

**“DEFINING, MEASURING AND EVALUATING
CARRYING CAPACITY
IN EUROPEAN TOURISM DESTINATIONS”
B4-3040/2000/294577/MAR/D2**

Final Report

Athens, December 2001

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Study Team

The Study has been carried out by the members of the Environmental Planning Laboratory of the University of the Aegean, Greece:

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Expert Committee

1. Prof. Jan van der Straaten, Prof. of Economics, University of Tilburg
2. Dr. Jan van der Borg, Prof. of Economics, University of Venice
3. Ivica Trumbic, Director of PAP/RAC of MAP/UNEP, Split, Croatia

Invited Experts

1. Prof. Michael Scoullos, University of Athens, Mediterranean Information Office for Environment, Culture and Sustainable Development (MIO-ECSDE)
2. Thymios Papayiannis, Senior Advisor on Mediterranean Wetlands, Med-Wet

In addition to the **Final Report** another Report under the title “**Material for a Document**” has been prepared. The latter presents the experience from the EEA countries (members of EU, Norway and Iceland) and it discusses in particular the various impacts from tourism development but also the diverse type of actions implemented in order to promote sustainable tourism.

PART A

A.1. Scope – Tasks- Phases of the Study

The study aims at the elaboration of a comprehensive methodological framework which will contribute to an understanding of the concept of Tourism Carrying Capacity (TCC), its practical analysis and measurement and its efficient application in European tourist destinations.

A review of theory and practice provided the basis for development of the methodological framework. Within this context various approaches for TCC Assessment have been considered along with their practical applications. The methodology for defining and assessing TCC has been described for each one of the different components of Carrying Capacity: physical-ecological, socio-demographic and political-economic taking into consideration socio-economic, institutional and environmental characteristics and particularities of tourist destinations in EEA countries (members of EU, Norway and Iceland).

The Study has been carried out in two phases:

Phase A: "Defining Tourism Carrying Capacity in the European context". It included the following tasks:

- T1. Analysis of various scientific approaches and methodologies developed to define Tourism Carrying Capacity (i.e. methodologies developed by WTO-the World Tourism Organization, UNEP/MAP/PAP-Priority Actions Programme)
- T2. Review of indicators developed to assess and implement Carrying Capacity.
- T3. Analysis of key limiting factors for tourism development for different types of tourist destinations in the EEA countries in respect to carrying capacity components, based on review of case studies
- T4. Establishment of Expert Committee to guide the development of methodology.

On the basis of the above analysis, a draft paper on a methodology for defining and implementing TCC has been elaborated along with a checklist of indicators.

A Workshop with experts was organised at the end of phase A (see paragraph A.2.3). The invited experts presented their experience on the different types of tourism destinations (rural areas, natural areas, historical centers, etc) the problems related to tourism flows, the limiting factors for tourism development and environmental thresholds. They were also invited to comment on the conceptual framework for Carrying Capacity, the critical factors and the checklist elaborated by the Research Team. They also presented their experience on tourism management issues and provided information from projects implementing Carrying Capacity or sustainable tourism policies.

Phase B: "Definition of guidelines and methodology for Carrying Capacity Assessment in the EEA tourist destinations". It included the tasks:

- T5. Finalization of methodology (preparation of a final checklist of indicators)
- T6. Selection on the basis of certain criteria (types of tourist destinations, types of environmental problems, etc) of case studies (either sites where Tourism Carrying Capacity could be appropriate as a tool for managing pressures from tourism development or sites where TCC has been already implemented) and detailed description of them.
- T7. Formulate policy guidelines for implementing Carrying Capacity.

A.2. Methodology used

A.2.1. Review

A.2.1.1. Literature review

A significant number of papers and other publications (books, reports) in respect to a variety of issues, including tourism management, environmental, economic and social impacts of tourism in the case of various tourist destinations, carrying capacity issues, indicators, etc., have been reviewed by the research team (for a detailed presentation of the consulted Journals see Annex I, while in Annex II a full list of the articles consulted is presented as Reference Bibliography). The documents reviewed were in English, Spanish, Italian, French and Greek.

Members of the Environmental Planning Laboratory carried out supplementary surveys in other University libraries except the one of the University of the Aegean and key Greek libraries (i.e. KEPE and TEE). More specifically in the:

- University of Indiana, providing a significant insight from the experience in the USA
- Bodleian Library of the University of Oxford, UK
- DUET (University Diploma in Tourist Economy) Library of the University of Venice, Italy

Several other documents/reports and papers have been downloaded from the databases accessible in the Internet, such as Science Direct, OCLC FirstSearch, Swetsnet Navigator and Ideal Academic Press.

The documents selected covered a significant period (1976- 2001). They have been organised in different sections using relative key words:

- A. Carrying Capacity:
 - 1. Theory: definition, approaches
 - 2. Methodology, tools
 - 3. Case studies:
 - Coastal areas

- Islands
 - Historical settlements
 - Protected areas
 - Rural areas
 - Mountain resorts.
- B. Tourism: general information in respect to tourism development, impacts, trends and prospects, policies, sustainability issues, etc

A.2.1.2. Internet survey

An extended Internet survey has been carried out in order to collect more information for case studies. Several web sites in English, French, Spanish and Italian were searched, like those of various Tourist Boards, Universities, Tourism Associations, Research Institutions, etc., in order to find information about case studies and TCC methodology (for a detailed presentation of the Internet sites consulted see Annex II)

A.2.1.3. Case studies review

Particular emphasis was placed on information concerning the implementation of the TCC concept and tools (for further details about the case studies see section 3.2.2. of the Report “Material for a Document”)

A.2.2. Data collection from other sources

A.2.2.1. Participation in Conferences

Ms. Anna Collovini, participated in the International Conference on Sustainable Tourism held in Rimini during 28th –30th June 2001, organized by the Province of Rimini.

Valuable information in respect to recent initiatives in tourism management and applications of Tourism Carrying Capacity methodology, (i.e. Rimini and Elba Island) has attained.

Prof. Harry Coccossis provided valuable information through his participation in various conferences (Regional Conference of World Tourism Organisation and Greek National Tourism Organization on “Ecotourism and Sustainable Development in protected areas” organised in Thessaloniki 2-4 November 2001, and “Tourism in protected natural areas” organized by EKBY –the Greek Center for Biotopes and Wetlands” in Sitia, island of Kriti, 15-16 October 2001).

A.2.2.2. Consultation

Requests for further information have been addressed to various research organizations and institutions in an effort to collect further information on current TCC projects and related issues such as Touring Club Italiano, International Centre for Integrated Mountain Development, LEAD (Leadership for Environment and Development).

A.2.3. Panel of Experts and Workshop

A Workshop had been organized with the scope to discuss the methodological framework for TCC and the master checklist of indicators defined by the study team.

The Workshop was held on the 10th of September 2001 in Athens. Besides the study team, consisted from Prof. Harry Coccossis, Dr. Alexandra Mexa and Ms. Anna Collovini, the following experts have been invited to participate on the basis of their expertise on tourism or on carrying capacity issues:

1. Prof. Jan van der Straaten, Prof. of Economics, Tilburg University, Dept. of Social Economics/ Dept. of Leisure Studies, with expertise and experience on Tourism carrying capacity and management of natural areas
2. Dr. Jan van der Borg, University of Venice, Department of Economical Science, with expertise and experience on assessing and implementing Tourism carrying capacity in historical settlements
3. Ivica Trumbic, Director of the Priority Actions Programme/ Regional Activity Centre (PAP/RAC) of the Mediterranean Action Plan United Nations Environment Programme, with expertise and experience on carrying capacity and management of coastal areas

Furthermore the experts have been asked to prepare papers providing information not only about the theoretical aspects of carrying capacity but also in respect to specific applications/case studies of TCC. The papers have been presented and discussed during the Workshop.

Other Greek experts, with expertise on tourism and carrying capacity have also participated:

4. Mr. Thymios Papayiannis, MedWet (The Mediterranean Wetlands Initiative) with expertise and experience in the management of ecologically sensitive areas
5. Prof. Michael Scoullou, President of the Hellenic Society for the Protection of the Environment and Cultural Heritage, Chairman of the Mediterranean Information Office for Environment, Culture and Sustainable Development (MIO-ECSDE), which is a Federation of Mediterranean NGOs acting throughout Mediterranean
6. Dr. Apostolos Parpairis, University of the Aegean, Department of Environmental Studies with expertise in the definition of TCC in the case of islands.

With the help of invited experts the main problems and policy issues for tourism development and the main issues for carrying capacity (CC) in the case of the various types of tourist destinations such as: islands, coastal areas, historic centers, rural areas, areas with high ecological significance were discussed.

A.3. Work programme

A.3.1. Provisions of the project work plan

An extension of one month has been requested in order to ensure proper preparation of the translation of the final Report

A.3.2. Work undertaken

A.3.2.1. Desk research

Desk research on the subject and issues related to tourism:

- Carrying capacity for tourism (theory and critique)
- Other relevant approaches, tools (LAC, etc)
- Environmental, economic and social impacts of tourism in various tourist destinations
- Limiting factors for tourism development
- Tourism planning and management

A.3.2.2. Case studies for TCC

Empirical material was compiled for various EEA tourism destinations in respect to tourism carrying capacity issues. Information has been collected about destinations that have sur-passed their carrying capacity limits or risk of doing so, including islands, coastal areas, historical settlements, rural areas, protected areas and mountain resorts:

- Islands: Rhodes and Mykonos (Greece), Elba (Italy), Lanzarote and Calvia (Spain), The Isle of Puberk (UK),
- Coastal areas: Province of Rimini (Italy), Catalan Coast (Spain), Donegal (Ireland), Wadden Sea (Netherlands, Germany, Denmark)
- Historical settlements: Venice (Italy), Oxford, Chester county, Canterbury and Stratford upon Avon (UK), Bruges (Belgium)
- Rural areas: rio Mundo (Spain), Sruma project (Ireland), Loch Lomond (UK)
- Mountain resorts: Albertville (France), Alps
- Protected areas: Coto Donana National Park (Spain), Zakynthos (Greece), Gower Peninsula (Wales), Prespes (Greece), Abruzzo National Park (Italy)

The presentation of all case studies is included in the Report “Material for a Document”. The evidence from practice provided significant input for the elaboration of the methodological framework of TCC.

Cases of TCC applications in non EEA countries have been also studied. These case studies are:

- Islands: Malta, Vis (Croatia), Maldives, Mauritius
- Coastal areas: east coast of Cyprus, state of Goa (India)

- Mountain areas: Nepal, Himalayas, ski resorts in Colorado
- Protected and natural areas: Kruger National Park, natural Parks in Montana and New Jersey, lakes of Ontario

A.3.2.3. Desk research on indicators and methodological approaches

A review of various methodological approaches for T.C.C. Assessment (WTO, UNEP/Mediterranean Action Plan/Priority Actions Program, Coccossis and Parpairis, etc) and indicators has been carried out.

A.3.2.4. Suggestion for a modified approach

On the basis of the review of different methodological approaches and of the practical experiences in different EEA tourism destinations a methodological framework for the measurement and evaluation of carrying capacity was prepared. The approach elaborated by PAP/RAC (1995) provided a good basis. Although this methodology for the calculation of TCC has been prepared for the case of coastal areas, it provides a solid framework and a rather comprehensive procedure not only for measuring TCC but also for integrating it into the planning and management process for an area. The guidelines for sustainable tourism for local authorities developed by WTO in 1998, were also used. A detailed description of the methodology and list of indicators for the carrying capacity evaluation can be found in Part B of this report.

A.4. Criteria for the selection of case studies

The selection of the case studies presented in the Report “Material for a Document” was made on the basis of the following criteria:

- (1) Geographic location of the particular site (north, central and south)/ Representativeness.
- (2) Type of tourist destination (i.e beach resort)
- (3) Geographical/environmental characteristics of the area (island, mountain area, rural area, historical settlements, coastal area, etc.),
- (4) Types of environmental problems due to tourism development (physical-ecological, social, demographic, etc)

Tourist localities, which have implemented carrying capacity studies or were in the process of doing so, were included. It should be noted though that a limited number of such case studies has been identified.

PART B: TECHNICAL DOCUMENT

B.1. Methodological Considerations for measuring and implementing TCC

In general there is limited experience with the application of carrying capacity in the management of tourist destinations across European countries. This probably reflects the ambiguities involved with the concept and/or the difficulties in its operationalization. Another reason could be that overall there is little experience on the ground with managing tourist destinations, therefore with the use of tools and methods for that purpose.

However, the basic element of the concept: the need for a limit -a threshold -in the tourist activity is present in one way or the other in the concerns and priorities of local managers and planners. Tourism creates pressures on the natural and cultural environment, affecting resources, social structures, cultural patterns, economic activities and land uses in local communities. To the extent that such pressures are felt to create problems on tourism or alter “significantly” the functioning of nature and the local community, taking special measures to mitigate such impacts can be a viable option. These concerns increase and dominate public policy agendas as modern societies give increasing consideration to issues such as environmental conservation, quality of life and sustainable development. The issue of tourism development is increasingly sought within a local strategy for sustainable development in which case determining the capacity of local systems to sustain tourism becomes a central issue.

On the basis of the scientific literature on the subject, carrying capacity considerations revolve around three basic components or dimensions: physical-ecological, socio-demographic, political-economic. These dimensions reflect also the range of issues considered in practice.

In considering carrying capacity the three components are assigned different weights (or importance) in different destinations. These differences stem from the type (characteristics/particularities) of the place, the type(s) of tourism present and the tourism/environment interface. The three are interrelated to some extent.

-The characteristics of the locality provide the basic structure for the development of tourism. These can be evidenced in terms of local resources, the vulnerability of local natural ecosystems, population size, economic structure, culture and local heritage, etc. To some extent the characteristics of a locality determine its resilience to pressures from tourism. The size, the structure and dynamism of the local society, culture and economy can be significant factors which influence the local ability to cope with pressures and impacts from tourism

-The type of tourism determines the basic characteristics of tourist behaviour –to some extent- and condition the tourist/local community, tourism/local economy

and tourist development/environmental quality relationships. The type of tourism can be expressed in terms of the motive(s) for visiting a place, the mode of mobility and transport, the frequency-length of stay- and activity range of tourists, etc. In this context it is important to consider differences among types of tourists in terms of expectations, attitudes and behaviour as these condition the pressures and impacts of tourism on a place.

-The tourism/environment interface is a composite of the previous two factors mainly in the form and type of tourist development (spatial patterns), the phase in a life-cycle context of the destination, the level of organizational and technological systems employed, the management regime, etc. The tourism/environment interface is expressed in terms of constraints evolving either from the impacts of tourism on the environment or from the degradation of the environment on tourism.

The above underline the need to consider a different emphasis-or significance- in carrying capacity considerations in each type of tourist destination:

-Coastal areas:

Coastal areas are normally associated with mass tourism, large scale construction and infrastructure, intensive land development and extensive urbanization, a prevalent model in most Mediterranean destinations. Carrying capacity issues revolve around considerations about tourist density, the use of beaches and tourist infrastructure, congestion of facilities, sea pollution, etc.

-Islands:

Island tourism, if not falling within the previous category, is more of the selective type with small and medium scale accommodation, often in (or around) existing settlements, rural local societies, small communities, etc. Carrying capacity considerations focus on the relationship of tourism with the local society/culture, the effects on local production systems and the economy of the island, quality of life but also the demands and impacts on resources such as water and energy, the management of waste, etc.

-Protected Areas:

Tourism in protected areas is associated with appreciating and observing nature, scientific endeavour and education. This type of tourism is associated with minimal development of infrastructure and small scale interventions in areas of – normally-strong control and restrictive management. Carrying capacity issues concern the number of tourists, visitor flows and spatial patterns of concentration/dispersion vis-à-vis the protection of nature and the functioning of ecosystems but also the quality of experience of visitors.

-Rural areas:

Tourism in rural areas covers a wide range of purposes (motivations) and is usually associated with visiting areas of special beauty, being in nature, low intensity activities but widely dispersed around low density-often remote- rural communities. In some areas agro-tourism falls within this category. Carrying capacity issues involve questions about visitor flows, impacts on local society and culture, effects on rural economies, the spatial patterns of visitor flows, etc.

-Mountain resorts:

These are likely to resemble to the intensive development, mass tourism category, often centred around winter sports. Carrying capacity issues include environmental impacts from large scale infrastructure or access roads on natural ecosystems, microclimate change from artificial snow, vegetation cover losses and soil erosion, landscape deterioration, but also congestion of facilities and waste management.

-Historical settlements and towns:

Tourism is attracted to historic towns as a result of the built cultural heritage, urban amenities, lifestyle and cultural traditions, cultural events, etc. There can be several types of tourism in this category. The dominant mass tourism associated with large numbers of visitors centering around monuments, museums, etc. often of a short stay (even daily visits) in which case carrying capacity issues center around congestion of facilities, traffic, urban land-use change, waste management etc. At the other end of the spectrum in some other cases tourism in historic settlements could be more of the selective type associated with small groups of visitors, low pressures for development, etc. in which case carrying capacity considerations could be limited to urban fabric change, etc.

Whether real or perceived, limits (thresholds) can stimulate communities to take action at a destination level. Such action is easier to become incorporated within the existing responsibilities, functions and activities of managing local affairs. It seems easier in two cases:

-Areas of special environmental interest, such as natural parks or protected areas, where management regimes exist already in the sense of administrative/organizational structures and –at best- management plans (goals, priorities and measures).

-Local authorities in the process of developing or reviewing local planning strategies, where future development issues become part of planning and management activities. Strategic planning can provide a supporting process to consider tourist carrying capacity.

B.2. Tourist Carrying Capacity assessment methodology

B.2.1. The Approach: TCC as part of a planning process

The definition-assessment and implementation of TCC needs to be considered as a process within a planning process for tourism development. Figure 1 outlines the main steps of a process which could be used to define (and implement) TCC.

In this respect, the following should be noted:

1. The process of defining and implementing TCC and a broader process of planning for sustainable tourism, which are parallel and complementary processes, can provide a general framework which could guide the local community, planners and decision-makers. This framework consists of principles, goals, objectives and policy measures in regard to tourist development in an area on the basis of the area's distinctive characteristics/features respecting local capacities to sustain tourism.
2. Setting capacity limits for sustaining tourism activity in a place involves a vision about local development and decisions about managing tourism. These should be carried in the context of democratic community strategic planning, which requires participation of all major actors and the community at large. Consultation with relevant stakeholders is a key issue at all stages. The whole process is dynamic and cyclical.
3. Overall measuring Tourism Carrying Capacity does not have to lead to a single number (threshold), like the number of visitors. Even when this is achieved this limit does not necessarily obey to objectively, unchangeable, ever lasting criteria. An upper and a lower limit of TCC can be of more use than a fixed value. TCC assessment should provide not only the maximum but also the minimum level of development, that is the lowest level, necessary for sustaining local communities.

In addition, TCC may contain various carrying capacity limits in respect to the three components (physical- ecological, social-demographic and political –economic). “Carrying capacity is not a scientific concept or formula of obtaining a number, beyond which development should cease. The eventual limits must be considered as a guidance. They should be carefully assessed and monitored, complemented with other standards, etc. Carrying capacity is not fixed. It develops with time and the growth of tourism and can be affected by management techniques and controls” (Saveriades, 2000).

4. The process of defining TCC is composed of two parts (it follows in principle the conceptual framework for TCC as described by Shelby and Heberlein (1986)).

Descriptive part (A): Describes how the system (tourist destination) under study works, including physical, ecological, social, political and economic aspects of tourist development. Within this context of particular importance is the identification of:

- Constraints: limiting factors that cannot be easily managed. They are not flexible, in the sense that the application of organisational, planning, and management approaches, or the development of appropriate infrastructure does not alter the thresholds associated with such constraints.

- Bottlenecks: limiting factors of the system, which managers can manipulate (number of visitors at a particular place)
- Impacts: elements of the system affected by the intensity and type of use. The type of impact determines the type of capacity (ecological-physical, social, etc). Emphasis should be placed on significant impacts

Evaluative part (B): Describes how an area should be managed and the level of acceptable impacts. This part of the process starts with the identification (if it does not exist already) of the desirable condition/preferable type of development. Within this context goals and management objectives need to be defined, alternative fields of actions evaluated and a strategy for tourist development formulated. On the basis of this Tourism Carrying Capacity can be defined.

Within this context of particular importance is the identification of:

- Goals/ objectives: (i.e define the type of experience or other outcomes that a recreation setting should provide)
 - Evaluative criteria: specify acceptable levels of change (impacts).
3. The implementation of TCC can be assisted, guided and monitored, with a coherent set of indicators. During the process of defining TCC an initial set of indicators may be developed, finalised following the final decision on TCC of the total system. The whole process is dynamic and, as already noted, since TCC is not a fixed concept; it should be regarded as a tool for guiding policy formulation and implementation towards sustainable tourism

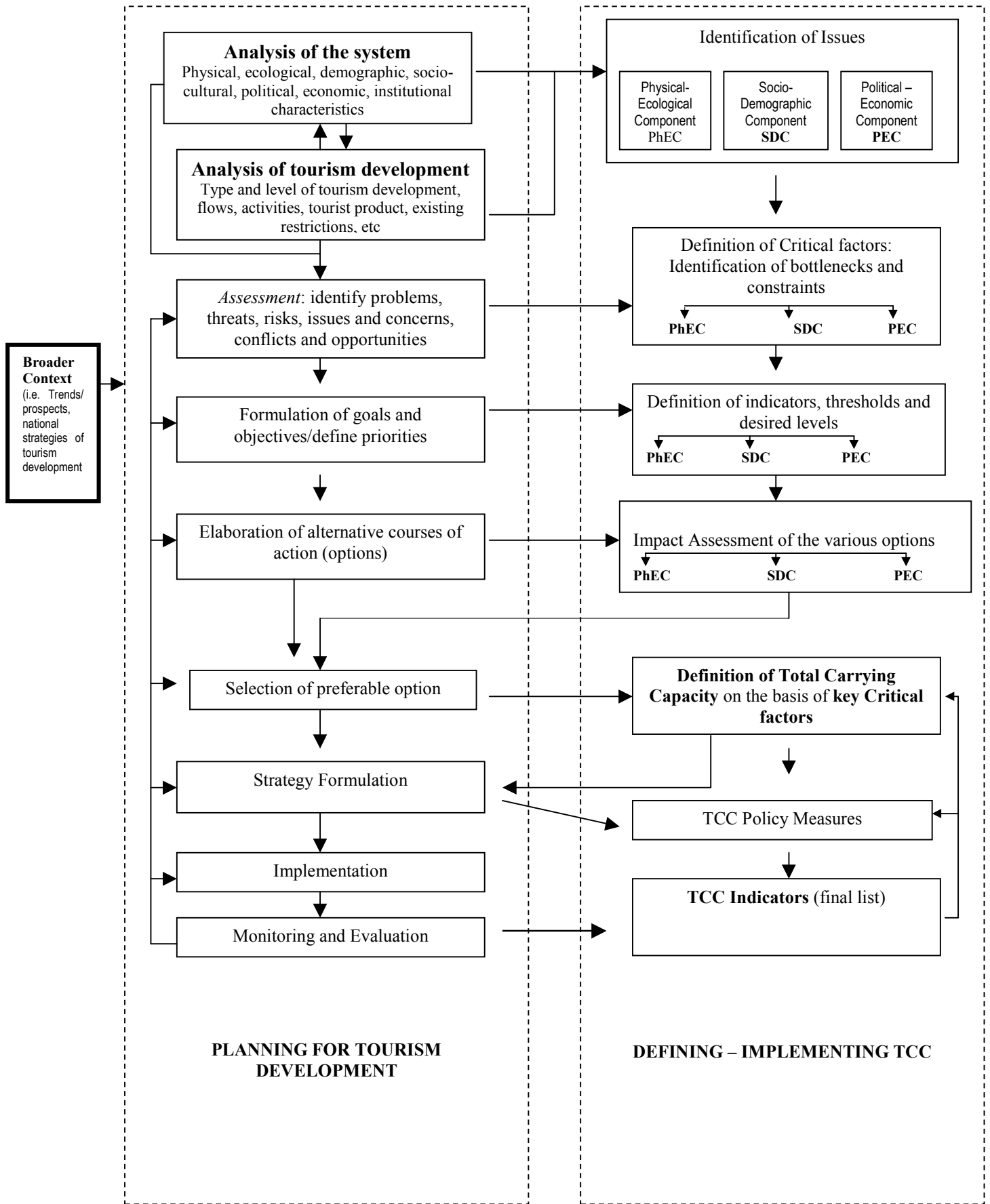


Figure 1

B.2.2 The Components

On the basis of the main dimensions of development/environment interface, following a systemic analysis, the impacts of tourism in an area can be analyzed in terms of three major axes: physical environment (natural and man-made including infrastructure), social (population and social structure and dynamics) and economic (including institutional and organizational). These can provide also the basis for analyzing and assessing TCC in terms of main and distinct–but interrelated- components (PAP/RAC, 1997)

B.2.2.1. Physical-ecological component

The **physical-ecological** set comprises all fixed and flexible components of the natural and built-cultural environment, as well as infrastructure. The “fixed” components refer to the capacity of natural systems expressed occasionally as ecological capacity, assimilative capacity, etc. They cannot be manipulated easily by human action and to the extent these limits can be estimated they should be carefully observed and respected as such. The “flexible” components refer primarily to infrastructure systems (and their characteristics) like water supply, sewerage, electricity, transportation, social amenities (postal and telecommunication services, health services, law and order services, banks, shops and other services). The capacity limits of the infrastructure components can rise through investments in infrastructure, taxes, organizational-regulatory measures, etc. For this reason their values cannot be used as a basis for determining carrying capacity, but rather as a framework for orientation and decision on management/action options.

Levels of capacity for the components can be set –for example-in terms of:

- Acceptable level of congestion or density in key areas/spatial units such as parks, museums, city streets, etc.
- Maximum acceptable loss of natural resources (i.e. water or land) without significant degradation of ecosystem functions or biodiversity or loss of species.
- Acceptable level of air, water and noise pollution on the basis of tolerance or the assimilative capacity of local ecosystems
- Intensity of use of transport infrastructure, facilities and services
- Use and congestion of utility facilities and services of water supply, electric power, waste management of sewage and solid waste collection, treatment and disposal and telecommunications
- Adequate availability of other community facilities and services such as those related to public health and safety, housing and community services, etc.

B.2.2.2. Socio-demographic component

The **socio-demographic** set refers to those social aspects, which are important to local communities, as they relate to the presence and growth of tourism. Social and demographic issues, such as available manpower or trained personnel, etc. including also socio-cultural issues, such as the sense of identity of the local community or the tourist experience etc. Some of these can be expressed in quantitative terms but most require suitable socio-psychological research. Social capacity thresholds are perhaps the most

difficult to evaluate as opposed to physical-ecological and economic, since they depend to a great extent on value judgements. Political and economic decisions may affect some of the socio-demographic parameters such as, for example, migration policies.

Social carrying capacity is used as a generic term to include both the levels of tolerance of the host population, as well as the quality of the experience of visitors to the area.

Levels of capacity for the components may be expressed in terms of:

- Number of tourists and tourist/recreation activity types which can be absorbed without affecting the sense of identity, life style and social patterns and activities of host communities,
- Level and type of tourism which does not alter significantly local culture in direct or indirect ways in terms of arts, crafts, belief systems, ceremonies, customs and traditions,
- Level of tourism that will not be resented by local population or pre-empt their use of services and amenities.
- Level of tourism (number of visitors and compatibility of types of activities) in an area without unacceptable decline of experience of visitors

B.2.2.3. Political-economic component

The **political-economic** set refers to the impacts of tourism on local economic structure, activities, etc. including competition to other sectors. Institutional issues are also included to the extent they involve local capacities to manage the presence of tourism. Considerations of political-economic parameters may be also necessary to express divergence in values, attitudes within the local community vis-à-vis tourism.

Levels of capacity for the components may be expressed in terms of:

- Level of specialization in tourism
- Loss of human labour in other sectors due to tourism attraction
- Revenue from tourism and distribution issues at local level.
- Level of tourism employment in relation to local human resources

B.2.3. Methodology for measuring TCC organised by component

As already discussed, TCC involves setting levels of acceptable tourism (expressed often in numbers of tourists per unit of time or density, etc.) which are derived from an analysis of key features (like for example natural resources, species under protection, cultural and social patterns and traditions, etc.) which may intervene in the tourist development of a place, felt (perceived) as limits, constraints and bottlenecks on the basis of which tourism management decisions have to be taken. These can be set on the basis of any one of the components (as presented in the following Table) or their combination.

Measuring TCC for the Physical Ecological Component	Measuring TCC for the Socio-Demographic Component	Measuring TCC for the Political-Economic Component
<p>ANALYSIS OF THE PHYSICAL –ECOLOGICAL CHARACTERISTICS OF THE SYSTEM</p> <p>(a) Analysis of general ecological and physical characteristics of the area.- Data collection - analysis Within this context it is necessary to define the boundaries of the system, meaning the spatial extent of the area on the basis of homogeneous or functional characteristics. It could be useful if the area under study can be matched to the boundaries of data units, such as census areas or municipalities for which data is likely to exist. Although the identification of problems usually follows the analysis of the system and therefore of data collection, in reality data collection is often driven by key issues/problems. This cannot exclude the possibility of enriching the analysis, at a later stage, adjusting the relevant boundaries of the area concerned. After all the whole process is cyclical. Special consideration is normally given to key features and processes such as hydrology, coastal dynamics (in case of coastal areas and islands), vegetation patterns and cover, wildlife species distribution, natural and cultural landscape, urban (and tourist) development patterns, urban sprawl, land use patterns and dynamics, transport network, water supply and sewage disposal, wastewater treatment facilities, energy production, presence of a variety of services, necessary to support tourism (i.e. health facilities), etc.</p> <p>(b) Definition of relationships with the adjacent/neighbouring areas on the basis of strong linkages with the system under study, i.e. due to existing infrastructure or key ecological processes. The presence of technical and tourist infrastructure, and of tourist attractions in neighbouring areas may contribute to the pressures exerted to the area under study.</p>	<p>ANALYSIS OF THE SOCIO-DEMOGRAPHIC CHARACTERISTICS OF THE SYSTEM</p> <p>(a) Analysis of general demographic and social characteristics of the area. Data collection - analysis Analysis of population growth and density, age structure, etc.</p> <p>(b) Analysis of cultural patterns and social relations. Particular emphasis is often placed on those aspects which might affect the use of resources and on the relationship of local community to tourists/visitors expressed often in terms of conflicts, perceived threats, etc. Sometimes for example, immigration of labour from neighbouring or other areas may result in conflicts and social tensions, particularly relevant for small islands with small and traditional local communities.</p> <p>(c) Definition of the relationship with the broader system (cultural and social conditions in wider region) which may influence the system under study</p>	<p>ANALYSIS OF THE POLITICAL ECONOMIC CHARACTERISTICS OF THE SYSTEM</p> <p>a) Analysis of general political and economic characteristics of the area Data collection - analysis</p> <p>i) <i>state/ structure of the economy:</i> employment/unemployment, presence of traditional activities like agriculture and fishing, seasonality of activities, average income.</p> <p>ii) <i>political, decision-making process</i> Major actors and community participation</p> <p>iii) <i>organizational aspects.</i> Mechanisms in place. Scientific, technical and management capabilities to manage problems.</p> <p>iv) <i>regulatory/ institutional context.</i> Goals and policies for tourism, development and environment, land use plans, regulations and standards in force at the tourist destination due to various regulations, pattern of tourist development related to overall sensitivity of the area (i.e. highly restricted, controlled, integrated, intensive).</p> <p>v) <i>public, private investments for the area.</i></p> <p>b) Definition of the relationship with the broader system which has strong political-economic linkages and influences the system under study</p>

ANALYSIS OF TOURISM DEVELOPMENT.

- (a) Analysis of **tourist supply and demand**.
 - (b) Definition of the **type of tourism development**, i.e. mass vis-à-vis selective types of tourism development like agro-tourism, cultural, related to religious, etc.
 - (c) Definition of the **level of tourism development**. In this case data like tourist arrivals, overnight stays will be necessary
 - (d) Exploration of **future trend/ prospects for tourism development/ Potential tourist demand (international, domestic)**. Quantitative and qualitative data will be useful in the second part of the process, that is the evaluative part of the process of defining TCC. The increase of tourism demand in the region as well as the rising of certain types of tourism activities needs to be considered in planning for future tourism development.
 - (e) Identification of **tourist attractions**. Identify resources and particular areas, which consist significant poles of attraction for many tourists (i.e. beaches, natural areas, wild life, etc). Classification of these tourist attractions including those of the associated region/neighbouring area. Are these attractions of a seasonal function (i.e. sea, beaches), or not (i.e. a casino, monuments, historic areas, etc.)? Gastronomy, traditions, festivals, performances, life style, etc need to be included as well.
 - (f) Analysis of **Tourist spatial and temporal (seasonality) flows**. Duration of stay (within this context it would be interesting to note the duration of stay for certain key tourist attractions)
 - (g) Inventory of **Activities and events**.
 - (h) Identification of the **characteristics of visitors** Characteristics of the visitors such as age, sex, income, motivations, expectations, race, ethnic origins could provide valuable information. Identification of main groups: tourists, excursionists, etc
 - (i) Identification of **patterns of behaviour**. The level of use of various facilities, visitor densities, length of stay, activities at the destination and levels of tourist satisfaction are also important factors.
 - (j) Definition of the **profile of the area**
- Analysis of
- (k) **Current policy versus tourism development**
 - (l) **National and local strategies of tourism development**
 - (m) **Tourist revenues**
 - (n) **etc**

IMPLICATIONS FOR THE PHYSICAL-ECOLOGICAL COMPONENT – IDENTIFICATION OF DRIVING FORCES-CAUSES

ex.

- (seasonality) In many coastal areas and islands tourist season has a rather limited duration, usually no more that a few months. The increased number of arrivals and of over night stays may result in significant pressure on the limited natural resources like water, while the physical capacity of the systems in respect to waste.

IMPLICATIONS FOR THE SOCIO-DEMOGRAPHIC COMPONENT IDENTIFICATION OF DRIVING FORCES -CAUSES

ex.

Tourism development could have major implications on employment opportunities, family structures and social relations (i.e. divorces, etc). The study of these impacts will highlight the vulnerability of socio –demographic component in respect to tourism development.

IMPLICATION FOR THE POLITICAL- ECONOMIC COMPONENT IDENTIFICATION OF DRIVING FORCES –CAUSES

Abandonment of traditional activity patterns, monoculture, lack of organizational capacity to cope with impacts of tourism, etc. could be of special interest.

<p>management and in certain cases energy production is usually surpassed.</p> <ul style="list-style-type: none"> • (type of activities) Impacts on the environment often result from activities that are quite often classified as environmental friendly. Trekking and paragliding can cause severe threats to fragile ecosystems and for this impact assessment, or prediction of future impacts on the environment requires a careful study of the whole range of activities 		
<p>ASSESSMENT OF THE STATE OF THE PHYSICAL –ECOLOGICAL COMPONENT OF THE SYSTEM</p> <p>in particular of the</p> <ul style="list-style-type: none"> ▪ Environment (the deterioration occurred from existing development, resources and ecosystems vulnerability) ▪ Technical infrastructure/services ▪ Tourist superstructure and in particular bed capacity, categories, quality of services, available technology used in respect to conserving key resources like water and managing key problems like waste, etc. ▪ Tourist attractions. <p>(a) Assessment of impacts to local environment and infrastructure</p> <p>(b) Identification of problems and threats: Certain problems will/may result to the deterioration of the physical-ecological characteristics of the area or of some key resources and could eventually lead to the disaffection of tourists and to the increase of the cost for providing various services and furthermore impose threats on the identity of the area. Evidence from practice has indicated that local people, planners, decision -makers, and entrepreneurs have a relative good knowledge on what are the major problems. Most of these problems are the ones exerting significant pressure (i.e. lack of water resources), imposing major costs (i.e. waste management), threatening the base of tourism development. The identification of key problems, threats and risks should be done for both:</p>	<p>ASSESSMENT OF THE STATE OF THE SOCIO-DEMOGRAPHIC COMPONENT OF THE SYSTEM</p> <p>(a) Assessment of impacts to local community. Identification of local population preferences. Residents are an important part of the tourism system around a destination. They are an important ingredient of "hospitality" of a destination. The reaction of the inhabitants of a tourism destination to tourism in general, and to tourists and excursionists in particular, determines the social impact of tourism on the local society and thus the social- carrying capacity of the destination</p> <p>(b) Assessment of the level of tourists satisfaction</p> <p>(c) Identification of problems, threats for key resources, socio-cultural conflicts When ecosystems are scarce, conflicts can easily arise between different groups of users. The more groups that use an ecosystem, the more likely that such a situation will occur.</p>	<p>ASSESSMENT OF THE STATE OF THE POLITICAL – ECONOMIC COMPONENT OF THE SYSTEM</p> <p>(a) Identification of problems, threats, conflicts, opportunities and issues for management. Conflicts between existing activities: When tourism development coexists with a no complementary activity, i.e. agriculture conflicts over the use of land and key resources like water may arise. The capacity of tourism development may be defined in respect to the desirable level of development of the other activity. If for example local community, but also institutional settings call for particular protection of agricultural land, then the remaining land may present the max. capacity for tourism development. If the desired level of development is defined then the number of hotel beds in the area may be estimated. These kind of conflicts and therefore of limits may be more profound in the case of co-existence with polluting activities. Crowding out phenomenon: The social-economic tourist carrying capacity may be defined as the total number of visitors that can be allowed to a city without hindering the other functions that the city performs. This dimension is closely linked to the phenomenon of "crowding out".</p>

<ul style="list-style-type: none"> ▪ The environment (problems caused due to tourism development) ▪ Tourism development (problems caused due to environmental deterioration). Potential threats to tourism development due to future environmental problems need to be carefully considered. These problems pose risk to future tourism development. <p>(b) Identification of conflicts, opportunities and issues for management (i.e. visitor flows).</p>		
<p>DEFINITION OF TCC FOR THE PHYSICAL –ECOLOGICAL COMPONENT</p> <p>(a) Identification of bottlenecks for the physical –ecological component</p> <p>(b) Identification of constraints for the physical –ecological component</p> <p>(c) Definition of thresholds for bottlenecks and constraints. Maximum but also minimum values need to be identified</p> <ul style="list-style-type: none"> • Selection of indicators • Definition of desired level of each indicator/ thresholds. Standards related to the capacity of the physical environment, to the construction of tourist accommodation establishments and facilities, to protection against various forms of pollution, infrastructure and transportation standards can be very useful. Where standards exist the monitoring of indicators is done relative to the established standards 	<p>DEFINITION OF TCC FOR THE SOCIO-DEMOGRAPHIC COMPONENT</p> <p>(a) Identification of bottlenecks for the socio-demographic component</p> <p>(b) Identification of constraints for the socio-demographic component</p> <p>(c) Definition of thresholds for bottlenecks and constraints. Maximum and/or minimum values could be identified.</p> <ul style="list-style-type: none"> • Selection of indicators • Definition of desired level of each indicator/ thresholds. For example a ratio of visitors/local population is occasionally used. 	<p>DEFINITION OF TCC FOR THE POLITICAL –ECONOMIC COMPONENT</p> <p>(a) Identification of bottlenecks for the political-economic component</p> <p>(b) Identification of constraints for the political-economic component</p> <p>(c) Definition of thresholds for bottlenecks and constraints. Maximum but also minimum values can be identified. I.e. in Malta an increase in foreign exchange earnings from tourism by a minimum average annual increase of 6%. was suggested</p> <ul style="list-style-type: none"> • Selection of indicators • Definition of desired level of each indicator/ thresholds.
<p>ELABORATION OF ALTERNATIVE TOURISM DEVELOPMENT OPTIONS AND ALTERNATIVE COURSES OF ACTION</p> <p>Alternative “development options and courses of action” (Options) comprise two kind of components:</p> <ul style="list-style-type: none"> • <u>Constant</u> components: constraints (remain unchangeable in the various options) • <u>Flexible</u> components: bottlenecks (changeable given the various courses of action). For ex. the capacity of a beach may not necessarily pose restrictions on the number of beds, given that new activities in the hinterland are provided for tourists, etc. <p>(a) Formulation of goals and objectives. Goals are important in planning for tourism development by giving broad directions and clarifying that some aims are more important than others. Furthermore the establishment of priorities is important to the concept of capacity and will determine whether some obstacles can be overcome in pursuit of objectives. In the light of goals and objectives, management parameters can be introduced to reduce impacts.</p> <p>(b) Elaboration of alternative course of actions, taking into account future trends and prospects for tourism development.</p>		

- (c) **Analysis/ assessment of the impacts of the various Options for each of the three components** (costs related to envisaged projects, measures).
- (d) **Definition of optional values of the carrying capacity, of each one of the components for each Option**
- (e) **Selection of preferable Option**
- (f) **Elaboration of Strategy for tourism development**

DEFINITION OF TOTAL CARRYING CAPACITY FOR THE SYSTEM

- (a) **Definition of the flexible parameters (bottlenecks) for the preferable Option.**

Total TCC does not necessarily have to take the form of unique numerical value, resulting from a “calculation” of the various TCC for each component. At this stage having selected the desired Option it would be possible to identify the final key factors and therefore the thresholds and indicators to be considered. It may be possible that only one proves to be the real key factor and therefore Total TCC of the whole system coincides with for example the TCC of the physical-ecological component. Such cases will be presented in various case studies in the Report “Material for a Document”.

IMPLEMENTATION OF TOTAL CARRYING CAPACITY

- (a) Elaboration of TCC policy measures
- (b) Selection of final list of indicators for the constraints and bottlenecks identified.
- (c) Definition of thresholds- standards.

B.3. Application of Tourism Carrying Capacity

B.3.1 Issues to be considered

Carrying capacity is a powerful concept for policy making although from a scientific perspective it has met with considerable controversy due to the analytical difficulties in arriving at a “calculated” capacity (threshold or limit). This difficulty stems from the multiple dimensions of the concept and the inherent constraints in estimating limits in natural and human ecosystems. Getz (1987) identified six different approaches of interpretations or methods of determining carrying capacity: Tangible Resource Limits, Tolerance by the Host Population, Satisfaction of Visitors, Excessive Rate of Growth of Change, Capacity based on the evaluation of costs and benefits, The role of Capacity in a Systems Approach. In recent literature the interest on carrying capacity has shifted from an “objectively” assessed threshold to –policy useful- *desired conditions* providing more advantages to planning and decision making. Alternative concepts have been also suggested in the spirit of *management-by-objectives approaches* such as Visitor Impact Management, Limits of Acceptable Change, Visitor Experience Resource Protection frameworks, instead of TCC.

There is a growing concern for developing and utilising tools that could facilitate planners and decision- makers in their efforts to control tourism development. However, there is limited, almost non-existent, experience not only in implementing tourism carrying capacity but also in measuring it. Within this context the following should be taken into account:

Spatial considerations

Carrying capacity is easier to be defined in limited well-defined areas. In addition TCC could vary among the different parts of an area (ex. centre of the town vs. surrounding areas, or in various sub-areas within ecologically sensitive areas, etc). In some cases it could be that entire regions can be considered as for example in the case of islands or river valleys, etc. Through planning tools, such as zoning, and management techniques, such as visitor flow management, the impacts of tourism (therefore the capacity of an area to sustain tourism: TCC) can be mitigated.

The role of Actors

- Effective implementation depends on the political will to impose rules on the way tourism develops, as for example, to control access to a destination in order to protect it. Within this context the development of appropriate institutional measures/mechanisms is absolutely essential. An effective legal framework could help to reduce/mitigate the negative impacts from tourism.
- Consensus of key stakeholders over the definition of TCC is critical. An agreement on the goals of tourism development will be necessary. The results of the TCC study

should be communicated to stakeholders, local people and users who will have to support the implementation of envisaged measures.

The participation of tour Operators is essential too in those cases where they may have a prominent role (i.e. mass tourism destinations, as coastal zones)

- The implementation of carrying capacity needs to take into consideration *cultural elements*

Integrating TCC in planning process and institutional context

- Carrying capacity studies have to be incorporated in a plan for sustainable development although this is not a prerequisite in order to employ TCC. Consensus among the various stakeholders over a strategic vision of the area could be helpful.
- TCC should be incorporated in the institutional framework

Evaluation-Monitoring

- Carrying capacity needs to be flexible and reflect the particularities of the area under study. Systems are dynamic, therefore are subjected to continuous changes. Visitors and local communities, for example, tend to alter their behaviour over time and often adapt to worsening or different conditions, resulting to a different social response.
- There is a need for monitoring but also for credible data and information in order to assess and implement carrying capacity. In that sense significant resources will be required in the initial stage but also during implementation. *Demand* needs to be monitored as well.

B.3.2 Constraints and common pitfalls in implementing TCC

- The changing role of the state. In a market economy, the private sector is expected to undertake increasingly the responsibility or initiative of nature/environmental protection or local identity enhancement. In some countries for example forests are privatized. This may probably lead to an increase in pressure, since recreational activities may grow and expand in order to increase profits.
- Action is generally encouraged at local and national level, while several environmental problems are transnational. Managing pressures at local level often requires policies at a higher level.
- Synergies are often overlooked as a result of fragmentation of responsibilities. An integrated approach in planning and management could provide a good basis.
- Several rather sophisticated systems have been developed in order to measure Carrying capacity. However the final number provided doesn't prove to be always useful and the confusion over alternative measures might discourage managers and policy makers. Furthermore limited effort and resources have been given for the implementation of TCC assessments. The promotion of more pilot projects at European level is necessary including the dissemination of experiences over the use of TCC or its components in managing tourism.

B.3.3 Institutional tools to implement TCC

At European level there are several instruments that may encourage and facilitate the application of tourism carrying capacity.

There are opportunities to include TCC (as guidelines) in existing interventions and tools which are well accepted :

- *Natura 2000*, the *Habitat Directive* and the *Red Lists* are valuable instruments for nature protection and for defining CC levels for ecological sensitive sites so as to limit tourist development. Of significant value can be corresponding institutional approaches like *Emerald Network*, *UNESCO World Heritage* and *Biosphere Reserve*, *Ramsar Convention*, which set as a priority the protection of these areas
- Rely on the *Compensation Principle*. It is one of the ways to put priorities on capacity considerations, as for example in the case of TGV construction in France, by assigning nature a price in order to protect it.
- Tourism carrying capacity as a required concern in *Environmental Impact Assessment*. It should be applied to proposed development projects and programmes in order to evaluate the potential impacts in light of forecasted tourism growth and peak demand. Alternative sites for development should be considered, taking into account local constraints and carrying capacity limits.
- TCC could be a central concern required in *SEA* (Strategic Environmental Assessment) since this reflects anticipating development on the basis of the capacity of local systems to support it.

B.3.4 Management tools for implementing TCC

Regulatory

- *Zoning* is a rather useful tool, easy to be applied. It is applied mainly in protected areas, since their special status allows the definition and delimitation of zones where protection, conservation and limitations in the various uses are imposed. A typical division in zones is the following:
 - Zone A – Most valuable and vulnerable. Entry only to authorised scientific teams
 - Zone B – Highly sensitive. Escorted visits in small groups
 - Zone C – Considerable natural interest. Some traditional and tourism activities, limited car access
 - Zone D – Mild development and buffer: Tourism and visitor facilities, car access and parking, compatible activities
- *Limits to free access*. It could help significant environmental protection. However, many European laws protect free access. It is not possible to discriminate people on the basis of various factors (ex. cartavenezia). Imposing limits to accessibility is allowed only in certain cases like the application of International Conventions.
- *Limits to specific activities*. All kinds of tourist activities have to be evaluated in order to prevent impacts on the environment or conflicts among different users. Special

permits or the application of EIA are not foreseen in the case of new forms of activities as in the case of infrastructure development. Some activities may be forbidden given particular conditions, while others may be just limited to certain periods of the year or to a limited number of users. For example paragliding is forbidden in some French National Parks because it disturbs fowls .

- *Eco-labels*. The use of eco-labels in tourist hotels and other public establishments had a little overall effect on resource consumption and waste production.
- *Concentration or dispersion of development pressures and tourist flows*. From an environmental point of view concentration is not always the best approach to manage tourist flows. Dispersal is preferable, because externalities appear only when the system reaches certain levels of thresholds. However it is also a matter of choices: is it better to concentrate tourists or to disperse them? Alternatively, could it be better to promote the creation of several poles of tourist development? The concept of carrying capacity can be applied in all three cases. However even in cases where a plan for tourism dispersion exists, it would be difficult to manage and guide tourist's flows.
- *Land use/spatial planning* is a process par excellence to implement carrying capacity assessment in the case of islands and coastal areas, while for the areas with ecological value institutional mechanisms seem to be a more appropriate way in order to ensure protection. As far as historical centres, where the pressure is not from land development, the management of flows could prove to be a more suitable way to go. However, attention needs to be placed on the changes of the functions/uses within the cities

Economic

- *Pricing* It is not always the most appropriate tool to use in order to limit/control tourism development /growth. In the case of Venice such a policy is expected to penalise tourists and not excursionists, who do not consist a preferable target group. Imposing such a policy selectively to certain groups (i.e. lower prices for residence) is against European laws, since it implies discrimination. However, there are occasions when pricing for parking and entry to major attractions should be imposed in order to discourage visitors. Although pricing is considered, as the least desirable solution, it remains the most effective at least in the short-term.
- *Taxes* may be used as a way to incorporate in prices various externalities like environmental destruction. Increased prices can discourage tourists and entrepreneurs as well.
- *Cost-benefits analysis* should be conducted in the different phases of the life-cycle of a tourist destination. Costs are always higher in the earlier phases of tourist development.
- *Incentive schemes* should be applied in both public and private sectors in order to spread tourism demand over time and space and optimises the use of accommodation.

Organisational

- *Reservation and booking systems*. They facilitate management of both tourists and excursionists flows. In Venice, for example, the promotion of the Venice card, which corresponds to a package of services facilitates management of tourist's flows. In this

case it is also possible to introduce taxes in a more equitable way, because the Venice card is available to everyone. People who use this card can also benefit from discounts on local transportation, and entry fees to museums and other facilities. The only condition is advance booking. However the use of such system may encourage social inequalities since the cost for visiting such places would be affordable only to specific groups. One should also be aware of the possibility of the creation of a “black market”. The possibility of introducing a corresponding package for excursionists should also be explored.

- *Information management* In Venice information in respect to congestion, peaks, traffic, etc is constantly provided through the web site. This is a way to discourage tourists from visiting Venice and avoid as a result overcrowding.
- *Education* of local community in order to gain their support for implementing TCC is essential.
- *Training* of local planners- managers in the use of various techniques, etc.
- *Market control*. At present there is little co-ordination between management, planning and tourism marketing. Sophisticated marketing and communication allows marketers to pursue particular market segments and to undertake promotions for periods in which there is available carrying capacity. Tour operators could play an important role in managing environmental impacts and maintaining the sustainability of tourism through promoting activities and other actions. (See tour operators project of UNEP)

B.4. Indicators

Indicators provide significant opportunities for defining and implementing TCC, a process which does not necessarily have to follow the steps described in figure 1 and therefore have as a prerequisite the existence or the elaboration of a strategy for the development of tourism. Evidence from practice (see Material for a Document) indicates that in several cases a core set of indicators, reflecting pressures and state of key factors (i.e. endemic and threatened species), has been used as a way to monitor the state of the system and identify the violation of tourism carrying capacity limits. Changes could guide the identification of carrying capacity limits, which are not necessarily defined in advance. The implications of indicator's measurement need to be examined in terms of the goals that have been defined and the sensitivity of the sites under study. The use of indicators as a way to identify and define TCC limits is a simpler and more flexible approach compared to the process described in figure 1. It could be also effective in the short term, enabling managers to confront increasing pressures from tourism development. This kind of approach has been witnessed in the cases of natural parks and generally areas with high ecological value.

In conclusion, indicators are essential, but not the only building block for managing tourism development.

Within this context three types of indicators are suggested reflecting on the components of TCC:

1. Physical –ecological indicators
2. Socio-demographic indicators
3. Political –economic indicators

In the following tables (1 to 3) the main topics/thematic areas (i.e employment, demography) addressed by the indicators are presented.

Table 1

<i>PHYSICAL-ECOLOGICAL INDICATORS</i>						
THEMATIC AREAS	Coastal area	Islands	Protected areas	Rural areas	Mountain resorts	Urban, historic
Natural environment and biodiversity	H	H	H	H	H	
Air Quality			H			H
Noise Pollution			H		H	H
Energy		H				
Water	H	H	H		H	H
Waste	H	H		H	H	H
Cultural heritage	H	H	H	H	H	H
Tourist infrastructure	H	H	H	H	H	H
Land	H	H	H		H	H
Landscape	H	H		H	H	
Transport and mobility					H	H

H = High priority

Table 2

<i>SOCIO-DEMOGRAPHIC INDICATORS</i>						
THEMATIC AREAS	Coastal area	Islands	Protected areas	Rural areas	Mountain resorts	Urban, historic
Demography		H	H	H	H	
Tourist flows	H	H	H		H	H
Employment	H	H		H	H	
Social behaviour		H		H	H	
Health and safety	H	H		H		H
Psychological issues	H		H	H	H	

H = High priority

Table 3

<i>POLITICAL-ECONOMIC INDICATORS</i>						
THEMATIC AREAS	Coastal area	Islands	Protected areas	Rural areas	Mountain resorts	Urban, historic
Tourism earnings and investments	H	H		H	H	H
Employment	H	H		H	H	
Public expenditure and revenue	H	H		H	H	H
Policy for tourism development	H	H	H	H	H	H

H = High priority

Each one of the thematic areas can be represented by more than one indicator following the logic of the framework of DPSIR (figure 2). Within this context indicators to measure

- pressures and stresses,
 - the state of the natural environment and of the resources,
 - impacts and consequences,
 - the effectiveness of management efforts and implemented actions
- need to be developed/used.

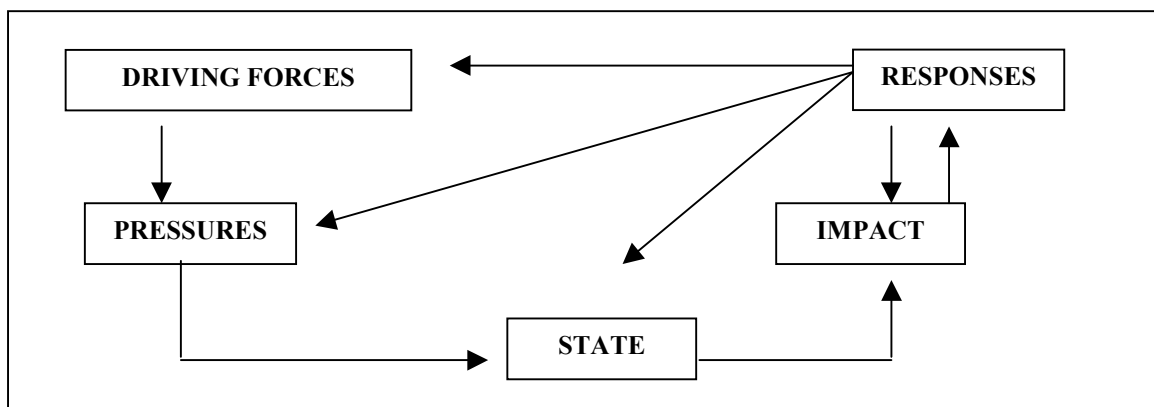


Figure 2

In the tables 4 to 6 indicators for each one of the thematic areas are described. Indicators are furthermore divided into three major categories:

1. ***Sustainability Indicators,***
2. ***Sustainable Tourism Indicators*** and
3. ***Tourism Carrying Capacity Indicators.***

Sustainable Tourism indicators are directly linked with the definition and implementation of TCC. They aim at describing the general relationship between tourism and the environment, the effects of environmental factors on tourism, the impacts of the tourism industry on the environment and the responses required for promoting and safeguarding a more sustainable development of tourism and recreational activities. Sustainability indicators are also useful since they provide an overall indication of the state of the system in respect to sustainability. Tourism Carrying Capacity indicators aim at describing the pressures that are exerted, the state of the system and the impacts from tourism development. However in this case only the *key* factors, problems, etc are considered.

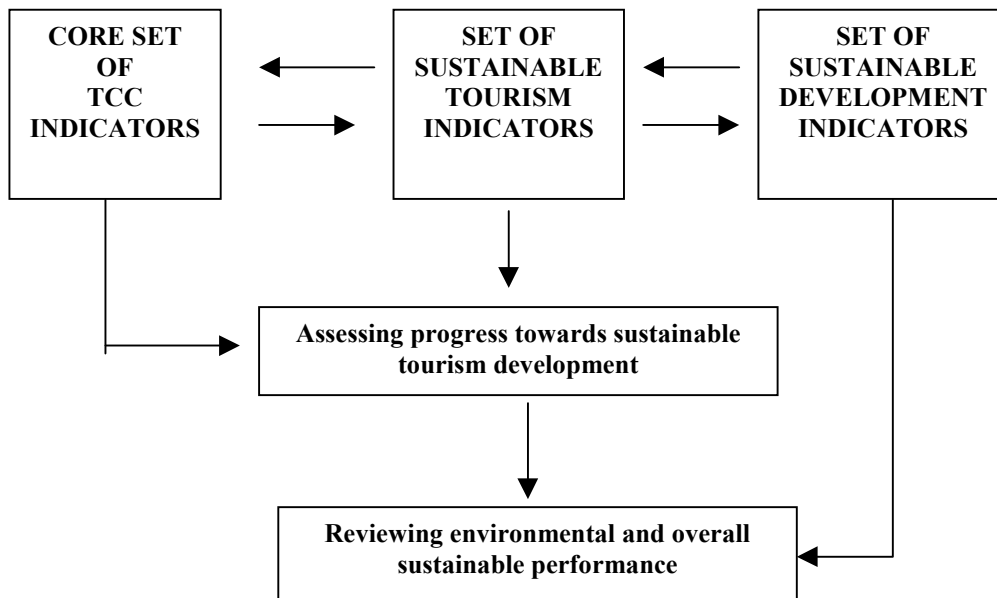


Figure 3

The following list of indicators (as presented in tables 4-6) is neither exhaustive nor mandatory. Planners and decision-makers could select some of the suggested indicators on the basis of local particularities and priorities and formulate a new set of indicators for TCC.

SPECIAL NOTE

It is obvious that the last column (Tourism Carrying Capacity Indicators) consists of elements of the other two columns (Sustainable Indicators, Sustainable Tourism Indicators) since it tries to put tourism in the context of the capacity of local systems to sustain development

INDICATIVE LISTS

Table 4

PHYSICAL-ECOLOGICAL INDICATORS			
ISSUES	SUSTAINABILITY INDICATORS	SUSTAINABLE TOURISM INDICATORS	TOURISM CARRYING CAPACITY INDICATORS <i>(see Special Note, par. B4)</i>
1. Natural environment and biodiversity			
1.1. Ecosystems <i>1.1.1. Ecological destruction, beach degradation, etc</i>	-Total area of natural and semi-natural areas -Surface of natural and semi-natural areas/Total area		
	Percentage of natural areas: <ul style="list-style-type: none"> • in good condition • heavily degraded 	-Change in vegetation cover due to tourism activities -Change in biodiversity due to tourism/recreation activities	
		-Change of critical areas due to tourism development -Length of unspoiled coastline/total length of coastline -Length of artificialised coastline/total length of coastline -Beach length/total length of coastline	-Area of key ecosystems (wetland, forest, etc)/total area
<i>1.1.2. Disruption –loss of fauna and flora</i>	-Number of endemic and threatened species -Number of endemic species/ Number of endemic species at national level		
	Area occupied by endemic or threatened species/total land (%)		

PHYSICAL-ECOLOGICAL INDICATORS			
ISSUES	SUSTAINABILITY INDICATORS	SUSTAINABLE TOURISM INDICATORS	TOURISM CARRYING CAPACITY INDICATORS <i>(see Special Note, par. B4)</i>
<i>1.1.3. Overcrowding</i>			Number of tourists per <ul style="list-style-type: none"> ▪ km of (accessible) coastline ▪ sq m of (accessible) coast ▪ sq. km of natural site
1.2. Protection	-Percentage of areas under protection status (protected land/ total land) -Protected land of various key ecosystems (wetland, forest, etc)/ total key ecosystem land (i.e. protected forest land/total forest land) -Protected Areas as % of Threatened		Number of tourists/ protected key ecosystems surface
2. Cultural heritage			
		Loss or degradation of built structures and other archaeological or historical sites due to tourism development	
		Degradation of aesthetic values	
3. Tourist infrastructure			
			Tourist beds/ permanent population
		Number of bed places per tourist accommodation type /total number of bed places	
		Percent occupancy of key facilities	

PHYSICAL-ECOLOGICAL INDICATORS			
ISSUES	SUSTAINABILITY INDICATORS	SUSTAINABLE TOURISM INDICATORS	TOURISM CARRYING CAPACITY INDICATORS <i>(see Special Note, par. B4)</i>
		Tourist accommodation units that have been awarded with an eco-label (recognised at international, EU, national, regional or local level), that follow eco-audit, etc/total tourist accommodation units	
4. Air quality			
	Average number of days in which pollution standards are exceeded per year		Average number of days during tourist season in which pollution standards are exceeded per year
	Level of pollution due to exhaust fumes per year		
5. Noise pollution			
	Average number of days per year where noise pollution standards are exceeded (number of reports)		Average number of days during tourist season where noise pollution standards are exceeded
6. Energy			
6.1. Energy consumption	Per capita consumption of energy (from electric power and petrochemical fuels)	Average annual consumption of energy/ average consumption during tourist season	
	Energy consumption per source (from renewable and non-renewable sources)/ total energy consumption)	Energy consumption of tourism related activities/ total energy consumption • Annual • Monthly	Energy consumption of tourism related activities/local capacity for energy supply

PHYSICAL-ECOLOGICAL INDICATORS			
ISSUES	SUSTAINABILITY INDICATORS	SUSTAINABLE TOURISM INDICATORS	TOURISM CARRYING CAPACITY INDICATORS <i>(see Special Note, par. B4)</i>
		Consumption of energy from renewable sources/ total consumption of energy (in tourist units)	
		Preventive actions for minimising energy consumption for clients	
6.2. CO₂ emissions	- Total CO ₂ emissions per year - CO ₂ emissions per capita	CO ₂ emissions of tourism related activities/ total CO ₂ emissions (per year)	
	CO ₂ emissions for each type of fuel sources (GPL, natural gas, electric energy, etc)/total CO ₂ emissions		
7. Water			
7.1. Water consumption	Water consumption/ resident / day	Water consumption per bed or per tourist/day	
	-Seasonal withdraws/ seasonal available resources (Seasonal exploitation index of water resources) -Water consumption per sector (industry, tourism related activities, primary, etc)/ total consumption		Water consumption of tourism related activities/total consumption
	Abstraction/ renewable water resources	Average water consumption during peak season / average annual water consumption	Water consumption of tourism in respect to total available resources
	Water consumption /Water supply (Unaccounted for water)	Tourist beds in tourist units where practices for water consumption minimisation are followed/total tourist beds	

PHYSICAL-ECOLOGICAL INDICATORS			
ISSUES	SUSTAINABILITY INDICATORS	SUSTAINABLE TOURISM INDICATORS	TOURISM CARRYING CAPACITY INDICATORS <i>(see Special Note, par. B4)</i>
7.2. Water quality			
7.2.2. Water quality	Percentage of water samples under the quality standard at the water treatment outflow site per year	Cleanness index of the water available in tourist complexes (is the water drinkable or not?)	
			Percentage of coastal water quality samples, which conform with bathing quality standards per year
		Index of the number of pollutants (coliform bacteria and concentration of heavy metals)	
7.2.1. Water management	Wastewater undergoing first, second and third stage treatment/total wastewater	Annual cost of water supply/ number of tourist	
		Annual cost of drinking water supply/ number of tourist	
8. Waste			
8.1. Waste production			
8.1.1. Solid waste production	Daily solid waste production per capita	Daily solid waste production per tourist	Daily average solid waste production in peak period/ daily annual average solid waste production
	% composition of waste (organic, plastic, metal, etc)	% composition of waste during peak season	
8.1.2. Liquid waste production	Daily liquid waste production/person		Daily average liquid waste production in peak period/ daily annual average liquid waste production

PHYSICAL-ECOLOGICAL INDICATORS			
ISSUES	SUSTAINABILITY INDICATORS	SUSTAINABLE TOURISM INDICATORS	TOURISM CARRYING CAPACITY INDICATORS <i>(see Special Note, par. B4)</i>
8.2. Waste management			
8.2.1. Solid waste management	Solid waste disposal for each treatment type (incinerator, landfill, recycling, reuse)/ total solid waste	Tourist units (tourist beds) that follow recycling or waste minimisation approaches/total tourist units (total tourist beds)	Daily solid waste production during peak season/ Daily solid waste collection capacity or capacity of the disposal systems
	Solid waste collection or landfilling capacity/day	Recyclable waste produced in tourist units/total waste produced in tourist units	
	Percentage of persons served by organised and hygienic solid waste management systems	Existence of preventive actions for clients with the scope of minimising solid waste productions	
		Cost of waste management/number of tourist	
8.2.2. Liquid waste management	Liquid waste treatment capacity/day	Share of tourist beds in tourist units that have their own waste water treatment plant	Daily liquid waste production during peak season/ Daily liquid waste treatment capacity
	Share of local population served by waste water treatment plants		Share of tourist beds in TU served by waste water treatment plants
	Share of collected and treated wastewater by the public/private sewerage system	Cost of liquid waste management per number of tourist	
9. Land			
9.1. Land use			
9.1.1. Intensity	Urbanised land/ total land		Urbanised land for tourism (second houses, hotels, recreation centres, etc)/ total urbanised land
	Green area ratio per person in (sq. m./per capita)	Number of secondary houses/ total houses	

PHYSICAL-ECOLOGICAL INDICATORS			
ISSUES	SUSTAINABILITY INDICATORS	SUSTAINABLE TOURISM INDICATORS	TOURISM CARRYING CAPACITY INDICATORS <i>(see Special Note, par. B4)</i>
		Percentage of land use per sector	Density of tourism development (No. of beds/ tourism urbanised land)
9.1.2. Changes	%of land abandonment in the last decade	Loss of agricultural, forest, wetland land, etc., in the last decade due to tourism development % of natural area spoiled by skiing activities/facilities	
9.2. Soil erosion	Eroded land/ total land		Rate of coastal erosion
10. Landscape			
<i>10.1.Loss of aesthetic values</i>		Average and maximum height of construction	
		Configuration of the land and the architectural aspects	
11 Transport and mobility			
11.1. Accessibility <i>(loss of access to key sites)</i>		Seasonal day average traffic (no. of domestic and international flights, no. of boats arriving, no. of cars, etc)/ annual day average traffic	-Average distance and time per tourist to reach the destination -Waiting time to use facilities (i.e. waiting time at ski lifts, museums entrance, etc)
11.2. Infrastructures	-Road density (road length / total area) -Telecommunication networks		Number of parking places/ average number of cars per day, coaches etc in critical areas (i.e. along a beach, historic centre, etc)
11.3. Mode of transportation		People using public transport / resident population + tourists	
11.4.Safety		Accident levels: Distribution of the number of car/water related, etc accidents during the year	

Table 5

<i>SOCIO-DEMOGRAPHIC INDICATORS</i>			
ISSUES	SUSTAINABILITY INDICATORS	SUSTAINABLE TOURISM INDICATORS	TOURISM CARRYING CAPACITY INDICATORS <i>(see Special Note, par. B4)</i>
1. Demography			
	Population growth rate , age structure		
	Population density (persons/km ²)		
2. Tourist flow			
			Tourists/inhabitants: • Max value (peak period) • Min-Average value
			Number of beds places per 100 inhabitants
			Number of over-nights per 100 inhabitants
			Number of arrivals per 100 inhabitants
			Number of tourists per square meter of site/ key area (i.e. beach, square, museum, natural/cultural site, etc.): • Max value (peak period) • Min-Average value
			Tourists/ territory surface: • Max value (peak period) • Min-Average value
			Tourists/ month (distribution during the year)
3. Employment			
	Employment record in traditional activities (agriculture, fishing, etc)		Tourist bed places/ local people employed

<i>SOCIO-DEMOGRAPHIC INDICATORS</i>			
ISSUES	SUSTAINABILITY INDICATORS	SUSTAINABLE TOURISM INDICATORS	TOURISM CARRYING CAPACITY INDICATORS <i>(see Special Note, par. B4)</i>
	Decrease in employment in traditional activities (i.e. agriculture, fishing)	Part-time or seasonal employment/ employment throughout the year	
			Migrant labour/ local population Comparison with national average
4. Social behaviour			
	Number of marriages compared to national average	Percentage of tourists understanding/using language of the destination	
	Number of divorces compared to national average	Number of mixed couples compared to national average	
		Rate of school abandonment	
5. Health and safety			
5.1. Health		Average first aid emergencies during tourist season /annual average	
5.2. Criminality	Crime levels: Distribution of the number of crimes reported (theft, assault) during the year	No. of crimes in which tourists were involved/ total no. of crimes -No and type of crimes against tourists	
6. Psychological issues			
6.1. Tourists satisfaction's level			Number of tourists' complaints
		Rate of tourists satisfied from their vacation	

<i>SOCIO-DEMOGRAPHIC INDICATORS</i>			
ISSUES	SUSTAINABILITY INDICATORS	SUSTAINABLE TOURISM INDICATORS	TOURISM CARRYING CAPACITY INDICATORS <i>(see Special Note, par. B4)</i>
<i>6.2. Residents satisfaction's level</i>		Rate of residents satisfied with current level of tourism development	Number of residents' complaints (i.e. from noise)
		-Number of retail establishments/number of establishments serving local needs (as opposed to tourists) -Number of local establishments open year –around/total number of local establishments	
			Rate of residents which benefit from tourism (local employers + local employees /total population)
			Displacement of members of local population due to tourism development

Table 6

<i>POLITICAL-ECONOMIC INDICATORS</i>			
ISSUES	SUSTAINABILITY INDICATORS	SUSTAINABLE TOURISM INDICATORS	TOURISM CARRYING CAPACITY INDICATORS <i>(see Special Note, par. B4)</i>
1. Tourism earnings and investments			
		Ratio of net foreign exchange earnings relating to the tourist investments or to the functioning of tourist activity	
		Inflow earnings from expenditure prior departure	
		Per capita tourists' expenditure during stay	
		Tourism receipts (in absolute terms)	
	Average per capita income of resident population		Average per capita income in catering and tourism
2. Employment			
	Employment by economic sector	-Average annual employment (directly or indirectly) in tourist sector/ total employment	
	Unemployment ratio Number of unemployed residents	Number of seasonal workers	Percentage of seasonal labour force in the total number of workers employed in tourism
3. Public expenditure and revenue			
	Public expenditure on <ul style="list-style-type: none"> • conservation and value enhancement of natural, cultural and historic patrimony • protected area management /total public expenditure	<ul style="list-style-type: none"> - Tourist tax revenue/ total tax revenue - Tourist tax revenue/ public expenditure for tourism development 	

<i>POLITICAL-ECONOMIC INDICATORS</i>			
ISSUES	SUSTAINABILITY INDICATORS	SUSTAINABLE TOURISM INDICATORS	TOURISM CARRYING CAPACITY INDICATORS <i>(see Special Note, par. B4)</i>
			Differences in land prices compared with no tourist areas
			Contribution of tourism to GDP (in %) of the area
		Share of tourism receipts in import	
4. Policy			
<i>4.1. Regulatory / planning context</i>		Presence of tourism restriction measures Regulations and standards in force	
		Presence of zoning measures Presence of land use plans	
<i>4.2. Management</i>		Programs/projects for sustainable tourism/total projects	
			Existing economic and other tools to control tourism development
		Awareness campaigns for tourists and local population	
<i>4.3. Organizational aspects</i>		Presence of services, necessary to support tourism	Scientific and technical personnel in local community capable to manage problems due to tourism development

ANNEX I

CONSULTED JOURNALS AND OTHER DOCUMENTS

- Annals of Tourism Research
 - Environmental Conservation
 - GeoJournal
 - Interpretation
 - Landscape and Urban Planning
 - Leisure Science
 - Ocean and Coastal Management
 - Reveu d'Economie Regionale et Urbaine
 - Socio-Economic Planning. Science
 - Progress in resource management and environmental planning
 - Progress in tourism and hospitality research
 - Proceedings of the World Conference on Sustainable Tourism, Lanzarote,
 - Proceedings of the International Conference on Sustainable Tourism, Rimini (to be published)
 - Tourism geographies
 - Tourism Management
 - Travel and Tourism Analyst,
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- UNEP/MAP/PAP publications
 - WTO publications
 - EEA publications
 - OECD publications

ANNEX II

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ANNEX III

INTERNET SITES

Research Institution/ Universities

- Centre for Tourism Policy and Research (www.rem.sfu.ca/tourism/index.html)
- International Center of Studies on the Tourist Economy (helios.unive.it/~ciset/)
- Tourism Research (www.geocities.com/Paris/9842/tourism.html)

Tourism Boards/ Authorities

- Agenda21 Baltic Sea Region - Tourism (www.surfnet.fi/agenda21/)
- Countryside recreation Network (www.countrysiderecreation.org.uk)
- Finnish Tourist Board (www.finland-tourism.com/mek_page1.html)
- French General Secretariat of Tourism, direction of Tourism (www.tourisme.equipement.gouv.fr/)
- North America Commission for Environment Cooperation (www.cec.org)
- Office of Tourism and Sport, New Zealand: (www.otsp.govt.nz)
- Observatoire National du Tourisme (www.ont.asso.fr/gbefault.htm)
- Parks Canada Web site (www.parkscanada.gc.ca)
- Scottish Natural Heritage (www.snh.org.uk)
- Swedish Tourist Authority (www.tourist.se)

Associations/ Organizations

- Alpine Network of Protected Areas (alparc.ujf-grenoble.fr/800-index.phtml)
- Association for Heritage Interpretation (www.heritageinterpretation.org.uk)
- Commission Internationale pour la Protection des Alpes (www.cipra.org)
- ECONETT (www.greenglobe.org/econett.htm)
- Equations in Bangalore (www.equitabletourism.org)
- English Heritage (www.english-heritage.org.uk)
- European Coastal Guide (www.coastalguide.org)
- International Centre for Integrated Mountain Development in Kathmandu Nepal (www.icimod.org.sg)
- IUCN (www.iucn.org)
- Ordeniamento Ecologico (www.ine.gob.mx)
- Touring Club Italiano (www.touringclub.it/)
- Tourism and Environment Forum (www.greentourism.org)
- UNESCO (www.unesco.org)
- World travel and Tourism Council (www.wttc.org/)
- World Tourism Organization (www.world-tourism.org/)
- WWF International (www.panda.org)

Tools and Indicators

- Recreation Indicators (www.sustainable.measures.com/Database/Recreation.html)
- The Limits of Acceptable Change (www.western.edu/envs/black/lac.html)