.23% in the service sector&lt;br&gt;30.34% in hotels, restaurants and commerce&lt;br&gt;In Limenas the corresponding percentages are as follow:&lt;br&gt;76.33% in the service sector&lt;br&gt;35.11% in hotels, restaurants and commerce</td>
<td>Source: Census Data 1991</td>
<td>This indicator illustrates the local economy’s profile and its dependence or not on tourism. It would be of interest to measure its alteration through the time if data were available for time series.</td>
</tr>
<tr>
<td>Number of “locals” employed in tourism as a percentage of total employment</td>
<td>N/A data</td>
<td>The Mayor estimates that employees and owners (apart from a couple of large establishments) in tourist accommodation, restaurants, café-bars and stores are mainly residents while the rest live in the broader area.</td>
<td>It indicates the local retention of tourism related income</td>
</tr>
<tr>
<td>Revenues generated by tourism as a percentage of total revenues generated in the area</td>
<td>N/A data</td>
<td></td>
<td>This indicator reflects the relative weight of tourism compared to other economic activities on the area</td>
</tr>
<tr>
<td>Hotel and restaurant taxes</td>
<td>Since 1999 municipality taxes are 2% of the gross revenues practically of all kind of businesses related to tourism. Total tax revenues for the Municipality (mostly from Limenas) were 800 million drs in 1999. This implies that total revenues were about 40 billion drs.</td>
<td></td>
<td>Compared to overnight staying (if data were available) it would be a good indication of the economic effectiveness of tourism</td>
</tr>
<tr>
<td>Business establishments offering tourist services and owned by locals as a percentage of all business establishments</td>
<td>N/A data</td>
<td>The Mayor estimates that the majority of the tourist businesses belong to locals</td>
<td>It indicates the local retention of tourism related income</td>
</tr>
<tr>
<td>% of self employed or family businesses in tourism</td>
<td>22.8%</td>
<td>Source: Census Data 1991 Employment was examined in commerce, hotels and restaurants</td>
<td>It measures local SME’s participation</td>
</tr>
<tr>
<td>Change in Gross Regional (Local) Product by sector</td>
<td>N/A data at the local level</td>
<td></td>
<td>It indicates the change of local economy through time</td>
</tr>
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### Involving local communities & Consulting stakeholders and the public

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<tr>
<th>Indicator</th>
<th>Value</th>
<th>Source</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Existence of educational/informational programs for the public</td>
<td>No</td>
<td></td>
<td>This indicator reflects implementation of procedures for involving, advising and informing the public</td>
</tr>
<tr>
<td>Number of local meetings to discuss issues before policies are implemented</td>
<td>No</td>
<td></td>
<td>This indicator reflects implementation of procedures for involving, advising and informing the public</td>
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“Involving local communities” is examined along with the principle “Consulting stakeholders and the public” as they are actually expressions of the need for communication, information and experience exchange. Applying this kind of methods, it is believed to better succeed in implementing sustainable development, rising awareness and spreading of information.
### Public-private partnerships/investments

1) Golf  
2) Expansion of tourist season  
3) Extreme sports (paraglading) (some substructure by the Municipality)  
4) Hotel and restaurant owners are currently financing the planning for the coast road management which later on the local authority will enact.  

It is an indication of awareness and joint problem solving.

### Training staff

Training staff ensures better performance contributing this way to sustainability. Indicators representing this principle are more meaningful on a regional or even on a national scale since it is not an easy task to differentiate between the place of training and the place of work. Moreover there are no data available on tourism education and training on a local scale. The data used to estimate the indicators in this principle refer to the whole region of Crete.

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<th>Indicator</th>
<th>Data</th>
<th>Notes</th>
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| % of employees that are graduates of tourist schools | N/A data | More meaningful on a broader scale  
This indicator measures the educational level of those involved in tourism services |
| % of hours of short term training courses in tourism to those of all available short term courses in the Region of Crete | 12% (1990-1999) | More meaningful on a broader scale  
It reflects the emphasis given on tourism regarding training |
| Change of short term training courses hours in tourism | 536,7% | More meaningful on a broader scale  
Shows the alteration through time and therefore the intensity or not of actions taken |
| Number of short term courses realized in the Municipality concerning tourism | 0 | |

### Undertaking research

Undertaking research is essential to help solve problems, create new products, make efficient use of the resources and after all, better implement sustainable development in practice.

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<th>Indicator</th>
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| Number of surveys made concerning tourist preferences and perceptions | In a survey contacted in 1995 by SETE there were a few questions concerning tourist preferences and perceptions | It indicates some provision for responsible management and marketing of tourism  
The same as in a previous principle |
| Number of surveys made concerning locals perceptions for tourism | No official survey concerning local perceptions | It is an indication of inclusion of local’s input in planning decisions |
| Number of research studies on the profitability of the industry / number of research studies on the impacts of tourism | University of Cincinatti has undertaken research on the area’s prospect on sustainable development | Same as the previous principle |
| Conferences and other activities attracting interest in tourism and sustainable development research organized locally | 0 | This indicator reflects relative weight given on an integrated approach for sustainable development. |
5. Conclusions

One of the most striking problems estimating the indicators was the lack of proper data. This is relatively common in Greece since no special provision is taken regarding the availability and quality of necessary data other than those resulting from certain official surveys. Although tourism is one of the major economic activities in the country, lack of data, especially at a local scale, is striking. Moreover, since sustainable development indicators necessitate data other than those gathered for classical statistics, the problem is even worse. The need of identification and systematization of data for sustainable tourism development appears to be imperative.

In order to compensate the lack of data, surrogate indicators were introduced where possible. Undoubtedly, when an integrated evaluation of an area’s tourism development is the target, there should indicators representative for each parameter related to sustainable development. It is believed that the evolution of research on the field of sustainable tourism indicators will contribute to the improvement of the quality and the quantity of data available.

Another problem concerning data relates to the time of their collection and therefore to the time on which the evaluation is referring. Although the right thing to do would be the indicators estimation for the same period of time, this didn’t happen as available data were segmented in different years. Nevertheless, all estimated indicators do not refer strictly to a given period of time.

Finally, another problem encountered relates to the vagueness the concept of sustainable development implies as long as its prerequisites, parameters and criteria are concerned. This is even more apparent when dealing with a local scale of application where specific measures are necessary. Inevitably, this vagueness is projected to the indicators as well. However, it is believed that further research on defining the criteria of sustainability would result in better-formed indicators. Conversely, because of the interrelation between indicators and criteria, further research on the topic of sustainable tourism indicators would have a positive impact on this definition.
In any case, as long as a local scale of application is considered, the need for a thorough analysis over the parameters which define sustainable practices, becomes apparent.
6. Bibliography


OECD (1994) Environmental Indicators – OECD Core Set, Paris, OECD.


U.N. (1998) Indicators of Sustainable Development


