

UNIVERSITY OF THE AEGEAN • DEPARTMENT OF ENVIRONMENTAL STUDIES

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



Material for a Document



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The Report “Material for a Document” presents the findings from the Study “Defining, Measuring and Evaluating Carrying Capacity in European Tourism Destinations” (Contract number: B4-3040/2000/294577/MAR/D2), which was commissioned to the Environmental Planning Laboratory by the European Commission, Directorate-General for Environment, Nuclear Safety and Civil Protection.

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Executive Summary

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. It is based on the analysis of key limiting factors for tourism development for different types of tourist destinations in the EEA countries (*coastal areas, islands, protected areas, rural areas, mountain resorts, historical settlements*) in respect to carrying capacity components (*physical-ecological, socio-demographic, political-economic*). The analysis was based on the review of theory and of *case studies*, several of which are presented in this Report. Furthermore measures for implementing carrying capacity assessment for the different type of destinations are presented. In addition various other actions implemented in order to promote sustainable tourism in the EEA countries (members of EU, Norway and Iceland) but also in non EEA countries (selected case studies) are included.

For years European countries have been the primary destinations for tourists, receiving, according to WTO, 60% of all international arrivals. France, Spain, Italy, United Kingdom and Austria are placed among the ten most popular world tourist destinations. Tourism development is particularly important for the Mediterranean region and the Alps. Coastal areas, islands, protected areas, rural areas, mountain resorts and historical settlements are the most popular tourist destinations.

Each one of these resorts is confronting different problems. Although in all cases management of tourism growth is necessary, the focus of policy measures in each case may be different.

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 urbanisation, 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 type is mass tourism associated with large numbers of visitors centering around monuments, museums, etc. often of a short stay (even daily visits).

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.

In considering carrying capacity, the three components (physical-ecological, socio-demographic, political-economic) acquire different weight 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 tourism development (spatial patterns), the phase in a life-cycle context of the destination, the level of organisational 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 definition-assessment and implementation of Tourism Carrying Capacity (TCC) needs to be considered as a process within a planning process for tourism development. These two processes are parallel and complementary and can provide a general framework guiding local community, planners and decision-makers. This framework consists of principles, goals, objectives and policy measures in regard to tourism development in an area on the basis of the area's distinctive characteristics/features respecting local capacities to sustain tourism.

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.

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).

In any case Tourism Carrying Capacity needs to be regarded as a management tool and not only as a numeric value.

The process of defining TCC can include the following steps:

1. Analysis of the characteristics of the system
2. Analysis of tourism development.
3. Implications of tourism development for each one of the three components
4. Identification of driving forces-Causes

5. Assessment of the state of each component. Identification of impacts, problems, threats, conflicts, etc
6. Definition of TCC for each component. Identification of bottlenecks, constraints. Selection of indicators (initial list) definition of thresholds
7. Elaboration of alternative Tourism Development options and alternative courses of action, analysis of impacts, selection of preferable option, elaboration of a Strategy
8. Definition of Total Carrying Capacity for the System on the basis of the preferable option
9. Implementation of Total Carrying Capacity. Selection of a final list of indicators.

The implementation of TCC remains the most critical phase and several issues such as spatial considerations, the role of actors, integration of TCC in the planning process and the institutional context, evaluation and monitoring, need to be carefully considered.

The use of various tools such as institutional and management tools (economic, organisational, etc) can be very helpful. Indicators provide significant opportunities for defining and implementing TCC. Evidence from practice indicates that in several cases a core set of indicators, reflecting pressures and state of key factors has been used as a way to monitor the state of the system and identify the violation of tourism carrying capacity limits.

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

For each one of the above categories three other types of indicators are identified: *Tourism Carrying Capacity Indicators*, *Sustainable Indicators* and *Sustainable Tourism Indicators*.

Introduction: 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).(See also "Final Report")¹

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). Review of case studies where TCC has been implemented.
- 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. The Committee is composed of three experts:
 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*

A Workshop with the participation of the Expert Committee and two invited experts: *Prof. Michael Scoullas*, University of Athens, Mediterranean Information Office for Environment, Culture and Sustainable Development (MIO-ECSDE) and Mr. *Thymios Papayiannis*, Senior Advisor on Mediterranean Wetlands, Med-Wet, was organised at the end of phase A. The invited experts presented their experience on the different types of tourism destinations (rural areas, natural areas, historical centers, etc) the problems

¹ In addition to the "**Material for a Document**" another Report under the title "**Final Report**" has been prepared, presenting only the methodological aspects of defining and implementing TCC.

related to tourism flows, the limiting factors for tourism development and environmental thresholds.

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.

The approach followed included:

- 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 Study team. 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 (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.
- Internet survey: 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. (for a detailed presentation of the Internet sites consulted see Annex III)
- Case studies review: Particular emphasis was placed on information concerning the implementation of the TCC concept and tools. 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), Island of Terschelling (the Netherlands), Mallorca (Spain)
 - Coastal areas: Province of Rimini (Italy), Donegal County (Ireland),
 - Historical settlements: Venice (Italy), Oxford, Canterbury (UK), Bruges (Belgium), Salzburg (Austria), Heidelberg (Germany)
 - Rural areas: Sruma project (Ireland), Loch Lomond (UK)
 - Mountain resorts: Albertville (France), Alps
 - Protected areas: Coto Donana National Park (Spain), Zakynthos (Greece), Gower Peninsula (Wales), Prespa (Greece), Abruzzo National Park (Italy), Tammisaari National Park (Finland), Capo de Gata (Spain), Dadia (Greece), Steinhuder Meer

Nature Park (Germany), Sporades Marine Park (Greece), Medes Archipelago (Spain)

Cases of TCC applications in non EEA countries have been also studied. These case studies are: Malta, Vis (Croatia), Fuka-Matrouh (Egypt), Lalzit Bay (Albania), Bermuda, Barbados, U.S. Virgin Islands, Galapagos National Park, Nancite Beach (Costa Rica), Michelmus Bay (State of Queensland) La Reunion, Bird Island (Seychelles).

- Consultation with the members of the Steering Committee. The experts have been asked to prepare thematic papers providing information not only about the theoretical aspects of carrying capacity but also in respect to specific applications/case studies of TCC.

Three papers have been prepared:

- *Jan van der Borg, "Tourism Development, Carrying Capacity and Historical Settlements".*
- *Jan van der Straaten, "The Implementation of Tourism Carrying Capacity Assessment (Tcca)".*
- *Ivica Trumbic, "Tourism Carrying Capacity Assessment in Coastal Areas".*
- Participation in Conferences (International Conference on "Sustainable Tourism" held in Rimini during 28th –30th June 2001, 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 Conference on "Tourism in protected natural areas" organized by EKBY –the Greek Center for Biotopes and Wetlands" in Sitia, island of Kriti, 15-16 October 2001).
- Consultation: Requests for further information have been addressed to various research organisations 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).

The current Report consists of three parts. In Part A the characteristics of tourism development in the EEA countries are presented along with the main impacts from tourism development on local environment, society and economy. In Part B the methodological aspects of defining and implementing Tourism Carrying Capacity are discussed. Indicative lists of TCC indicators are included. In part C examples of the implementation of TCC assessment are presented along with diverse type of actions for tourism management in the EEA countries (members of EU, Norway and Iceland) and as well as non EEA countries.

PART A. Tourism development in the EEA countries

A1. Characteristics of tourism development in the EEA countries- typology of tourist destinations

A.1.1. Tourism development at the European level

A.1.1.1. Characteristics of tourism development, socio-economic implications

For years European countries have been the primary destinations for tourists, receiving, according to WTO, 60% of all international arrivals (see table 1). France, Spain, Italy, United Kingdom and Austria are placed among the ten most popular world tourism destinations (see table 2), while Germany, which is considered a tourist generator country, is expected to become an important tourist destination in the future (the eighth most popular destination in Europe). It is interesting to note that the vast majority of European tourists (91%) chooses to visit a location in Europe (EEA, 2001).

European destinations areas, rich in natural and cultural resources, have a major advantage in the world tourism market. Despite the emergence of new destinations they still account for a large share of world tourist trade (Coccosis,1996).

<i>Region</i>	<i>Estimation</i>			<i>Average Rate of Increase %</i>	
	1990	2000	2010	1990-2000	2000-2010
Africa	15	24	36	5.0	4.0
America	94	147	207	4.6	3.5
East Asia/ Pacific	52	101	190	6.8	6.5
Europe	284	372	476	2.7	2.5
Middle East	7	11	18	4.0	5.0
South Asia	3	6	10	6.1	6.0
World	456	661	937	3.8	3.55

Table 1: International tourists' arrivals (Millions) for the period 1990-2010

Source: WTO

Tourism is not only growing in terms of numbers. It has slowly transformed into a diversified and complex economic activity. Although mass tourism remains the predominant type of tourism, other types of tourism related to culture, environment, business, education, health, religion, etc. have emerged. These forms of tourism reflect among others preferences for environmental quality and a more active and “participatory” form of recreation. Skiing, hiking, cycling, climbing, canoeing, etc. are attracting more “fans” than ever, satisfying the need to be close to nature, exercise, explore and learn. These new activities are also responsible for environmental degradation, since they are often disperse in areas with no proper infrastructure development or capacity to handle tourism.

In general there is a tendency, among European consumers, towards a more active type of leisure activities including more cultural activities (see, for example, Gratton and Van der Straaten, 1994 and Richards, 1994) in contrast to the traditional tourism pattern that of sun and sea.

On the basis of the activities undertaken by tourists Richards (1994) identifies five types of tourism, ranked by significance:

1. sun and sea 37%
2. adventure holiday 18 %
3. skiing 6 %
4. city tour 21 %
5. special cultural holiday 19 %

Although the above distinction is quite rough, it indicates that a significant part (approximately 60%) of all tourist activities depend on the natural environment (availability of resources, characteristics, uniqueness, beauty, etc), while approximately 40% of recreational and tourist activities are based on urban or cultural elements. Pressures are increasingly exerted on historical towns and traditional settlements, which are becoming more and more crowded with tourists and visitors, with increasing risk of degradation of local urban structures and of cultural resources.

In most cases the increasing concentration of tourists, in time and space (*seasonality*), is the main cause of problems and this is why there is an attempt from policy makers to spread these pressures through the tourist season.

Countries	Overnight stays in hotels 1998		Overnight Visitors (000's) 1998
	Residents	Non- Residents	
Austria	16,483	53,503	17,352
Belgium	3,498	9,483	6,179
Denmark	4,339	4,462	2,073
Finland	9,494	3,226	2,644
France	96,696	66,330	70,040
Germany	147,274	29,735	16,511
Greece	13,984	42,565	10,916
Iceland	309	791	232
Ireland	5,583	13,220	6,064
Italy	126,178	87,192	34,933
Luxembourg	81	1,089	789
Netherlands	12,622	14,262	9,320
Norway	11,252	5,168	4,538
Portugal	9,164	23,241	11,295
Spain	66,552	111,803	47,403
Sweden	15,643	4,409	2,573
United kingdom	81,093	56,299	25,745

Table 2: Overnight stays in hotels and similar establishments by residents and non-residents and International inbound tourism, tourists (overnight visitors) in the EEA countries.

Source: European Environmental Agency, 2001

Countries	Contribution of Tourism to GDP (direct impact only)				Employment (direct employment only)			
	1999		2011 (foreseen)		1999		2011 (foreseen)	
	US\$ Bn.	% on total GDP	US\$ Bn.	% on total GDP	Jobs (000's)	% on total employment	Jobs (000's)	% on total employment
Austria	11.89	5.67	19.98	5.12	224.60	5.59	240.02	5.55
Belgium	8.33	3.35	16.98	3.77	168.72	4.34	190.87	4.79
Denmark	8.05	4.57	16.34	4.88	99.51	4.55	126.93	5.46
Finland	5.70	4.41	11.51	4.02	102.50	4.46	118.70	4.71
France	70.08	4.89	137.70	5.23	1,288.32	5.65	1,539.07	6.10
Germany	72.56	3.44	120.28	3.28	792.52	2.33	902.35	2.54
Greece	7.15	5.60	16.30	5.84	210.15	5.43	256.06	6.46
Iceland	0.78	8.75	1.53	8.52	12.55	8.15	14.06	8.40
Ireland	3.54	3.79	8.76	2.99	53.86	3.35	61.70	2.79
Italy	61.21	5.23	136.69	6.01	1,194.54	5.78	1,425.50	6.66
Luxembourg	0.25	1.46	0.74	2.21	4.79	1.97	8.08	2.85
Netherlands	16.71	4.20	31.21	3.83	292.18	4.06	279.78	3.60
Norway	5.28	3.46	10.01	3.65	84.77	3.75	81.14	3.16
Portugal	8.43	7.45	17.62	8.59	341.75	7.08	408.17	8.14
Spain	48.98	8.02	110.44	9.15	1,060.81	7.68	1,559.89	9.22
Sweden	8.15	3.38	14.25	3.01	153.55	3.78	161.26	3.59
United Kingdom	70.46	4.89	125.94	4.86	1,225.03	4.39	1,567.11	5.33
EU	401.48	4.71	784.73	4.92	7,212.80	4.70	8,845.50	5.35
EEA	407.55		796.28		7,310.15		8,940.69	
World	1,301.04	10.66	2,654.40	11.03	74,274.90	8.06	99,321.70	8.96

Table 3: Contribution of tourism to economic development
Source: World Travel & Tourism Council, 2001

Box 1: Direct and indirect economic implications of tourism development

Tourism is one of the strongest economic sectors in the member states of the **European Union** (EU). Tourism activities in all Member States involve around 2 million *businesses* (mostly small and medium-sized enterprises) currently generating up to 12% of GDP (directly or indirectly), 6% of employment (directly) and 30% of external trade. All these figures are expected to increase further as tourism demand is expected to grow by almost 50% and capital investments (as a percentage of GDP) are expected to double by 2010 in comparison with 1996 (EU average). (EEA 2001)

In 1999, tourism in **EEA countries** has generated US\$ 1,040 bill of GDP (directly and indirectly), with the share in the total ranging from 9.04 % in the Netherlands to 24.39 % in Iceland. It is also a strong employment generator with a total of 18.5 mill jobs (direct and indirect employment) with the share in total employment ranging from 6.92% in Germany to 20.87% in Iceland. (WTTC, 2001).

Another indication of the importance of tourism for national economies is the percentage of current account balances that is being covered by tourism receipts. In 1992, the above indicator for some **Mediterranean** countries was as following: Spain 71%, Greece 28%, Malta 102%, and Cyprus 74%.

However, there are significant regional differences in European countries in respect to tourism development, indicating the unequal distribution of economic benefits. Mallorca is one of the well-known tourist resorts where the prosperity of local society is attributed to tourism development, which contributes with 70 % to GDP (EEA 2001).

A.1.1.2. EU Policy for Tourism

In the **Fifth Environmental Action Programme** of the EU tourism has been identified as one of the policy areas with priority for action. Within this context the following axes have been considered:

- better management of mass tourism and use of integrated management plans for sensitive areas, especially mountains and coasts, focusing on development control, visitor and site management which matches environmental capacity and visitor demand;
- raising the awareness of tourists for social and environmental good practice including promotion of a code of conduct;
- promoting sustainable transport policies favouring the use of public transport, including the use of economic instruments,
- better spread of tourism in time and space moving away from over-used mountains and beaches towards more rural and cultural tourism; and

Box 2: Sustainable tourism: One goal for many actors

Sustainable development has become an accepted concept for policy development. International Agencies and Organizations like World Tourism and Travel Council (**WTTC**), International Federation of Tour Operators (**IFTO**), have attempted to highlight tourism- environment issues. The World Tourism Organisation (**WTO**) published, in 1993, a Guide for sustainable development for local planners. **UNEP** in collaboration with **International Hotels Environment Initiative** has produced guidelines to improve environmental performance of hotel units (The Green Hotelier, Going Green Make Sense, Environmental Management for Hotels). The **Convention for Biodiversity** and the **Agenda 21** support incentives towards sustainable tourism development.

The **European Commission** published the Green Paper on the Role of the Union in the field of Tourism in 1995 and in 1996 it established ECONETT, a network for tourism and the environment. Significant initiatives for sustainable tourism are also undertaken by the **Council of Europe**. By virtue of Treaty obligations, the EU's tourism sector cooperation with governments or private business needs to include a consideration of the environmental effects of planned action. Within this context the private sector also undertook initiatives towards reducing impacts from tourism on the environment. Hotels, airlines, etc, implemented several actions in order to promote sustainable consumption of natural resources and minimization of waste production.

- promoting environment friendly forms of tourism and building awareness for environmental issues among tourism managers and local communities, by pilot projects, training, brochures and exchange of good practice.

Within this context several instruments for the sustainable tourism development are promoted including: strict implementation and enforcement of environmental standards on noise and air emissions, creation of buffer zones around sensitive areas, utilisation of economic instruments such as CO₂/energy taxes and road pricing to encourage the use of public transport.

However, there is still little evidence of concrete results of sustainable tourism development despite the efforts for the preservation and amelioration of environmental quality. Tourism pressure is still high and the development of such destinations can by far characterised as unsustainable. Emphasis is placed on infrastructure development to cope with increased pressures and on the implementation of management tools to control visitor flows. However there are still areas which still seek tourism as a unique opportunity for development but do not necessarily consider the long-term effects of tourism on the environment and ultimately on tourism itself.

Integration of environmental concerns in sectoral policies remain a key issue, while it is necessary to promote actions in order to mitigate impacts from tourism.

The **sixth Environmental Action Programme** “Environment 2010: Our future, our Choice” proposes five priority avenues of strategic action in order to accomplish environmental objectives:

1. improving the implementation of existing legislation
2. integrating environmental concerns into other policies
3. finding new ways of working closer with the market via business and consumers
4. empowering people and helping them to change behaviour
5. *encouraging better land-use planning and management decisions*

Tourism is recognised explicitly in this last priority and mainly in the development of networks across tourist destinations with the aim to encourage the exchange of experience and good practice on sustainable forms of tourism and furthermore of the active participation for sustainable tourism

A.1.2. Tourist development at regional level

Tourism development is particularly important for the Mediterranean region and the Alps. Some more detailed information is provided in the following paragraphs.

A. The Mediterranean basin

The Mediterranean is considered as the largest tourism region in the world. Tourism growth is not equally distributed even among Mediterranean countries. The significance of tourism development in the Mediterranean, EU member states is higher in comparison to the rest of the Union.

France, Spain, Italy and Greece remain by far the main destinations for international tourism. In addition, tourism development is concentrated in the already densely populated coast. In Greece for example almost 90% of tourism and leisure activities is located along the coast and in the islands.

During past decades, efforts have been concentrated in the development of other types of tourism (i.e. health, congress, ecotourism, cultural tourism, etc.), complementary to the predominant type of mass and 3s tourism.

In spite of these efforts tourism development is still of seasonal character

Seasonal overconcentration leads to increased pressure to environmental and cultural resources. Deterioration of limited water resources and urbanisation along the coast are some of the major impacts of tourism development. Ribbon development is a common phenomenon in the east coast of Spain, in the north coast of Crete and in several parts of the south coast of France and one of the main reasons for the decrease of the attractiveness of these areas

B. The Alps

The Alps are considered as one of the most popular tourist destinations in summer as well as in winter. Over the last decades, there has been a sharp increase in the number of winter visitors. This has resulted to the increase of the total number of skiing facilities, leading to the erosion of mountain slopes resulting from the deforestation and the leveling of steep slopes. An ideal ski run needs to have a certain angle of

Box 3: Prospects for tourism in the Mediterranean region

Tourism in the Mediterranean region accounts for 30% of international arrivals and 25% of receipts from international tourism. The number of tourists in Mediterranean countries is expected to increase from 260 million in 1990 (with 135 million in the coastal region) to 440 to 655 million in 2025 (with 235 to 355 in the coastal region).

"Tourism development in the northern Mediterranean is regarded to be amongst the most extensive and intensive in the world. It is estimated that by the year 2050, 95 per cent of that coastline will be urbanised. The Mediterranean basin may have to support more than 500 million inhabitants and 200 million tourists with 150 million cars" (Williams, P. W., 1992). EU Mediterranean countries attract the majority of tourists benefiting with almost 80% of the total tourism income generated in the Mediterranean region.

Box 4: Tourists arrivals in the Alpine region

The Alps have the second highest tourism intensity in Europe, with 59.8 million arrivals and a total of 370 million bed nights per year, while the total added value deriving from visitors in commercial accommodation in the Alpine region is about 24 billions EUR per year. (EEA 2001)



inclination. Mountains, which are too steep, are modelled with the help of bulldozers and dynamite. This practice has been applied to certain French ski resorts, where even up to 30 metres of ground and rocks could be blown up in order to get the desired angle of inclination. In addition to this, skiing facilities are made available through the production of artificial snow, which poses severe threat to the natural environment of the area.

Part of the vast mountain woods growing on the slopes, is cut down giving its place to ski runs extending from the top of the mountain till the valley. The skiers with the help of lifts, which consume significant amount of electric energy can easily reach the top and enjoy a long run. Many villages, famous skiing centers in France and Italy are surrounded by ski lifts and ski runs. The environmental impacts are far from negligible: loss of vegetation, deterioration of landscape and extended erosion due to which fertile humus is lost to the sea. It is not an exaggeration to say that the carrying capacity of the ecosystems in Alps has been considerably surpassed.

A.1.3. Tourism development at local level

A. Coastal areas

Coastal areas are considered as the most valuable parts of many countries' territories, either with respect to their natural and environmental qualities or with regard to their potential for national socio-economic development. Therefore, it is not surprising that population has always been attracted to coastal areas. It is estimated that, today, more than 65% of the global population lives within 100 kilometres from the coastline and the trends indicate that this percentage will only grow in the future. Equally so, large number of the world biggest urban agglomerations is located in coastal areas.

The greatest pressures are still exerted in the Mediterranean. Northern and Western European coastlines although attracting a large number of tourists do not confront the environmental problems of the Mediterranean.

Local communities benefit significantly from tourism through relatively higher income, higher employment rate and investments, infrastructure development, etc. Unfortunately there is a great demand for pristine natural areas. It is estimated that 50% of the ecologically richest and most sensitive areas in EU are located in coastal areas. Tourism is a large consumer of natural resources (e.g. land) and a producer of significant load of waste, often exceeding the capacity of the ecosystems. Tourism activity also tends to consume the best, i.e. the most attractive and the most sensitive,

Box 5: Density in coastal areas*

Tourism development is adding to the already existing pressures in coastal areas. Population densities (resident plus tourist population) are increasing in the tourist coastal regions in the seasonal peaks. In the northern European countries, the density ranges from 119% in Finland to 168% in Norway. In Western Europe, it ranges from 119% in Germany to 247% in Ireland. In the Southwestern Europe, the density increases, ranging from 765% in Monaco, to 383% in Malta and 207% in France, and down to 157% in Italy. It has to be noted, also, that these data do not make a distinction between urban tourist destinations and the coastal ones, and are to be considered as indicative only. Coastal urban tourist agglomerations are particularly exposed to these pressures. In some cities, the number of beds is very high in relation to the number of resident population. Thus, for example, in Lindos (Greece) the number of beds is 81% of the number of resident population, in Sliema (Malta) 47%, in Pafos (Cyprus) 42%, etc. However, the general rule is that the larger the city the lower this percentage is. In Athens the number of beds is only 1% of the number of resident population
*(From the thematic paper of Ivica Trumbic, 2001)

sites imposing constant threats to other coastal uses (e.g. agriculture). Many negative impacts of tourism development are evident in coastal areas arising from the sheer concentration of tourists, accommodation and infrastructure development including poor water quality (salt and freshwater), conversion of natural and agricultural land into tourism facilities, over-consumption of groundwater resources and discharges of untreated waste water to sea and catchment areas, generation of waste and traffic, terrestrial pollution caused by inappropriate disposal of solid waste, loss of non-renewable resources, overexploitation of renewable resources, reduction of biodiversity, loss of habitat areas, coastal erosion caused by the construction of inappropriate marine structures (jetties, marinas, beach defences, etc), increased urbanisation, etc.

B. Islands

Islands constitute important tourist destinations. The growing demand for tourism provides opportunities for income generation and employment, improvement of infrastructures and services. However tourism can also have negative effects to the islands' built and natural environment, economy and society. Small islands present a particular case of interest due to their limited resources and the fragile relationship between economy-society and the environment. (Coccosis, 1998). Small islands are particularly susceptible to the negative impacts of intensive tourism development.

There is an increased concern on the impacts on local identity (architecture and landscape), local resources, services and infrastructure from tourism development, which does not always respect the scale and the capacity of small islands.

The development of tourism gravitates to the island's natural features –landscape, plant and animal life- complemented by cultural and social attractions. Although these features and attractions should be protected, tourism development can come into direct conflict with the protection of uniqueness since it implies modernization, cultural change, urbanization and extensive exploitation of resources. In many islands, the landscape and coastline are being visibly affected by widespread urbanization and the intrusive impacts of hotel, marina, air and road construction. The consequent environmental degradation due to uncontrolled and intensive tourism development, however, inevitably affects tourism itself and the sensitive island ecosystem on which tourism is based. Special emphasis should be placed on the management of key island resources –coasts, fresh water, agricultural land, marine resources – in recognition of the interdependence of socioeconomic phenomena and environmental processes.

C. Protected areas

The number of visitors to environmentally sensitive areas is increasing, due to a growing interest in nature all over Europe. Activities (e.g. bird watching) related to scientific and educational purposes along with other recreational activities are often developed in protected areas, like wetlands. However, national parks and protected areas are inherently vulnerable to environmental degradation and the development of any recreational activities requires careful environmental management.

The main problems are caused by the excessive use of passenger cars, overcrowding during peak periods, particularly at sites that are close to urban centres. Increased pressures are posed from the development of the adjacent areas. However, increased tourism and recreation may also contribute to improved resource management as a result of higher incomes for local communities. Different level of protection can help in reducing the overload of visitors.

D. Rural areas

Rural areas are popular tourist destinations throughout Europe. Rural tourism contains a great range of activities provided on the basis of natural, social and cultural elements. In principle, this type of tourism is integrated into the local community and the local environment since it is being developed in a complementary way to the other economic activities in the area. Furthermore, it utilises local resources, promotes the consumption of local products and last but not least encourages the participation of tourists in local (traditional) activities (e.g. open-air activities, local cuisine, etc).

Box 6: Ecotourism

Ecotourism represents a new type of tourism, often promoted through local and regional plans. It encompasses several other types of tourism such as outdoor/recreational, tourism related to adventure and the exploration of wild life, cultural, green, sustainable, alternative tourism, special types of tourism, and agro-tourism. According to 1994 statistical data 40% to 60% of tourists, at the international level, had nature as their final destination, accounting for 211 to 317 millions, out of which 106 to 211 millions are tourists who have as their destination wild nature. Domestic tourists are not included in the above figures, indicating that the actual number of tourists visiting natural areas is even higher. WTO notes that tourism, which has nature as a destination, corresponds to 7% of the international tourism expenditures, while it estimates that 20% of the 600 million international arrivals during 1997 concerned ecotourism. Tourist agencies report that the demand for tourism in nature increases every year by 10-25%. (Hellenic Ministry of Development, Hellenic Tourism Organization, 2000).



Box 7: Recreation in rural areas: the case of the Gower Peninsula

One of the emerging and expanding forms of tourism in Northern, Western and Southern Europe is rural tourism, contributing to the diversification, enrichment and strengthening of rural economy, which faces severe problems due to the declining role of agriculture. Tourism, in rural areas, is emerging as an alternative economic activity that could provide income and employment opportunities to local communities, but tourism development may have significant impacts for the continuation of traditional farming practices which contribute to nature conservation and landscape management. In certain cases rural tourism activities can take the form of eco-tourism in the sense that they are developed on the basis of natural characteristics. Such kind of activities may involve lower environmental impacts and are becoming increasingly popular.

The **Gower Peninsula** in South Wales is the first Area of Outstanding Beauty to be designated in England and Wales in 1956 and also a V Category protected areas as designated by the IUCN. The Gower coastal zone is characterised by limestone cliffs and sandy beaches in the south and extensive saltmarshes and dune systems along the northern shore. Inland the rural landscape is dominated by upland heathlands, wooded valleys and fields. A wide variety of activities take place on Gower, since the landscape and coastline provide opportunities for a range of water sports and land-based outdoor pursuits, from windsurfing and diving to rock climbing and pony trekking. The Gower peninsula receives a large number of visitors for the surrounding areas and from the industrial and urban areas of South Wales and West England.

The impacts of recreation and tourism on the Gower environment are as diverse as the range of habitats and recreational activities in the area. To a large extent, the pattern of impacts is determined by the geography of the peninsula, particularly the limited road network which controls access to the coast. The most intensive visitor impacts is concentrated at few 'honey-pot' sites along the south coast, where extensive car parking lies adjacent to sandy beaches. (Ballinger, 1996)

In spite of the socio-economic benefits of rural tourism one should not overlook the costs related to the development of required infrastructure (road network, water supply, waste disposal). In addition, rural tourism does not necessarily imply an environmental friendly type of tourism development. There is always the possibility of damages particularly in the case of environmentally sensitive areas. The main reason for this is the significant number of visitors often throughout the whole year.

Special attention is needed in the case of recreational activities such as golf and hunting that represent an environmental threat. It should be noted though that these activities can be hosted in rural areas, in coastal areas and even in islands. In all cases they cause problems in respect to the availability and quality of water resources, loss of biodiversity, etc., requiring careful planning and management. An 18-hole golf course for example requires at average 48.2 hectares of land.

Noise and fragmentation of habitats could be also some of the impacts of tourism development. Wildlife species in riparian habitats could be affected if a large number of tourists is concentrated near rivers. In addition to all the above, particular emphasis should be placed on accumulative impacts and synergies.

E. Mountain resorts

In several European countries tourism has been promoted as an ideal mean to combat economic decline and reverse the loss of population in mountain areas. In several cases

tourism has succeeded in becoming either the only or the primary economic activity, often resulting to economic monoculture. In such cases, tourism has contributed to the development of a strong, dynamic but also vulnerable local economy while it has generated pressures on the environment. Unfortunately the vogue for intensive, environmentally threatening “green tourism” continues to grow. The majority of tourism and recreation in European mountain areas is concentrated in the Alps. However, countries traditionally hosting summer tourism activities are recently facing increased demand for winter tourism and specifically mountain tourism (i.e. Greece). For the former case, the number of visitors during summer has stayed roughly constant over the last twenty years, while winter visitors have increased considerably. For the latter, increased demand has led to the development of infrastructure. Efforts are being concentrated in the development of a tourism that will be adjusted to local particularities (i.e scale of infrastructure, etc) and will be integrated to local economy.

The characteristics of tourism development in the mountains vary considerably. In the case of the Alps, only 10% of all Alpine communities host large monostructured tourist infrastructures while some 40% does not have tourism at all. (EEA, 1999). This type of concentration raises many issues in respect to socio-economic equity but also in respect to the opportunities for environmental conservation.

In the previous section (see A.1.2.) a brief description of the environmental impacts of tourism in mountain areas has been provided with an emphasis to the impacts from skiing activities.

In addition to them, many other impacts have appeared as a result of the decision to diversify the tourism product, through the development of additional activities attracting visitors during summer months. Mountain biking, trekking, canyoning, hiking are only some of these activities affecting undisturbed areas such as gorges or rock faces.

F. Historical settlements

History, culture and religion constitute significant elements of tourism. A visit to famous historic centres, temples and places of a unique cultural value is a desire for millions of people. Many of these major tourist attractions of Europe are often located in proximity to large urban centres or are even part of them. As in all cases, tourism provides significant benefits but it often results to major problems. In this case socio-economic implications of tourism are as important as environmental ones (traffic congestion, wear and tear on buildings and heritage sites).

Box 8: Tourism development in major urban centres*

In major tourist cities (e.g. **London, Paris, Vienna**) the large host population and the adequate infrastructures can easily absorb high-volume tourism. They are generally designed to withstand high volumes of visitors. The effective transport systems can deliver people into the city centres or in other parts of the cities.

Despite their reputation as cities of art, the tourist function of **Florence** and **Amsterdam** is proportionally minor in respect to their political, administrative, educational, economic and of course residential roles. In fact, although they benefit from large numbers of visitors, their vast resident populations numerically offset the social impact of tourism on the urban area.

On the contrary in smaller and confined areas such as walled towns or historic sites the concentration of tourists produces serious environmental management problems since small towns have greater difficulty in coping with the congestion, noise, pollution and other problems that accompany tourism. Furthermore in cities with high tourist flows, tourism may produce irritation on local population, crowding-out of normal economic activities from the town centre and increased prices, leading to a higher cost of living for residents.

*(From the thematic paper of Jan van der Borg, 2001)

Heritage sites and cities are both visited by millions of tourists. The continuous expansion of the tourism market in general and the more recent boom of cultural tourism in particular have raised the awareness that historical settlements may be subject to excessive tourism pressure as much (and in some cases even more) as natural environments.

Heritage cities are particularly sensitive to excess tourism demand, as they are socially, economically and environmentally complex. The conflicts that may arise between the normal functions of the heritage city and tourism may threaten both tourism development and the socio-economic structure of the settlement itself. The management of these conflicts becomes of the utmost importance in order to ensure the conservation of the art cities along with their socio-economic development, in which tourism can play a significant role.

Box 9: Impacts of tourism development in heritage cities*

Glasson, Godfrey and Goodey (1995) have shown that the impact of tourism on a destination can be measured on various levels, such as the level of the individual attraction and that of the destination as a whole. The character of the city determines which of the levels is the most relevant. For heritage cities which are attractions by themselves (for example, **Bruges** and **Venice**), the destination level dominates; for cities with a particular attraction (for example the Castle of **Salzburg** and the University Colleges of **Oxford**), the attraction level is the most suitable. Furthermore, impact has various dimensions. For most heritage cities, the social-economic one which expresses the conflict between tourism and the social and economic dynamism of the city will be of particular concern.

*(From the thematic paper of Jan van der Borg, 2001)

A.2. Impacts from tourism development

A.2.1. Main problems and threats

The study of impacts from tourism development requires a careful consideration of local particularities (i.e ecological and socio-economic characteristics). However it is possible to identify common impacts anticipated in most tourist resorts and organise them in three distinct groups: *physical –ecological impacts, socio-demographic and economic-political impacts* (summarised in tables 4 to 6 in the end of this section). In the following paragraphs a brief presentation of these impacts is being provided along with a reference to particular cases throughout Europe. The presentation should not be regarded as exhaustive since several other problems may arise as a result of the specific conditions of both the locality and the type of tourism development (i.e mass tourism, selective types of tourism development, seasonality, concentration of excursionists and tourists in time and space, average length of stay, kind of activities exercised by tourists, socio-economic characteristics and behavior of tourists, degree of use of tourist infrastructure). As far as it concerns socio-cultural impacts the main issues involve around the issues of employment, equal distribution of economic benefits, quality of life, cost of living, etc, while cultural conflicts between visitors and host communities are more rarely reported.

Box 10: Tourists versus excursionists: the case of Venice*

Tourist development in Venice (Italy) is characterised by marked seasonality. The proximity of major resort areas to the city creates a concentration of demand during the summer months. For a period equal to ten days a year, total demand amounts to more than 100,000 persons; peaks of 200,000 visitors on special occasions are no exception. For almost two-thirds of the year, the number of visitors easily surpasses the socio-economic carrying capacity (calculated by Costa and Canestrelli, 1991, in 25,000 visitors per day). In addition the profile of visitor flows has changed considerably during the last decade, with day visitors becoming more dominant. Day visitors do not bring to tourist localities the same economic benefits as tourists. They do not stay in hotels, they may not visit attractions or eat in restaurants but they often just wander around in the city centre. However they use basic services (public transport, water supply, waste collection, etc.) increasing total public costs for their management.

All heritage cities exhibit the same phenomenon due to the fact that their well-preserved historical centres have become "cultural resorts" attracting a significant proportion of excursionists.

*From the thematic paper of Jan van der Borg, 2001



A.2.2. Physical ecological impacts

A. Common

Tourism is responsible for a large share of the air and road traffic and consumption of energy (transportation, tourist infrastructure, etc.), adding further to the emissions of greenhouses gases and acidifying substances.

Tourists consume not only energy but several other local, non- renewable resources like water. The construction of hotels, swimming pools, golf courses, etc. exerts significant pressure on water resources, particularly in regions such as the Mediterranean where resources are scarce. Tourists typically consume around 300 litres of water and generate 180 litres of wastewater per day while in most cases, tourists consume more compared to local population.

In all cases (mass tourism vis a vis more selective type of tourism) travelling is a critical aspect responsible for significant environmental impacts and stresses. Increased consumption of fossil fuels contributes to increased emissions of greenhouse gasses and acidifying substances, the former responsible for the problem of global climate change and the latter for acid rain which is considered a regional problem. The mode of transport chosen by tourists is important for the generation of environmental impacts as the use of fossil fuels per passenger-kilometre varies significantly. The most polluting mode of transport is the aeroplane, followed by the private car, the bus and the train. Of course, biking and walking are the best modes of transport as far as environmental issues are concerned.

There are several physical and environmental negative impacts, common to tourist destinations.

Impacts related to facilities, accommodation and infrastructure

- Traffic, congestion and parking problems
- Overburdened infrastructure systems during summer months (water supply, telecommunications, energy supply) due to the seasonal character of tourism
- Sewage output

Box 11: Contribution of tourism to air emissions and water consumption

In **France**, 5-7% of greenhouse gas emissions are due to tourism, mainly because 80% of domestic tourist travel is by private car.

In **Mallorca**, water consumption in rural areas is 140 l/ per person/ day, in urban areas 250 l/ per person/ day, while the average tourist consumption is 440 l/ per person/ day, or even 880 l/ per person/day in case of a luxury establishment. (EEA, 2001)

Box 12: Conflicts among activities over the use of resources: the case of Coto Donana National Park

Conflicts arise among tourism and nature conservation, traditional hunting and agriculture. For example the Coto Donana National Park located in the south-west of Spain is an important breeding site for many of Europe's birds, and home of endangered species like the imperial eagle (*Aquila heliaca*), and Spanish Lynx (*Lynx pardina*), but it is now threatened by water extraction from tourism and local agriculture. (EEA, 1995)



- Littering by tourists and defacing of features by actions of vandalism
- Uncontrolled urbanisation
- Incompatibility among land uses
- Alteration of historic settlements

Impacts related to natural resources and ecosystems

Box 13: When peak periods coincide with the period of reproduction: the case of Zakynthos

- Air pollution caused from cars and coaches by increased vehicular traffic
- Noise pollution from tourist activities and vehicles.
- Impact on freshwater. During summer months in some localities, especially in the Mediterranean region, water supplies are exacerbated by tourist flows for use in hotels, swimming pools and golf courses leading to water shortages, over-extraction and salination.
- Water pollution from improper waste management of sewage and solid waste systems of hotels and other tourist facilities.
- Environmental hazards such as erosion, land slippage, flooding, etc., and land use conflicts resulting from poor planning, siting and inappropriate construction of tourist facilities.
- Loss of biodiversity and impacts on ecological equilibrium due to intense pressure from tourist development in some overbuilt destinations

In Zakynthos (Greece), which is the most important breeding site of the Loggerhead Turtles (*Caretta caretta*), the coastal nesting grounds along sandy beaches are disturbed and destroyed by tourism development and tourism behaviour. Unfortunately, the peak of the tourist season coincides with the nesting season for the vulnerable Loggerhead Turtles.



Impacts on landscape and cultural heritage

- Loss of landscape attractiveness due to uncontrolled development
- Damage of the natural and cultural heritage by overuse and misuse by tourists and inappropriate tourism development
- Building alterations

Many types of physical-ecological impacts may be generated by tourism development however if tourism is well planned, developed and managed it may generate also positive impacts. Appropriate tourism development leads to:

- Major investments for conservation of important natural areas and wildlife, archaeological and historic sites, since they represent major tourist attractions
- Actions for the improvement of the overall environmental quality of tourist areas, to keep them more attractive for tourists.
- Improvements of tourism infrastructure contributing to better quality of life for the local communities.

- Increase of local environmental awareness. Tourists' interest in conservation and appreciation to environmental and cultural heritage helps local communities to realise that protecting the environment is important

B. Destination specific

Coastal areas

- Marine and freshwater pollution by discharges of waste waters from tourist establishments
- Marine pollution by discharge from tourist vessels (yachts, speed boats, excursion boats), passenger liners and car-ferry
- Dumping of increased quantities of solid wastes in the sea and land
- Destruction or alteration of sand dunes due to removal of vegetation, uncontrolled development or high tourist pressures on beaches
- Destruction or alteration of coastal wetlands due to uncontrolled development or high tourist pressures
- Destruction or alteration of coastal natural habitats and cultural landscape due to uncontrolled development or high tourist pressures on beaches
- Vegetation changes and destruction of coastal forests due to fires
- Coastal erosion due to improper siting of structures
- Salination phenomenon due to over-extraction of freshwater
- Desertification

Box 14: Mykonos: a ..cosmopolitan and a rapidly urbanized island

The island of Mykonos (Greece) is a well-known international tourist resort which has experienced rapid tourist development during the last 30 years. Parallel to the expansion of the tourist industry (accommodation, bars, etc) the island's population has also increased in size in contrast to other Greek islands which have lost population during the last decades. This growth was followed by the expansion of infrastructure (enlargement of the port, improvement of the road network construction of a surface dam, etc). These investments have further boosted the island's capacity to accommodate tourists and other visitors, resulting thus to a vicious circle. Problems and some signs of saturation have already appeared: congestion, lack of parking space, insecurity, water and soil pollution, especially during the peak summer season. The limited natural resources are insufficient to cope with the increasing and competing demands placed on these resources as a result of uncontrolled tourism development. A large proportion of the island's extremely limited land surface has either been absorbed by intensive housing construction, tourism development and its accompanying infrastructure or left unused for future speculation thus causing widespread loss of agricultural land. The two traditional settlements in the island together with other newly developed villages on which the tourist industry was based mainly during the first phase of development have already been transformed in scale, volume of built-up areas, character and environmental quality as a result of uncontrolled and rapid development of tourism. Rapid urbanization has also altered the socio-economic structure and local culture. (Coccosis H., Pappiris A., 1996)

Islands

- High demand of energy resources (limited in islands)
- High demand of water resources (limited in islands)
- High pressure on sewage system (often missing in islands)

Box 15: The island of Lanzarote: a Reserve of the Biosphere

Lanzarote (846 km²) is the biggest island from a small island complex in the Atlantic Ocean subjected to a rapid tourist growth. The number of tourists rose from 450,000 in 1986 to 1,550,000 in 1997, while inhabitants rose from 57,000 to 79,000. Population growth is concentrated around the urban centre of Arrecife, in the central part of the island's coast.

The island is a Reserve of the Biosphere since 1994 and it constitutes an ecosystem of a volcanic origin unique in its kind with an exceptional landscape and an extremely fragile desert system. If destroyed or damaged, surface strata can not be easily regenerated and may take centuries to recover. For two decades now, hundreds of thousands of tourists have visited Lanzarote's shores with undeniable economic advantages as well as negative consequences. Among the latter are a crisis of cultural identity, population imbalances and, above all, a series of environmental impacts that could prove irreversible. In a short time period Lanzarote witnessed a rapid change from a traditional economy based on agriculture to a modern dynamic economy based on the tertiary sector, open to new multicultural influences from immigrants and tourists. Present estimated growth stands at 12 % p.a. and could exceed the Reserve's ecosystem in several ways, e.g., drinking water resources, energy and management of waste generated in the process of development.

Box 16: Rhodes: Mass tourism destination

Tourism development in the island of Rhodes (Greece) had several implications according to the different components of the environment including:

Economic environment: over-dependence of the island economy on tourism, sectoral links, faster employment growth than population growth, a decline in the utilization of capacities, decline of the market quality

Spatial and ecological environment: spatial concentration of tourism development, tourist urban development, signs of the typical deterioration of the environment

Socio-cultural environment: decline of traditional activities

Mountain resorts

- Forest clearance for skiing activities and increased incidences of avalanches
- Visual degradation of landscapes due to skiing activities. Natural forest barriers may be replaced with unsightly concrete, plastic and wooden barriers.
- Inappropriate and uncontrolled development of ski-centres.
- Loss of habitats and disturbance of endangered species
- Inadequate sewage disposal and water pollution. In the French Pyrenees the sewage from summer tourist resorts discharges directly to streams leading to water pollution. In the Alps it has been reported that the use of chemicals to prepare 36 glaciers for skiing led to the increase of nitrogen and phosphorus levels in drinking water (EEA, 1995)
- Exhaust from cars and coaches are believed to trigger acid rain and tree damage. The loss of plant life leads to increase erosion rates and landslide risk.
- Unsustainable use of water for snow cannons.

Box 17: Artificial snow generates impacts

By 1992, 4000 snow cannons were producing artificial snow to lengthen the ski season in the **Alps**, using (competing with other uses) 28 millions litres of water per kilometre of piste. In Le Meunieres (France) 185 cannons installed for the 1992 Olympics were supplied by drinking water sources (EEA, 1995). Artificial snow melts slowly reducing the short recuperation time for Alpine grasses and flowers. Furthermore, skiing in sparse snow conditions contributes to erosion and damages sensitive vegetation. The results are a severe reduction in water absorption and holding capacity of mountain slopes, and increased risk of runoff and avalanches.



Rural areas

- Reduction of agricultural activities
- Urbanization due to tourism development
- Fragmentation of habitats

Box 18: Impacts due to major events: Winter Olympic games

The Winter Olympic games of **Albertville** in 1992 were spread throughout 13 villages in the Savoy, with a total population of 340,000 inhabitants. In the past few decades, accommodation for 340,000 visitors was built in the Savoy region, doubling the population during the peak ski season. During the Olympics, the region accommodated 1,500 athletes, 7,000 journalists and around one million of spectators. The games left behind substantial environmental impacts and economic bankruptcy for 4 out of the 13 Olympic villages. Although villages residents benefited in terms of improved infrastructure, the large amounts invested by local governments have not been recaptured due to the lower than expected tourism rates. (Ted Case Studies, 1997)

Box 19: Tourism development in Loch Lomond, the largest water body in Great Britain

Loch Lomond is located in the southern Scottish Highlands. Although recreation is an important activity in the area, environmental impacts are not only due to recreation and tourism but also due to changes in other types of land use and to variations in natural environmental conditions. For this it has been recognized that management for tourism and outdoor recreation must take place within an integrated framework.

"Some impacts are evident along the shores, mainly at the junction between the beach back and the vegetated terrain beyond. The first species to be damaged and eliminated were herbs and small shrubs, followed by grasses, with mosses generally being the most resistant to trampling. Soil compaction in the top 5 cm resulted from foot pressure. If motor vehicles were involved, damage to vegetation was accelerated and soil impacts extended below the uppermost layer. Further recreational impacts occur through lighting fires, often at the base of mature trees, resulting in severe damage. Litter is a localised nuisance. Problems due to recreation activities on the water body had been also observed. Fishing has resulted in the decline of pike. The introduction of another fish specie has contributed into the drastic change in fish populations and has posed threats for certain species. The increased concentration of recreational boats has also caused various problems: launching from beaches, conflict with other recreational uses, safety issues and pollution are some of them". (Dickinson G., 1996, pp.26-28)

Historical settlements

- Degradation of monuments and historical sites

Box 20: Impacts of tourism in historic centres and towns*

- **Aix-en-Provence** is overcrowded during summer months;
- The centre of **Amsterdam** has serious parking problems;
- **Bruges** has problems with traffic all year round but especially during weekends and holidays. Its centre is losing inhabitants and economic activities. Hotels and souvenir shops take their place;
- **Oxford's** most famous University Colleges are threatened by huge visitor flows. Its inner city is congested with tourist buses;
- **Salzburg**, like Bruges, has a serious traffic problem caused by the huge number of tourist buses delivering excursionists during the summer months. The centre of the Austrian town suffers from crowding out of residents and of businesses as well;
- Tourism in the historical centre of **Venice** is becoming a mono-culture. Congestion suffocates economic activities and affects the quality of life of inhabitants.

*(From the thematic paper of Jan van der Borg, 2001)

A.2.3. Social-demographic impacts

Negative socio-cultural impacts have a stronger effect especially in small and traditional communities. Although as mentioned previously, socio-cultural impacts are generally of lesser importance in the case of European destinations compared to the physical-environmental ones, there are still some cases where small local communities may be negatively influenced by tourism like in the case of small islands, rural and mountain communities.

Some of the most common negative impacts are:

- Abandonment of traditional activities (agriculture, fisheries) due to the opportunity provided by tourism for higher income earnings
- Crowding-out (more common in urban areas). Tourism tends to dominate urban societies pushing out other activities or functions from the centre to the outskirts. The crowding out phenomenon may lead to tourism monoculture.
- Tourist colonisation and breakdown of host community values. Adjustment of residents to tourists' life styles, gradual loss of the local socio-cultural identity, creation of social differences, increased number of criminal acts, etc. Tourism may alter life style, values, customs and traditions, belief systems, family structures, community organisation. This may happen in the case where tourists are economically and culturally "stronger" than hosting communities since they tend to impose their needs and preferences.
- Misunderstanding and conflicts may arise between residents and tourists because of differences in languages, customs, religious values and behavioural patterns.

Box 21: 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". Tourism in cities like **Venice** or **Bruges** tends to dominate urban societies; it causes the relocation of other activities or functions from the centre to the outskirts. The price for centrally located land and the diminished attractiveness of a city for families and firms due to congestion and pollution, explains the process of crowding out.

*(From the thematic paper of Jan van der Borg, 2001)



Box 22: Impacts from tourism in Oxford

..."Congestion and crowding of some parts of the sites, with associated noise and a damaging of the local "ambience". At Christ Church, which is also the location of Oxford Cathedral, visitors can disturb worship. There is also a clash at the time of the June examinations. There is an increased risk of theft, and the outcome of the **social impacts** can be some dislike of visitors by the normal users of the site. There are also **physical impacts**. Litter is a particular concern and there may be minor acts of vandalism. The softer "natural" environment appears more at risk than the "built" environment, and respondents drew attention to the erosion of paths in the grounds of colleges, and a tendency for some visitors to stray off the designated visitor routes. **Economic impacts** are seen as positive: employment opportunities, contribution to the maintenance overheads and to income" (Glasson J., et al. 1995)

- Tourists/residents conflicts over uses. Tourists may compete with residents for the use of basic services (public transport, water supply, etc.), enjoyment of attractions (museums, urban parks, etc.) and amenity features (pubs, theatres, restaurants, etc.).
- Overcrowding of local attractions and amenity features as well as occasional irritation of local population. Tourist rush-hour due to the arrival and departure of daily visitors
- Over-commercialisation of the arts and crafts may lead to the loss of authenticity of dance, music, drama and crafts.

Positive impacts include the following:

- Strengthening of feelings of pride.
- Cross-cultural exchanges. Both tourists and residents can learn about one another's culture, which can lead to mutual understanding and acceptance and peaceful relationships among people of different cultural backgrounds.
- Conservation of elements of local cultural heritage, like dance, music, drama, crafts, fine arts, dress, customs, traditions and ceremonies, etc. Cultural patterns might be in danger of becoming lost in the face of modernisation. However since cultural heritage is part of tourist's attractions, it is possible that tourism may provides the justification for their conservation. In addition tourism supports museums, theatres and other cultural facilities that are used by both residents and tourists.

A.2.4. Political-economic impacts

Negative impacts include the following:

- Alteration of urban structure (e.g. the case of traditional agricultural market towns)
- Higher cost of living for residents (prices for land, services, products, etc.)
- Land-use conflicts among various activities.
- Risen public costs and expenses for infrastructures, management, intervention against pollution, etc, which are not adequately shared by the tourists.
- Seasonality of employment and income
- High dependence on tourism activity. Monoculture
- Uneven distribution of economic benefits
- Loss of potential economic benefits from tourism if tourism is not closely linked with other local economic activities, resulting to increased imports of goods and services

Box 23: Compensation of Local Communities for the loss of traditional activities

In cases where local communities are being excluded from the management and exploitation of natural resources, they may express discontent and even hostility towards efforts for protection and management of natural areas. During the establishment of a protection regime in the forest of **Dadia –Leukimi –Soufli** in Greece, there were several oppositions from the local community. The main reason was the prohibition of woodcutting, which represented the main economic activity in the areas of absolute protection. Compensation for the losses of income is not easy and in any case cannot be sufficient. Within this context, it is necessary to develop alternative types of economic activities, in accordance to the environmental particularities of the area. Tourism can provide such opportunities.

Box 24: Impacts of tourism in Europe's Historic Towns: the city of Salzburg*

Positive impacts include the following:

- Increased direct (hotels, restaurants, tour and travel operations and retail shops) and indirect (supplying sectors such as agriculture, fisheries, craft production, manufacturing and construction) benefits for employment and income.
- Stimulation of local entrepreneurship through creation of local tourism enterprises and development of skills.
- Foreign exchange earnings at the national level.
- Contribution to government revenues at all levels including the local level through local taxes for tourism. These revenues can be used to improve community facilities and services and local infrastructure.
- The multiplier effect of tourism serves as a catalyst for the expansion of other local economic activities such as agriculture, fisheries, crafts, etc.

The fragile equilibrium of the urban environment in the city of **Salzburg** is threatened by the excessive concentration of visitors, which generates increased levels of pollution and increased real estate prices, while it provokes the relocation of small artisan workshops to peripheral zones and the deterioration of historical heritage.

*(From the thematic paper of Jan van der Borg, 2001)

Box 25: Reverse population and economic decline

In Greece, tourism development has contributed to the regeneration of several rural and mountain areas. **Pilio, Metsovo, Kerkini and Papigo** are rural, mountain areas where proper tourism development had significant positive impacts on the socio-economic development while environmental impacts are considered limited. Tourism development did not prevent the continuation of traditional activities such as the cultivation of apples, chestnuts, cattle-breeding, cheese-making, woodcraft and viniculture. In certain areas like in **Prespa** and **Dadia** tourist development encouraged several young people to leave Athens and other major urban centers and settle in the area so as to work for the protection and the eco-development of the area contributing in this way to the retention of the population. In Papigo, located in the Prefecture of Ioannina at the northern part of Greece, the development of tourism contributed to the consolidation of certain key values like appreciation of the environment and cultural heritage. It was the local community who resisted and cancelled major infrastructure projects which could have imposed significant problems to the unique environment of the area.

Sector	Impacts	Coastal areas	Islands	Protected areas	Rural areas	Mountain resorts	Historical settlements
Quality of life	Uncontrolled development	x	x				x
	Traffic and congestion	x	x			x	x
	Noise pollution	x	x			x	x
Infrastructure	Overburdened infrastructures	x	x			x	
	Unsustainable waste production	x	x		x	x	x
	Unsustainable pressure on sewage system	x	x			x	x
Resources	Unsustainable use of water	x	x	x	x	x	
	Unsustainable use of energy sources		x				
	Pollution of fresh water	x	x	x	x	x	
	Marine pollution	x	x				
	Air pollution	x	x			x	x
Natural environment	Visual degradation of landscape	x	x	x	x	x	
	Forest clearance	x	x			x	
	Biodiversity <ul style="list-style-type: none"> Loss of habitats Disturbance to endangered species 	x x	x x	x	x	x	
	Damage to natural and cultural heritage	x	x	x	x	x	x
	Erosion <ul style="list-style-type: none"> Soil erosion Coastal erosion 	x x	x x	x	x	x	
	Wear and tear						x
Built environment	Incompatibility/ conflicts among land uses	x	x		x	x	
	Alteration within the urban networks/ structure	x					x
	Alteration of (historic) settlements <ul style="list-style-type: none"> Urbanisation/ extension of the limits of the settlements Alteration of its character (architectural style, etc) 	x	x x		x	x	x x

Table 4: Physical-Ecological impacts

Impacts	Coastal area	Islands	Protected areas	Rural areas	Mountain resorts	Historical settlements
Abandonment of traditional activities	x	x		x	x	x
Crowding-out <ul style="list-style-type: none"> • Along the year • Seasonal 	x	x			x	x
Breakdown of host community values		x		x		
Tourists/residents conflicts	x	x				x
Overcrowding and occasional irritation of local population	x	x			x	x
Adjustment of residents to tourists' life styles	x	x			x	x
Increase of criminality						x
Increase of accidents	x	x			x	

Table 5: Socio-Demographic impacts

Impacts	Coastal area	Islands	Protected areas	Rural areas	Mountain resorts	Historical settlements
Higher cost of living for residents	x	x			x	x
Land-use conflicts between activities	x	x		x	x	x
Risen public costs and expenses for infrastructure development	x	x	x	x	x	x
Seasonality of employment and income	x	x			x	
High dependence on tourism activity	x	x			x	x
Black market	x	x				
Increased dependence on imports	x	x		x	x	
Uneven distribution of economic benefits	x	x	x		x	x

Table 6: Political-Economic impacts

A.3. Sustainability of Tourism

Box 26: Definitions of sustainable tourism*

...."Definitions of sustainable tourism are numerous. Many of them are emanating from the basic definition of sustainable development. According to the Committee of Ministers of the Council of Europe (1995), sustainable tourism development pertains to all forms of development and management of tourism activity that respect the environment, protect long-term natural and cultural resources, and are socially and economically acceptable and equitable. Similarly, sustainable tourism development is also defined as a development which "...meets the needs of present tourists and host regions while protecting and enhancing opportunity for the future. It is envisaged as leading to management of all resources in such way that economic, social and aesthetic needs can be fulfilled while maintaining cultural integrity, essential ecological processes and life support systems." (Council of Europe, 1997) Similarly, Blangy (1997) defines sustainable tourism as "...any form of development, provision of amenities or tourist activity that emphasises respect for all and long-term preservation of natural, cultural and social resources and makes a positive and equitable contribution to the economic development and fulfillment of people living, working and staying in these areas." Also, Thibal (1997) claims that sustainable tourism is "...based on the enhancement of natural, cultural and social resources with the dual aim of improving the standard of living and quality of life of local residents, while satisfying the expectations and the needs of visitors, and preserving natural habitats and cultural identities for future generations." And finally, Ashiotis (1995) could be mentioned in that context by suggesting that sustainable tourism should "...guarantee the integrity of all non-renewable resources, while remaining economically viable in an increasingly competitive international market."

Travis (1994) gives a slightly more focused definition that is somewhat more related to the specific issues of tourism. According to him, sustainable tourism is "...all forms of tourism, development, management, and activity which enable a long life for that cultural activity, which we call tourism, involving a sequence of economic tourism products, that are compatible with keeping in perpetuity the protected heritage resources, be it natural, cultural or built, which give rise to tourism." Similarly, Middleton and Hawkins (1998) state that sustainable tourism "...means achieving a particular combination of numbers and types of visitors, the cumulative effects of whose activities at a given destination, together with the actions of the servicing business, can continue into the foreseeable future without damaging the quality of the environment on which these activities are based."

The above definitions are largely based on the definition of sustainable development as stipulated by the Bruntland Commission and supported by UNCED.

*(From the thematic paper of Ivica Trubics, 2001)

The issue of sustainability in tourism has become a priority concern in Europe, although some of the issues involved have been debated for quite some time in the context of world tourism, mainly from a social, cultural and economic point of view.

Despite widespread recognition of the need to seek strategies for sustainable tourism there seems to be a very wide margin of interpretation and perspective (Coccosis 1996):

- Sustainable tourism can be interpreted from a sectorial point of view according to which the basic goal is the viability of tourism activity, more in the line of ***economic sustainability of tourism***. As the focus of concern is tourist activity, the emphasis of such a strategy would imply strengthening, upgrading and even differentiation of the tourist product, often relying on organizational and technological solutions and innovations. Investment in infrastructure to increase capacity and improve services, "resort beautification" programmes, the provision of new facilities, i.e. congress halls, water parks, etc., are some of the policy tools used in this context.

- A second interpretation is largely based on ecology as a sociocultural and political view, and strongly emphasizes the need for *ecologically sustainable tourism*. This is a conservationist approach by which priority should be placed on the protection of natural resources and ecosystems. In the context of environmental management, some tourism activities, usually identified as the "soft" types, are acceptable as complementary and non-disturbing for the natural environment.
- The issue can be approached from a slightly different angle as *sustainable tourism development*, or the need to ensure the long-term viability of the tourist activity, recognizing the need to protect certain aspects of the environment. This approach, essentially based on an economic perspective, recognizes that environmental quality is an important factor of competitiveness and as such is should be protected. Protection extends over those aspects or dimensions of environmental quality which are directly involved in the development and marketing of the tourist product, usually aesthetics, monuments, cleanliness of beaches, traffic regulation, creation of reserved areas, etc.
- Another approach is based on ecologically sustainable economic development by which *tourism is part of strategy for sustainable development* and in which sustainability is defined on the basis of the entire human/ environmental system. From this perspective environmental conservation is a goal of equal importance to economic efficiency and social equity. Tourism policies are integrated in social, economic and environmental policies but do not precede them. This constitutes a more balanced and integrated approach, closer to contemporary thinking on tourism.

To illustrate the differences between these different interpretations at the conceptual level, a triangle can be used to represent policy. Each vertex depicts an imaginary situation in which policy is exclusively dominated by one goal, economic efficiency, social equity or environmental conservation. The first interpretation of sustainable tourism can be identified near the vertex corresponding to environmental conservation. The third is really a combination of economic efficiency and environmental conservation policies and can be identified somewhere along the side connecting these two vertices of the triangle. The last one seems to fit better in the centre of the triangle. There is no one, ideal tourism strategy. The above approaches reflect different priorities. Each one has its own merits and could be appropriate for different cases and settings, whether mature or emerging destinations, in growth or decline, natural areas or developed resorts, etc.

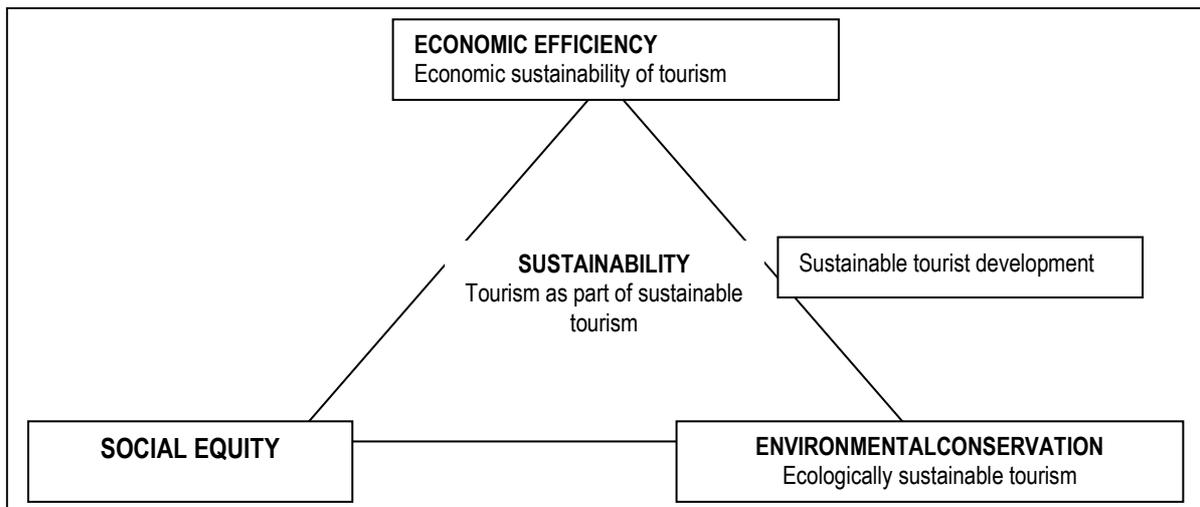


Figure 1: Interpretations of sustainable tourism (from Coccossis, 1996, p.10)

Sustainability has become a central issue in much of modern tourism development literature. However, the practical application of the concept of sustainable tourism development has so far been limited.

A wider perspective on tourism and the environment in the context of a search for strategies towards sustainable development would involve:

- linking development policy with environmental management.
- integration of tourism development and environmental management policies at the local, regional and national level;
- increasing local capacity to cope with environmental issues, particularly in rapidly developing tourist destination areas.

Sustainable development provides the general policy framework for tourist development. Applying the concept of sustainable development to sustainable tourism we find that the idea of carrying capacity or else the desirable, feasible and allowed, level of tourist development is deeply embedded in both concepts. Carrying capacity could be considered as a measure of sustainability. Chamberlain (1997) mentions the following reasons: it is a practical tool to use in maintaining the balance between development and conservation; it is a threshold beyond which one should not go without further planning; it is a benchmark against which one can measure change and the causes of that change; and it is an early warning system for trouble.”

PART B: Defining, measuring and implementing TCC

B.1.Methodological Considerations for measuring and implementing TCC

B.1.1.Defining TCC

In any locality there is a strong relationship between society, economy and environment. Environmental and other geographic features create locational advantages attracting people and economic activities. Human activities and patterns of living are often based on local environmental conditions and resources while at the same time they may affect them. Quite often such effects have impacts on people and their activities. To the extent that such effects do not disturb significantly the structure and dynamics of local human and natural ecosystems there is a perceived state of balance or “harmony” perceived in a dynamic sense of continuing gradual change and adaptation. A critical issue in this perspective is the capacity of a system to assimilate change, which brings forward also the notion of its thresholds or limits. This is the conceptual basis of carrying capacity in tourism planning and management

At a theoretical abstract level, carrying capacity can be defined as the number of user unit use periods that a recreation/tourist area can provide each year without permanent natural/physical deterioration of the area’s ability to support recreation and without appreciable impairment of the visitors’ recreational experience (Coccosis and Parpairis, 1992). Early definitions of carrying capacity have concentrated on a unidisciplinary/one-dimensional perspective (i.e. biology or sociology). However, recent interpretations underline the need for a multidimensional approach combining quantitative and qualitative aspects. The existence of three different types of carrying capacity – environmental, physical and perceptual or psychological – of an area has been suggested by Pearce (1989), referring mainly to negative impacts from tourism such as degradation of the environment, saturation of facilities and decline in enjoyment by visitors. Obviously the above simply describe in a systematic framework the various potential interpretations of carrying capacity. In reality there is a complex pattern of interaction

Box 27: Definitions of Tourism Carrying Capacity*

There have been many attempts to define carrying capacity. Middleton and Hawkins (1998) define carrying capacity as a «...measure of the tolerance a site or building are open to tourist activity and the limit beyond which an area may suffer from the adverse impacts of tourism.» Chamberlain (1997) defines it as «...the level of human activity an area can accommodate without the area deteriorating, the resident community being adversely affected, or the quality of visitors experience declining.» Clark (1997) defines carrying capacity as a «...certain threshold level of tourism activity beyond which there will occur damage to the environment, including natural habitats.» He also states that the actual carrying capacity limit in terms of numbers of visitors or any other quota or parameter is usually a judgement call based upon the level of change that can be accepted, regarding sustainability of resources, satisfaction of resource users, and socio-economic impact (Clark, 1997). The World Tourism Organisation (WTO) proposes the following definition of the carrying capacity (also adopted by the MAP's Priority Actions Programme - PAP): «the maximum number of people that may visit a tourist destination at the same time, without causing destruction of the physical, economic and socio-cultural environment and an unacceptable decrease in the quality of visitors' satisfaction.» (PAP/RAC, 1997) It is evident that there is a large degree of agreement between all the above mentioned definitions which proves that the concept itself is being generally accepted. However, there are more disagreement and scepticism regarding the practical application of this idea, in particular with regard to its use as a management tool. *(From the thematic paper of Ivica Trumbic, 2001)

among levels deriving from the composite character of tourism and the dynamic nature of systems involved (Pearce, 1989). Natural and human ecosystems are characterized by change and adaptation.

In tourism planning, and in simple terms, carrying capacity is the maximum acceptable level of tourist development in an area. Although at a conceptual level carrying capacity is easily understood and accepted, in operational terms it meets with considerable difficulties. For this reason the application of the concept in various tourism studies is limited to a few, “measurable”, dimensions which however might restrict substantially its potential in planning (Gold, 1980).

In practical terms carrying capacity is defined as the «the growth limits an area can accommodate without violating environmental capacity goals» (Ortolano, 1984). The analysis of carrying capacity is used in environmental planning to guide decisions about land use allocation. It is a basic technique widely used to define the capability of an area to accept the maximum level of development like tourism, agriculture, industry, infrastructure/superstructure etc. As there are difference between activities it is appropriate to define carrying capacity according to specific uses. In this respect carrying capacity is *site specific* and *use specific*.

B.1.2.Implementing TCC

In spite of much literature and apparent wide acceptance among planners and decision-makers on carrying capacity, there is limited evidence of its application in practice. Most of the existing experience is in various studies of tourism, particularly in coastal areas and resorts but quite limited in the case of small islands where conceptually it seems an obvious approach. In examining some of these examples it is interesting to note the way that carrying capacity is used in the analysis of tourist potential (rationale and method of estimate) but also as a policy tool in a strategy of tourist development.

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.

Box 28: Calvia: Sustainability as a reference for integrated tourism and local development

Calvia is a well known mass tourist destination. Over recent decades accelerated building development has exceeded the carrying capacity of the coastal ecosystems, producing impacts on the island's natural environment, as well as excessive use of basic imported resources, such as water, energy and materials. The emissions of carbon dioxide into the atmosphere are heavy, 58% of which are from transporting tourists in and out of Mallorca. Underground water is also being over-exploited while 60% of the territory is affected by soil erosion. Overall human pressure on Calvia's territory has multiplied sixty times, from 17 rising to 1,050 inhabitants per sq. km during the high season. The pressure has been distributed unevenly: the coastline of over 2,000 hectares has densely populated areas where the pressure soars to almost 3,000 inhabitants per km² in the high season. Yet the remaining two thirds of the island territory on the other side of the Palma –Andratx motorway, has marvelous town centers, valleys and mountains, where the population densities barely reach 110 inhabitants per sq. km.

In the case of Calvia, the concept of absorption capacity or desirable limits for change has been incorporated within a broader framework of planning for sustainable development, including an overall vision of local and island space and a statement of solidarity against global environmental problems.

Defining but also implementing Carrying Capacity limits in a resort, which has reached saturation, presents several difficulties. The revision of the 1991 General Town Planning Regulation indicated some efforts towards this direction. The 1991 GTPR although restricted building in comparison with the previous situation, it still allowed the construction of 250,000 tourist and residential units in the future, 65% more than at present. The revision contributed to a progressive reduction in the theoretical population ceiling: from 400,000 units in the 1982 Plan to 250,000 in the 1991 Plan and to 215,000 in the 1998 Plan. However, there is a steady real growth in the resident and visitor population which in the summer of 1998 reached a peak of 190,000.

Furthermore, initiatives in respect to key environmental sectors, which are characterized by unsustainable use like local mobility, water, energy consumption and urban waste, have been undertaken. Within this context the Building Clearance Plan has been implemented, as part of the Tourist Excellence Plan, resulting to the demolition of 12 buildings in areas with mass development, which have then been replaced by green spaces or leisure facilities. (Ajuntament de Calvia, 1999.)



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.

Obviously in considering carrying capacity the three components should be considered with 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 organisational 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 for 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 urbanisation, 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 visitors' experience.

-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 the destination level. Such action is easier to become incorporated within 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/organisational 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 guiding 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.

Box 29: TCC limit: a unique number or a management tool?*

On one hand, there are requests that the major output of Carrying Capacity Assessment (CCA) is a "number" followed by strict rules that would regulate and impose the resulting number of tourists. On the other hand, more moderate proponents of CCA state that it should only be a tool that could guide tourist development in a certain area. The elaboration of a strategy for CCA can be a guiding tool for tourism development, while quantifications of the limits could be pursued wherever possible. In any case, the outputs of CCA should be considered in a flexible way since the parameters could change following the situation in the area.

*(From the thematic paper of Ivica Trumbic, 2001)

Box 30: Searching for a unique numerical value*

Carrying Capacity Assessment, as a precise technique, was introduced in the 1960s as a method of numerical, computerised calculation for defining land use limits and imposing development controls in an objective way (Clark, 1997). Earlier, when it was applied to tourism, stakeholders were looking for «a number». Truly enough, calculations in the early periods (late 60s to early 70s) were quite simple. They were often based, for example, on the division of the available area of a certain beach by the area occupied per person. Today, there are still examples where carrying capacity is being calculated following such approaches.

*(From the thematic paper of Ivica Trumbic, 2001)

Box 31: TCC as a management system

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

Hall and Lew (1998) state that carrying capacity is increasingly being identified as “...a management system directed towards maintenance or restoration of ecological and social conditions defined as acceptable and appropriate in area management objectives, not a system directed toward manipulation of use levels *per se*.” Carrying capacity analysis helps establishing a development benchmark which is certainly more important than 100% accuracy.

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.

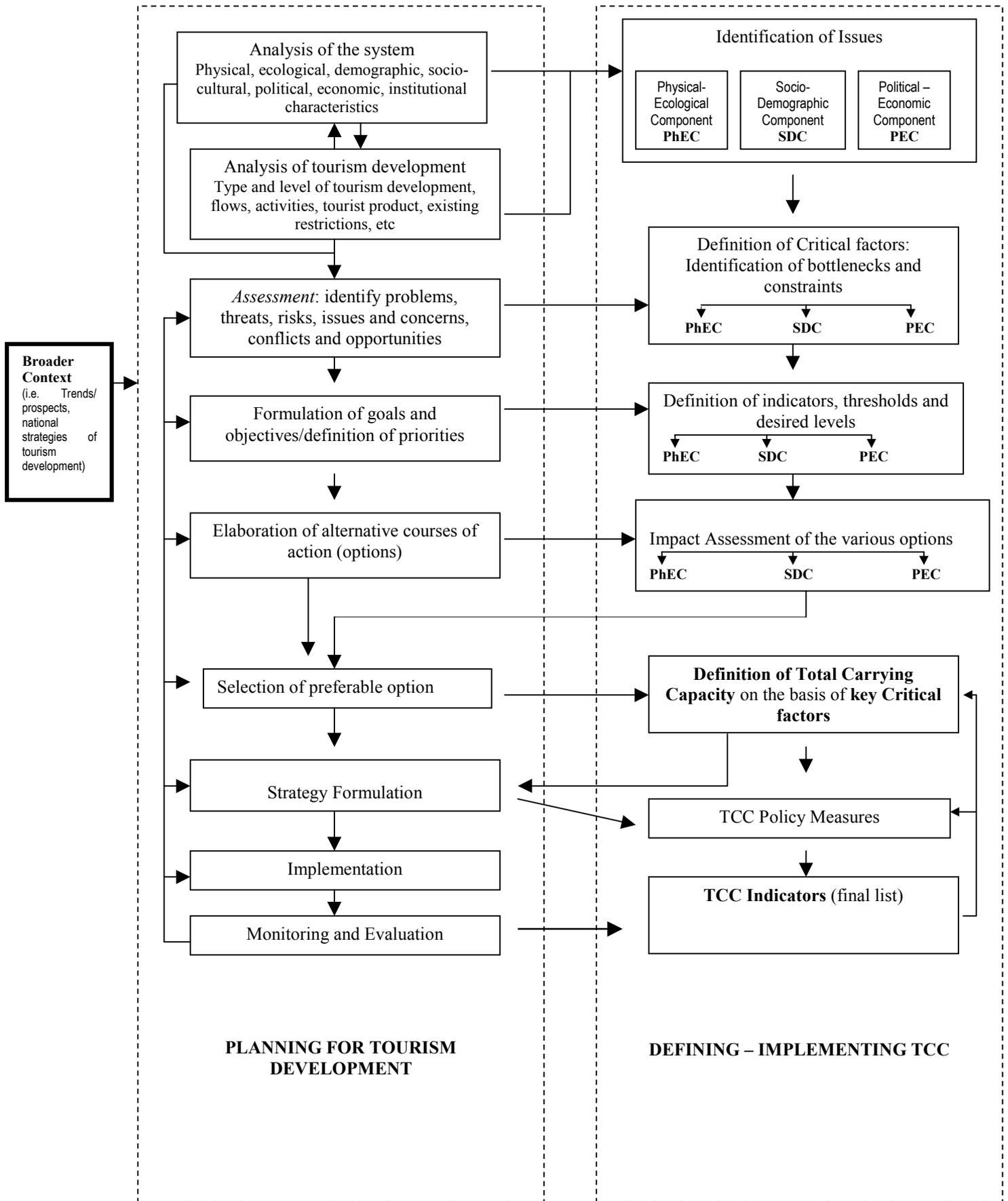


Figure 2: TCC as part of a planning process

B.2.2 The Components

On the basis of the main dimensions of the development/environment interface, following a systemic analysis, the impacts of tourism in an area can be analysed 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 organisational). These can provide also the basis for analysing and assessing TCC in terms of main and distinct—but interrelated- components (UNEP/MAP/PAP, 1997)

A. *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 that 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-making on management/action options.

Box 32 TCC study based exclusively on physical components

In the case of **County Donegal** (Ireland) limits to tourism use were defined on the basis of the physical characteristics of the destination area (i.e. services, accommodation, infrastructure, road capacity for touring, assumed maximum number of use on hill land and beaches, available labour). The number of visitors that could be absorbed and accommodated was defined for certain destination sites. in Country Donegal. This study focused almost entirely on the physical aspects of capacity and did not deal with the social characteristics of the visitors or the host populations, nor with the economic capacity of the destination communities to absorb the effects of tourism.

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. 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 ones 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

C. Political-economic component

The **political-economic** set refers to the impacts of tourism on the 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 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 various components (as presented in the following Table) or a combination of them.

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 the 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 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 non 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 relating 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 Major Issues

Carrying capacity is a powerful concept for policy making although from a scientific perspective it has met 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 (MBO) 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:

Box 33: The “Limit of Acceptable Change (LAC)” approach

“The LAC approach strives to define those conditions which are deemed desirable in an area and sets up management strategies to achieve specified goals. This approach does not look for use limits or numeric ceiling values but uses the concept of land –use zones where a set of desired conditions in terms of social, ecological, physical and economic impacts are maintained. **Standards** are set and **indicators** employed, to identify when unacceptable impacts emerge, with subsequent actions taken to modify the situation in line with management objectives. Indicators may relate to the various components of tourism impacts for ex. Traffic and people congestion. (Glasson J., et al., 1995, pp. 149-150)

Box 34: Visitor Impact Management

Visitor Impact Management follows on from LAC. The VIM approach establishes what are considered to be unacceptable visitor impacts, determines the likely cause of these impacts and sets in motion a series of actions to address the problems. What is significant to this approach is a response to the dynamics of the industry, involving a long-term outlook. Like LAC approaches it does not seek a numeric value, instead it identifies a set of standards which can be used to compare with existing conditions. VIM is a process of adaptation, which describes desirable conditions and evaluates current activity as a basis for setting tourism management objectives. It does not consider tourism in isolation but integrates the sector within other socio-economic development activities, thus forming an element of comprehensive local (and regional, as appropriate) development plans. (Glasson J. et al. 1995, pp.150)

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.

Box 35: Implementing TCC: spatial considerations

The scale of CCA should be limited. It should be middle to small scale, in practice, it could be applied at the sub-national, regional scale and at lower spatial levels. Lengthy coasts, such as those in Croatia or Greece, are too large for effective application of CCA. In this case the coast can be divided into a number of smaller geographical and/or functional units. CCA could be measured for each one of them separately.

The application of CCA is encouraged in the case of small islands. *Islands* are quite appropriate for the implementation of CCA. They are, in physical terms, relatively closed systems. In social and economic terms islands could be more open but is still relatively simpler to assess carrying capacity for tourism. It is no wonder, then, that the majority of CCA studies are carried out on the islands. Contrary to that the application of CCA in the case of mainland coastal areas, particular in transitional environments, could confront difficulties since it is difficult to establish the precise boundaries of physical, social and economic systems. This could render the calculation of carrying capacity more complex.

Box 36: Coastal area – Coastal zone: the appropriate level for TCCA

From the tourism development perspective, it is important to make a distinction between the “coastal zone” and the “coastal area”. Coastal zones are where most of the problems of tourism development are concentrated today. Coastal areas, on the other hand, offer the opportunity for sustainable tourism development in the future. The “coastal zone” is most frequently defined as a relatively narrow stretch of land affected by its proximity to the sea and that part of the sea affected by its proximity to the land. The coastal zone has been very attractive for tourism developers in the past. Consequently, because of the increase in use densities such development has brought, it is easy to conclude why so many coastal problems are concentrated in the coastal zone today. In most cases, the environmental and other limits were exceeded and coastal zone ecosystems were not capable to cope with the resulting pressures. The “coastal area” is geographically broader notion than the coastal zone. In most definitions it includes all terrestrial ecosystems and the territorial sea up to 12 NM. It usually extends to the nearest mountain range inland but could be extended well into the hinterland in order to allow for integration of all environmental, social, demographic economic and other processes (UNEP, 1995). In this respect, the territory relative to the coastal area is more appropriate for the implementation of the Tourism Carrying Capacity Analysis (TCCA).

Box 37: The role of various actors in the implementation of visitor management initiatives

Visitor management initiatives can be pursued under a variety of policy frameworks. The Oxford Local Plan Review (1999-2001) included policies on transport and tourism, accommodation and information for tourists.

The establishment of the Oxford Tourism Forum represents an important contribution towards policy implementation. The Forum has already been a catalyst for public/private sector co-ordination and joint funding. Recent initiatives include a more co-ordinate approach to central coach parking, visitor dispersal via new walking trails and an extension of bus routes and the development of an “Oxford Package” of linked activities with joint ticketing. Implementation depends on the attitudes of the key actors involved and their willingness or otherwise to accept the implications of a management approach. (Glasson J., et al., 1995)

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 such as coastal zones)
- The implementation of carrying capacity needs to take into consideration *cultural elements*

Box 38: Visitor management: the case of Heidelberg

The city of Heidelberg (Germany) provides a fascinating example of a community's response to visitor management. The approach adopted is set out in Guidelines on Tourism Heidelberg which are structured around three dimensions, each with main and secondary objectives:

Economic: securing present and future jobs in tourism on a seasonal and long-term basis

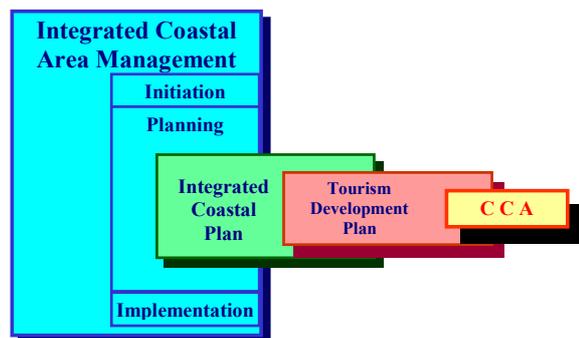
Socio-cultural: preserving the distinctive character of Heidelberg and promotion of the town's identity

Ecological: promoting an ecologically acceptable level of tourism. The above had several positive implications including re-targeting towards overnight tourism and towards particular groups, strategic shift towards seasonal working to capacity by transferring visitor potential into the low season, safeguarding of the identity and attraction of the city for local residents by, providing a programme of cultural events, etc, encouraging environmentally friendly travel by visitors to the town, etc. (Glasson J., et al. 1995)

Box 39: Integrating TCC in the planning process: the case of coastal areas

Since tourism development largely depends upon the protection and conservation of coastal ecosystems, its management should be closely linked to ICAM (Integrated Coastal Area Management) since it regulates the management of coastal ecosystems. The definition of carrying capacity is highly instrumental in establishing these links.

CC Assessment should be a tool of ICAM (see following diagram). The main purpose of CCA is to provide parameters relative to the development of tourism which is, again, one of the major components of coastal area development.



The PAP CCA guidelines provide two alternatives for CCA: (1) when it is not being prepared prior to the initiation of the ICAM process; and (2) when the tourism plan and CCA were prepared before the initiation of the ICAM process. Guidelines provide detailed steps on what needs to be done in either of the above cases.

Integrating TCC in the planning process and institutional context

- Carrying capacity studies have to be incorporated in a plan for sustainable development although this is not a prerequisite for employing 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.

Box 40: A monitoring system for the protected area of Dadia in Northern Greece

A monitoring system for the protected area of Dadia in Northern Greece is being implemented in order to acquire information about the conditions and the changes incurring in the protected area. This application allows the identification of the parameters/issues that would render necessary the conversion of the existing system of zoning so as to assure the protection of the area (i.e. the zoning system could be extended so as to ensure protection). Monitoring is significant for the development of eco-tourism since it allows the early identification of impacts on the ecosystem from tourism development. It could be also useful for the management of visitor's flows.

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 privatised. This may probably lead to increased 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 the 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 does not 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 the 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 the European level there are several instruments that may encourage and facilitate the application of tourism carrying capacity (TCC). There are opportunities to include TCC (as guidelines) in existing interventions and tools that 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 tourism 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.

Box 41: The National Park of Alonissos

The establishment of the National Marine Park of **Alonissos** and **Northern Sporades** in Greece, in 1992, aimed at the protection of the monk seal, *Monachus monachus*, which biotope had confronted severe problems in the past due to fishery and tourism development. Tourism has increased since the establishment of the Marine Park since Alonissos became known to the public as the island of the monk seal. Although the opportunities for actually seeing monk seal are rather limited, tourists choose to visit the island. The existence of a zone of rigid protection assures the protection of the species from the potential impacts of tourism development.



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

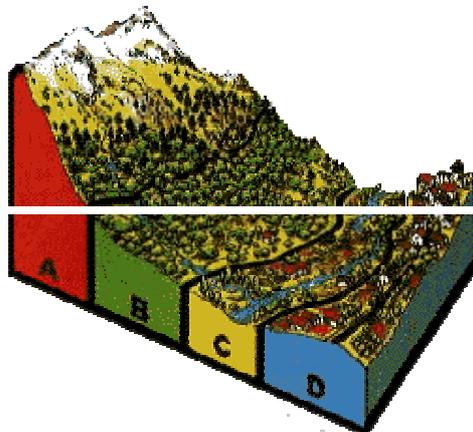
Box 42: The application of a zoning system in protected areas: the case of the Abruzzo National Park and the protected forest of Dadia

The **Abruzzo National Park** (Italy) is internationally considered as a good example in nature conservation. It has succeeded to demonstrate that the protection of the environment can provide positive impacts and economic advantages such as higher income and employment opportunities. A zoning system has been implemented while a special agreement with local Communities exists in order to overcome conflicts related to urban planning provisions.

The division of the Park into zones enables the delineation of different land uses and man's activities in order to be compatible with the ecological and cultural values of the area:

- *Zone A, Wilderness Area:* it consists the most sensitive part of the Park, which requires absolute conservation. Access to visitors is only allowed on foot. Visitors can walk along
- *Zone B, Nature Reserve:* it consists of an extensive 'green' area that needs to be conserved but where some human activities take place. Traditional activities like agriculture, forestry and sheep farming, are allowed under the control of the Park authorities. Visitors can walk or ride along specific routes; motor vehicles are allowed only on roads authorised for circulation.
- *Zone C, Protected Area:* it consists of a typical rural environment in which agricultural and pastoral activities dominate. The continuation of these activities is encouraged, along with the respect of local traditions. Access to this area is unrestricted.
- *Zone D, Development Area:* it consists of an area with villages whose historical centres are being restored and revitalised. There are also picnic areas, animal reserves, visitor centres and nature trails. This zone allows for the development of cultural and recreational activities for local communities and visitors.

Zoning has proved to be an effective measure in several other cases such as the protected forest of **Dadia** in Northern Greece. Two cores of absolute protection with a total surface of 72,500 thousands sq. m. have been identified along with a peripheral zone with a total surface of 357,100 thousands m². A Presidential Decree is under preparation; within this context the zoning system will become more detailed and specific. It should be noted that there would be no particular zones for tourism development but *conditions* for the practice of various tourism activities for each one of these zones.



Box 43: Targeted measures for critical problems*

The problem most frequently confronted by the heritage city councils is traffic and parking. In most cities, a policy to manage traffic congestion has been implemented in the form of a park and ride system in the town's periphery, often in combination with a new traffic plan. In the cities of **Bruges**, **Oxford** and **Salzburg**, the pressure from day-visitors has been eased by means of control of incoming excursionist buses, which are easy to spot and thus to divert. Similar management schemes are being implemented in the smaller Spanish art cities of **Toledo**, **Granada** and **Segovia**.

*(From the thematic paper of Jan van der Borg, 2001)

- *Limits to free access.* It can significantly contribute to 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.

Box 44: Limits to specific activities in protected areas: the case of the Medes archipelago

The marine reserve in the Medes archipelago (Spain) is formed by seven small islets and numerous reefs. The area is extremely rich in marine life and is therefore the ideal place for underwater activities. However, the marine area around the islands is protected since 1990 and two protection zones have been established. Water and underwater activities are regulated (1st zone) or prohibited (2nd zone).



Limits to specific activities. All kinds of tourist activities have to be evaluated in order to prevent environmental impacts 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 accommodation and other public establishments had a little overall effect on resource consumption and waste production.

Box 45: Management of sport activities: the case of the Steinhuder Meer Nature Park

The Steinhuder Meer Nature Park is an important bird habitat (Ramsar area, EU Bird Protection Directive area) but also the most attractive recreational area for the conurbation of Hanover, in the north of Germany. The core area of the park is constituted by the lake Steinhuder Meer. The main sports and recreational activities are water-sports, biking and hiking. In order to protect habitats and wildlife, the park authority in co-operation with local and regional authorities established a zoning system. Facilities for tourism and recreation are concentrated in two areas while all other areas along the lake are strictly protected. The park's visitor management system is based on limiting access to nature without banning it completely. A circular path for hiking and biking has been built around the lake gathering the people in certain areas. The route is well marked, while information is provided in respect to the reasons for the imposition of these restrictions. Water-sports are allowed now only from the first of April till the 31st of October in order to avoid disturbance of the birds. Furthermore, certain parts of the lake have been designated as nature protection areas, and access to them is prevented by buoy chains.

Finally, a free shuttle service is provided to carry visitors from the larger car parks, which have been built away from the core area of the park. The park is also accessible by bus and by train. Bike rental is available at the stations.

In general, visitors have accepted the restrictions introduced, with the exception of the water-sports limitations.

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.

Box 46: Dispersion strategies

English Heritage has implemented several policies to spread the tourist load and diminish wear and tear phenomena in several sites. Some examples:

- Hadrian's Wall: information for a popular site has been removed from the maps that visitors use, in order to reduce the annual number of visitors (500,000) and prevent irreparable damage
- Spreading visitors geographically and seasonally by keeping the sites open even during low season periods and promoting an advertising campaign
- Spreading visitors within a property. At Okehampton Castle in Belsay, woodland walks have been introduced to encourage visitors to explore the area so as to relieve pressure on the main area of the estate. At Osborne House the direction of the visitor flow was revised to ease pressure. The Swiss Cottage has been improved and a horse coach has been used to spread visitors around the estate.

Box 47: A visitor management strategy for Canterbury and Bruges

Canterbury (UK) has evolved over the last 15 years a visitor management strategy, on the basis of a long-term plan for sustainable tourism set up in 1985. The objectives were to lessen the physical impact of tourism, to provide for inevitable growth in visitor pressure to use part of the profits from tourism into the preservation of the city's historic fabric and to protect the lifestyle of the resident population. Six strategic themes have been developed:

- *Control of traffic*. A program of pedestrianisation has reduced the volume of traffic from the city centre. A parking strategy (price and provision of park and ride facilities) discouraged parking in the city centre.
- *Conservation*. Imposition of a strict design control on commercial development with the scope to control modifications of old buildings.
- *Dispersal through product development*. Introducing new attractions in restored historic buildings so as to disperse visitors around the city. This policy has produced benefits for retail and catering business located outside the tourist core.
- *Providing for groups*. Creation of new park site for coaches in proximity to the city centre, providing facilities for tourists and drivers. This policy allows for a greater degree of control over the coach trade.
- *Price Policy*. The cost for parking in the city centre is higher than parking at the park and ride facilities. An entrance fee has also been introduced to the cathedral.
- *Involving the host community*. Creation of a public/private organisation (Canterbury City Centre Initiative) aiming at involving the resident and business community in the decisions affecting the city centre.

Canterbury has made great progress in coping with its growing popularity as a tourist destination, however the adoption of management measures have encouraged further growth in visitor flows to the point where the city's carrying capacity is frequently exceeded.

In contrast to Canterbury's strategic goal of visitor dispersal, **Bruges** (Belgium) city authorities decided to pursue a strategy of concentration. Their intention was to restrict tourism to the city centre and discourage tourists from visiting residential suburbs. The policy was designed primarily to protect sensitive residential areas from hotel development. However, the result has been the gradual disappearance of resident-oriented shops and business from the city centre. The main disadvantage of the concentration model was the loss of variety. Tourists occasionally found themselves in areas resembling virtual theme parks, surrounded only by other tourists. (Curtis, 1998).

- *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, flow management 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 market prices various externalities like environmental degradation. 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 tourism development.
- *Incentive schemes* should be applied in both public and private sectors in order to spread tourism demand over time and space thus optimising the use of accommodation.

Box 48: Use of a tourist eco-tax: the case of the Balearic Island Region

The Balearic Island Region (Spain) has introduced a tourist tax (Ecotax) in order to raise funds so as to resolve some of the crucial environmental problems (over-exploitation of aquifers; increasing demand of electricity, water supply and water treatment of about 8-10% p.a., etc). The ecotourist tax will provide the financial resources for the Tourist Areas Restoration Fund. It is, therefore, a tool to improve tourism, the major source of wealth and employment in the Balearic Islands. On the other hand, the ecotourist tax is a way to shift part of the cost for the restoration, improvement and conservation of the natural and cultural heritage of the islands to tourists. It strengthens solidarity between visitors and residents.

The funds collected must finance actions that guarantee the improvement of the tourist trade, the preservation of the environment and the maintenance of the natural and agricultural landscape of the Balearic Islands and, specifically contribute to:

- Redesign and restore tourist areas.
- Upgrade natural resources and open and rural spaces.
- Revalidate heritage resources of social, cultural and tourist relevance.
- Revitalise agriculture as an economic and competitive activity.

The tax will involve a small amount per tourist, around 1 Euro per day (around 2% of a tourist's average daily expenditure). The tax is imposed to visitors and not to enterprises. Children under 12 and adults who come within a social programme do not pay the tax.

The Balearic Islands' Autonomy Statute empowers the community to establish its own taxes. At the time of preparing the current Document the tax was not imposed due to an appeal of the Spanish Central Government to the Constitutional High Court.

Box 49: Data collection–Information Management

In the majority of destinations, official statistics do not display information about the composition of tourism demand. The number of overnight visitors and day visitors is important for the analysis of tourism in heritage cities. Especially, since the growing interest in cultural tourism is usually manifested in an increase in the number of day trips and much less in terms of overnight stays (Costa and Van der Borg 1992). Therefore, in order to better understand the relevance of tourism in these cultural destinations, it is essential to observe the composition of the visitor flow.

Organisational

- *Reservation and booking systems.* These 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

tourists' 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.

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 tourism development. Evidence from practice 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 (7 to 9) the main topics/thematic areas (i.e employment, demography) addressed by the indicators are presented.

PHYSICAL-ECOLOGICAL INDICATORS						
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

Table 7: Thematic Areas of the Physical-Ecological indicators
H = High priority

<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	

Table 8: Thematic Areas of the Socio-Demographic indicators

H = High priority

<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

Table 9: Thematic Areas of the Political -Economic indicators

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.

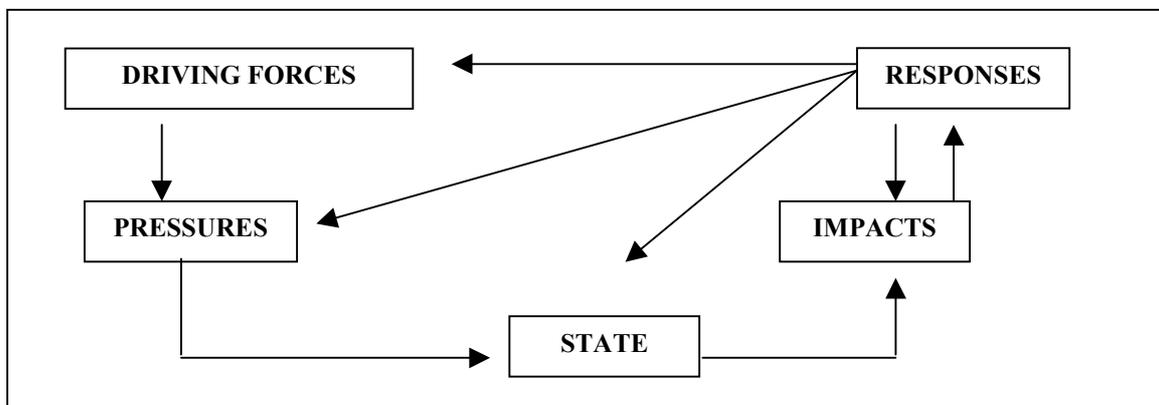


Figure 3: DPSIR Framework

In the tables 10 to 12 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 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.

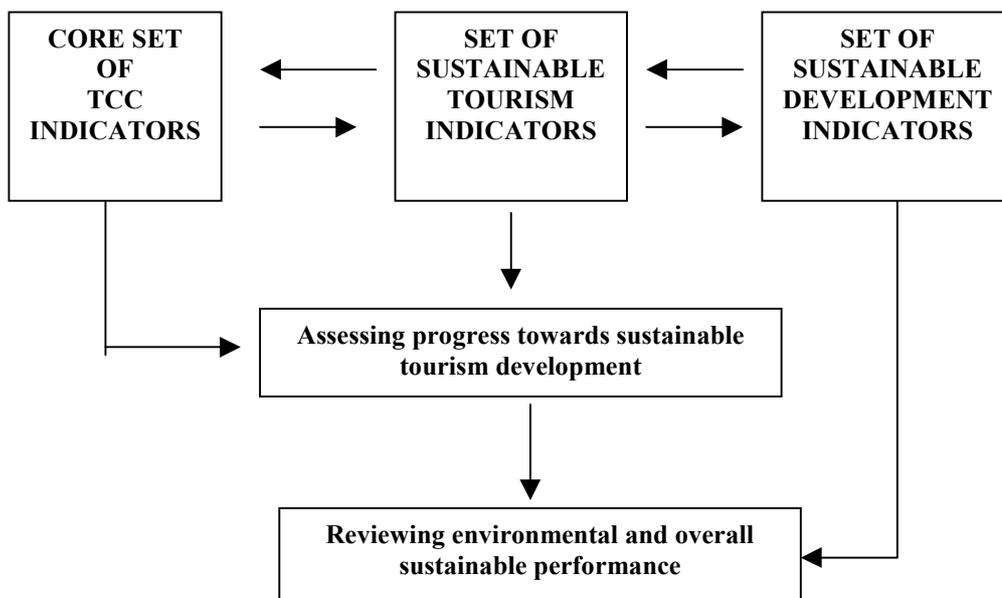


Figure 4: TCC-Sustainable Tourism-Sustainable Development Indicators

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 10: Physical –Ecological Indicators

<i>PHYSICAL-ECOLOGICAL INDICATORS</i>			
ISSUES	SUSTAINABILITY INDICATORS	SUSTAINABLE TOURISM INDICATORS	TOURISM CARRYING CAPACITY INDICATORS <i>(see Special Note, par. B4)</i>
1. Natural environment and biodiversity			
<i>1.1. Ecosystems</i> <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 <ul style="list-style-type: none"> • 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			
<i>11.1. Accessibility (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)
<i>11.2. Infrastructures</i>	-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)
<i>11.3. Mode of transportation</i>		People using public transport / resident population + tourists	
<i>11.4. Safety</i>		Accident levels: Distribution of the number of car/water related, etc accidents during the year	

Table 11: Socio-Demographic Indicators

<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

SOCIO-DEMOGRAPHIC INDICATORS			
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 12: Political –Economic Indicators

<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

PART C. Examples of tourist areas which applied Tourism Carrying Capacity approach

The review of literature, along with Internet survey has provided valuable information regarding the definition of TCC. However as already noted examples of actual implementation of TCC are still limited. It should be noted that TCC assessment has been carried out but not in all the cases implemented. Furthermore in several cases measures (limits) to control tourism have been implemented without previously assessing and defining the TCC of the resort. Since evidence from practice is limited such “incomplete TCC examples” are being described in an effort to stimulate action and discussion about the opportunities and constraints from implementing TCC as a tool for promoting sustainable tourism.

C.1. Examples of tourist areas which applied TCC assessment

The case of Elba Island, Italy

In the case of Elba Island (Italy) a mathematical Model for the analysis of Tourism Carrying Capacity of the island has been elaborated so as to serve the Local Authority as a management tool. The analysis is focused on the physical ecological and socio-demographic components of TCC.

In particular the Study aimed at maintaining the *quality of tourist's experience* and at securing the *conservation of natural resources*.

The model has been elaborated in three steps.

1. *Identification of the measurable limiting factors*. Those factors were of physical and social character:
 - water supply capacity,
 - waste treatment capacity,
 - utilisation of basic resources (beach surface per person), and
 - pressure on the population (tourist/inhabitants ratio).
2. *Definition of four sustainability scenarios*: conservative, high sustainability, low sustainability and degenerative. Each scenario was correlated with one of the previous limiting factors. The overpassing of the critical value of a limiting factor (i.e. water treatment capacity per day) causes the shift from one scenario to another. Furthermore each scenario is associated with an alarm degree: Null (I), Low (II), Medium (III) and High (IV). The most critical factor was proved to be water supply.

Limiting factors	Tourists per day	Scenarios					ALARM DEGREE
Water supply	52,646	conservative	I				
Beach use	60,100	high sustainability		II			
Waste Treatment	65,428	low sustainability			III		
tourists/inhabitants	89,922	degenerative				IV	

3. *Calculation of the number of tourists correlated to each scenario.* The increase of human pressure (i.e. the increase of the island's population due to the arrival of tourists) causes the shift from one scenario to another. In this step the number of tourists was correlated to the critical value of each factor.

The utilisation of the above model allows the monitoring of tourism flows on a daily basis and the identification of critical areas and periods of the year where the island exceeds its tourism carrying capacity. At the moment action plans have not been implemented. (Quintè E., 2001)

The case of Rimini, Italy

Rimini (Italy) is the most famous tourist coastal destination in Italy, characterised as a mature tourism area, saturated from the point of view of land-use and pressure on the natural resources. In this context any development scenario should aim at the reduction of the pressure on the environment, the promotion of sustainable policies and the participation of the private sector in the above actions.

The Carrying Capacity Study (Conte G. et al., 2001), which was still ongoing at the time this report was being prepared, aimed at the assessment of the socio-economic and environmental impacts of tourism.

During the first phase of the Study a series of indicators for the evaluation of the carrying capacity of the system have been proposed. The indicators were applicable to the socio-economic and environmental sectors.

Two thematic areas have been identified for the socio-economic sector:

- Type of tourist system (tourist flows, tourist density, etc)
- Employment and income (employment, GDP from tourism activities, etc.)

Seven thematic areas were considered for the environmental sector:

- Energy consumption and CO₂ emissions;
- Waste production and management;
- Water (water consumption, water quality sampling, etc);
- Natural environment, territory and biodiversity (land use, urbanised areas, etc);
- Transport and mobility (daily traffic, number of accidents, etc);
- Air quality; and
- Noise.

For each thematic area some indicators have been selected in order to monitor the effectiveness of the policies implemented. The above analysis would allow the identification of critical social or environmental problems. In any case the list of indicators prepared by the experts represents only a proposal, while the final decision for the indicators to be used will be taken in consultation with the various stakeholders (public administration, tourist operators, environmental associations, citizens, etc.). The second phase of the Study foresees the preparation and the assessment of two alternative tourism development strategies

The case of Venice, Italy

The problem of determining the social-economic carrying capacity for the centre of Venice has been formalised in Costa and Van der Borg (1988) and in Canestrelli and Costa (1991). They translated the conflict between tourism and other functions into a fuzzy linear programming model that maximises the *income* from tourism under capacity restrictions. These restrictions take into account, for example, the *availability of accommodation, catering facilities, parking facilities, intra-urban transportation, waste disposal services and the space available in Saint Mark's Cathedral*. The linear programming model follows certain sustainability principles, namely that of the quest for the optimal use of resources. Until now, the model has been applied with success to different mature tourist resorts, such as Cambridge (urban environment), Crete and Capri (islands) and Cortina d'Ampezzo (mountain resort).

The authors found that in the case of Venice, the historical settlement can support about 25,000 visitors per day, of which about 15,000 tourists (60%) and 10,000 excursionists. The restrictions taken into consideration were: the number of beds (the model tends to "fill" Venice first of all with tourists and then starts to look whether there is still space available for excursionists); the availability of local water transport (which determines the number of excursionists); and, the carrying capacity of Saint Mark's Cathedral.

Although the model lacks an explicit temporal dimension, its results are of great interest for visitor management. First it indicates that the 'optimal' visitor mix differs from the actual one. In fact, tourists represent only slightly more than 30% of the actual total tourism demand instead of 60%. Secondly, it was concluded that at present the overall pressure from tourism is slightly violating the capacity limits of the system. In the absence of fluctuations in demand, the total carrying capacity of Venice is slightly less than 10 million visitors per year, while the actual number of visitors is 11 million. (Canestrelli, E. and Costa, P., 1991; Costa, P. and Van der Borg, J., 1988)

The case of the Lanzarote Island, Spain

The "Lanzarote Biosphere Strategy" developed by the Lanzarote Island (Spain) Regional Government proposed a new type of development in contrast to the actual trends in order to maintain the ecological equilibrium and to improve the quality of life of both residents and visitors. In order to achieve this objective it was necessary to reduce human pressure

on the system, that is reduce tourist flows to rates compatible with the assimilation capacity of the island, and reorient development policy on the basis of sustainability criteria.

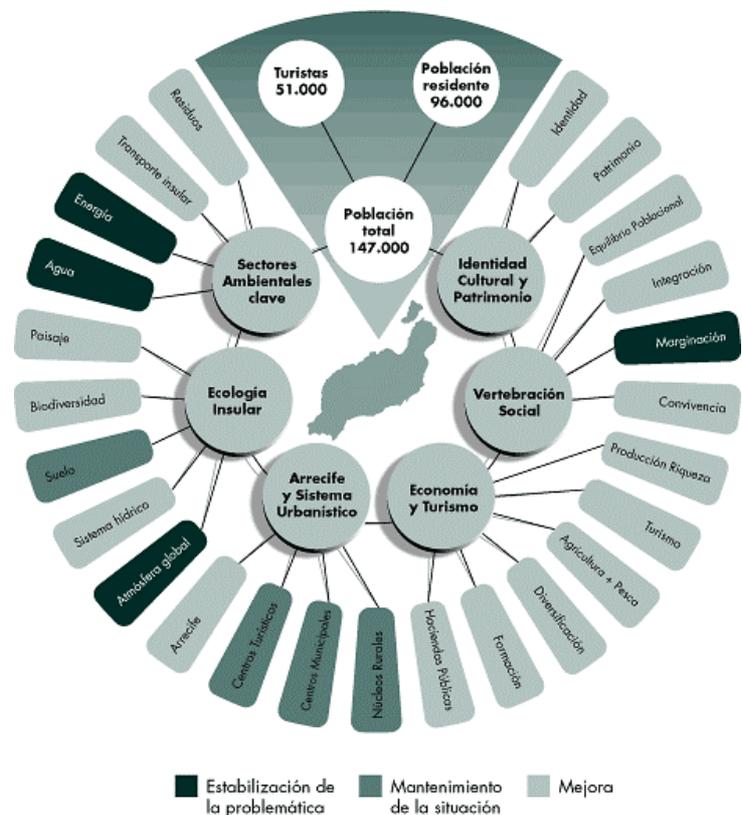
The formulation of the Strategy was based on the analysis, conducted by local and external experts. The analysis included the study of the current state of the system, the development trends and the risk factors. A wide survey on the population opinions and aspirations, through interviews, provided significant information to the analysis. On the basis of the outcomes of this analysis, two different *development scenarios* have been constructed: the Risk Scenario, which follows the present development trends, and the "Biosphere Strategy", which is based on sustainability criteria.

The elaboration of the two scenarios was based on the analysis of 7 major thematic areas. The evaluation of the variation in the thematic areas in each scenario was carried out with the use of several indicators. The thematic areas were the following:

- ✓ population (residents and tourists),
- ✓ cultural identity and heritage,
- ✓ social structure (social integration, employment, education, etc),
- ✓ economy and tourism,
- ✓ the city of Arrecife and the urban system,
- ✓ island ecology and
- ✓ key environmental sectors (water resources, energy, waste, etc).

The evaluation of the Risk Scenario indicated that maintaining the type of development followed in the last decade is not desirable since the costs will overpass enormously the benefits. The ecological, social and economic carrying capacity of the island has reached its limits.

The "Biosphere Strategy" defined 8 axes for actions and 28 programs. The most relevant action for the tourism sector is the limitation of the tourist inflow to a scale and rate compatible with the sustainability limits of the island. A limit has been suggested for the creation of new tourist establishments (limited to 8,000 new places instead of the 200,000 previously foreseen) for the next ten years, while promoting the replacement of outdated tourist units. This proposal however is based on the assumption that additional programs targeted to the sustainable development of the island would be also implemented.



The island of Rhodes: Greece

CAMP Study

The study for the definition of Tourism Carrying Capacity of the central and eastern part of the island of Rhodes (Greece), which is in the phase of a marked take-off of the overall tourism development, had as an objective on the one hand to provide decision-makers with a basis for defining concepts of a balanced development of tourism on the island of Rhodes and on the other hand to serve local institutions, planners and experts as a framework for planning and management for sustainable tourism. It should be noted that the Study was a part of the “Coastal Area Management Program” for the island of Rhodes, which was carried out by the Mediterranean Action Plan in cooperation with the Greek national and local authorities. Furthermore the study has been prepared in parallel with one of the most important activities carried out by PAP (Priority Actions Program) that of the Integrated Planning Study. The TCC study provided input to the precedent study.

The maximum level of tourism usage was determined on the basis of the following: *tourism business intensity, tolerance* (desired level of satisfaction) of tourists and *constraints related to economic and socio-cultural aspects*. The process followed included:

1. *Identification of Key problems* (tourist monoculture, limited availability of local labour force for employment in tourism, control of population inflows, preservation of the socio-cultural substrate of the island, preservation of a desirable image of the island)
2. *Identification of constraints*, whose control shapes overall development. The study has indicated that the constraints do not lie in the availability or the existence of space, of environmental resources and infrastructure. Instead the problems and related constraints lie in the economic and socio-cultural sphere
3. *Definition of qualitative determinants*. It includes various preconditions: relative decrease in the long run in the dependence of island's economy on tourism, demand for more specialized tourist products, etc
4. *Definition of quantitative determinants*.

Physical Carrying Capacity (in the particular case study the physical component represents the spatial characteristics of the area. The capacity limits are defined on the basis of land availability. Furthermore the Physical Carrying Capacity has been defined on the basis of various assumptions (tourist facilities can be located within a 1km wide coastal belt), corrective factors, defined goals (i.e 40% to 60% ratio for the high and medium-class facilities in the given area) and various standards (i.e 50 users per ha for high class facilities and 90 users per ha for medium-class facilities). The same value for Physical carrying capacity has been calculated with the application of beach standards (i.e. 6 m² for medium –class and 8 m² for high-class tourist units).

Ecological Carrying Capacity. Given the ecological characteristics of the area and the level of the various activities, it became apparent that there are no constraints

posed by the presence of the various ecosystems that could hinder tourism development.

Socio-Economic Carrying Capacity. Following the goals defined (improvement of the quality of future hotel establishments, etc) some standards were selected in respect to the employment (1 employee per two tourist beds) and the average tourist expenditure (in the long run the tourist expenditure should never exceed 70% of the gross domestic product of the area under study: *upper limit*).

5. *Identification of key constraint:* migrant labor
6. *Formulation of alternative hypothesis* for the population growth for the years 2000 and 2010. Elaboration of two scenarios for the migrant labor for the years 2000 and 2010 on the basis of the above hypotheses.
7. Calculation of selected indicators (number of beds, bednights, arrivals, receipts, ratio of tourists/local population and average tourist expenditure) for each scenario (option)
8. *Selection of desirable option:* Calculation on the basis of the real key constraint (migrant labor) of the total carrying capacity for the whole area taking into account the desired upper limit of the tourist expenditure.

(UNEP/MAP/PAP, 1993a).

The MIO-ECSDE Model of Carrying Capacity

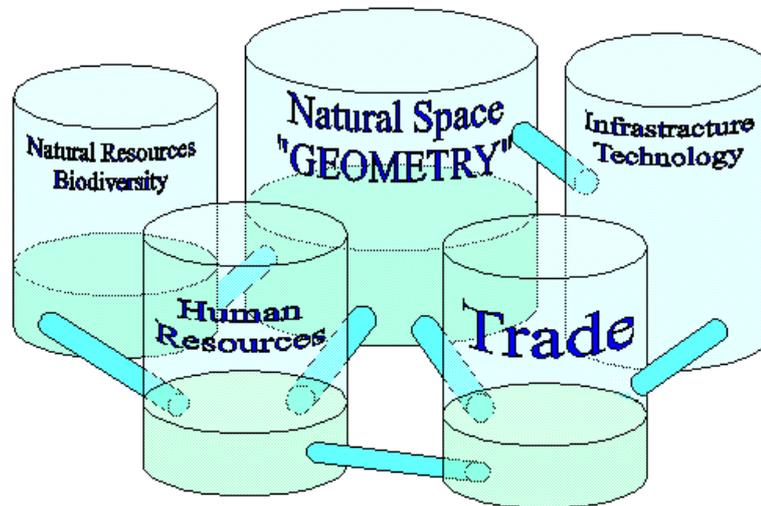
The model (its present form is still qualitative and suitable to demonstrate CC) is inspired by ideas borrowed from hydraulic and ecotoxicological experiments. The area under study can be viewed as a system of “tanks” of various volumes, which represent each one of the parameters (e.g. the natural space, the natural resources, etc.) connected at different depths, to signify that for each “resource” to contribute in the overall CC a certain “critical mass” or background level should be reached. In order not to exceed the CC of the system the different groups of “aquatic organisms” (representing indicators) placed randomly in the various tanks should not exceed at any point a certain level of risk, which might be defined by consensus (e.g. the non-effect level or the LD50, etc. but in any case the lethal dose for the specific organisms, kept in each one of the tanks, cannot be exceeded). That means that while the connection of more tanks in the system might enlarge the carrying capacity and the volume (and therefore they are likely to dilute the toxic substance added and decrease its concentration), at the same time, the organisms contained in the newly added tanks might be the most vulnerable.

The determination of CC is viewed as part of a broader process that of sustainable tourism planning. One of the key aspects of the process is the incorporation of the very beginning of the “expectations” and the subjective assessments and aspirations of the stakeholders involved in the development of the area under study.

The results provided by the preliminary application of the MIO- ECSDE model to Rhodes were in general in agreement with the CAMP study (see section C.1). The application was based on the participation of all relevant stakeholders. Interviews and discussion with small “focus groups” were held to provide experience of good/bad strategic interventions on the tourism development of the island of Rhodes. A questionnaire has been prepared and circulated to over 70 major stakeholders in the fields of tourism and the environment in Greece. 2 Workshops had been organized to discuss

the sustainability criteria that could be used to evaluate qualitatively the region's development and the elaboration of more concrete actions for a Sustainability plan for the area.

(Scoullos et al. 1999)



C.2. Examples of tourist areas which applied elements of the TCCA in tourism management

The Isle of Puberk, UK

Located on the coast of Southern England the Isle of Puberk (UK) is one of the richest and most diverse natural areas with several Natura 2000 sites. It accounts for 4.3 millions visitors/per day/per year and is considered as one of the most popular tourist destinations. The Stuland Beach, owned and managed by the National Trust, receives approximately one million visits every year.

The major problems in the beach and the surrounding environments are connected to litter production, disturbance of wildlife and traffic congestion in summer months.

The Trust's policy to reduce impacts and control tourism consists of:

- Provision of car parking sites for 1,000 cars.
- Public awareness campaign to reduce litter production and packaging for food.
- Provision of specific paths to reduce impacts to wildlife.

Furthermore the Purbeck Heritage Committee, a partnership of local authorities and other interested parties like the National Trust, prepared the strategy "Keeping Purbeck Special". The Strategy, produced in consultation with local community, highlighted the qualities of the area, described the pressures on local environment and identified the issues to be tackled in respect to the following sectors: land use, rural economy, tourism and traffic. Particularly in the case of traffic the strategy included the following measures:

- Minor road improvements
- Innovative use of signing
- Restriction of use for certain routes
- Promotion and encouragement of park and ride
- Effective provision of alternative forms of transport

The French Alps

The French government has attempted to control development in mountain areas through the prohibition of the development of new ski resorts in the **French Alps** since 1997 and for a period of 5 years. The French decision responded to the demand of the regional governments, as well as to pressures from the European Parliament. (Ted Case Studies, 1997)

Dublin and Mid-East regions of Ireland

The general goal of the SRUNA (Sustainable Recreational Use of Natural Assets) Project was to study the endangered amenity areas within the Dublin and Mid-East regions of Ireland and to initiate a program for their sustainable recreational management.

The project aimed at developing a methodology to ensure the sustainable recreational use of natural assets by applying the principles of local Agenda 21, integrating spatial planning measures with the sustainable use of recreational assets, developing sustainability indicators for recreational natural assets, ect.

A system of *sustainability indices* was developed and implemented to assess the condition of Recreational Assets Sites. The intrinsic value of each site was recorded and a ranking ascribed to determine its recreation sustainability. The criteria used were:

- Direct impact of recreation
- Impacts of other forms of development on site quality
- Accessibility (user-friendliness)
- Impact of transport issues on global environment

Both qualitative and quantitative indicators were then developed to describe these characteristics. Each of the indicators was assessed and given a high, medium or low score. The best sites emerged with a high (H) score, representing high sustainability for recreation, while those with a low (L) score indicated low sustainability. An analysis of the sites with Low or Medium-Low scores shows that 45% of the sites require some form of management intervention. Low scoring may be due to the poor condition of trails or paths, litter and the presence of endemic species. Many sites of high recreational sustainability are located close to population centres, reflecting higher usage and better opportunities for funding.

The score of the indicators should enable relevant authorities to identify fragile or vulnerable sites, prioritise those requiring urgent attention and prompt follow-up actions towards the development of sustainable management plans for those sites.

Furthermore surveys on the state of the resources and type of recreational activities produced the *Recreational Natural Asset Inventory*, which collects data on ecological, social, recreational, conservation and site management. The Inventory will assist decision-making in development and forward planing issues and allow the extent and efficiency of current ecological conservation activity to be assessed. For tourism and leisure agencies, the Inventory will function as an important information resource, highlighting deficiencies in recreation provision and indicating whether management action or intervention is required. Recreational pressures which threaten ecologically sensitive areas have been highlighted as well.

The Tammisaari National Park (Finland)

The Tammisaari National Park is constituted by a group of islands, which are part of the archipelago of Uusimaa Province in Finland. The site is under pressure from various users: the large number of boats sailing between Helsinki and Hanko, visitors and owners

of second houses who visit the island in the summer and land-owners with building rights.

In order to regulate future development in the site and minimise impacts, a master plan has been prepared. On the basis of research and existing inventories on habitat and species, the most fragile zones of the park have been identified and restrictions for the various uses have been imposed. Water traffic has been also restricted in the most fragile areas.

In order to manage visitor impact, facilities are provided in the less sensitive areas, while strictly protected areas do not host any facilities in order to discourage visitors. Furthermore, access to the marine zone is prohibited during spring and summer to avoid disturbance of the many rare and endangered bird species present in the area. However access is permitted in the terrestrial part of the park always with the presence of a guide. The Park visitor centre is located in the mainland in order to discourage boat traffic.

The Island of Terschelling (The Netherlands)

In the small Island of Terschelling, one of the Frisian Wadden islands, the number of tourists have recently increased to over 360,000 a year. Yet the island's natural values are still in good condition due to careful planning and visitor management.

In 1974 the Municipality in co-operation with the National Forest Service drew up a long-term Plan, integrating policies for agriculture, nature protection and tourism development plans. This plan is coherent with the policies and management plans of the National Forest Service, which owns and manages 80% of the island.

A limit to the number of beds in the tourist sector had been set (20,000). The economy of Terschelling depends on tourism while nature provides the basis for it. Approximately 80% of the inhabitants are employed, directly or indirectly in the tourism sector. Tourism management aims at the maintenance of the quality of nature and landscape and at the maximisation of tourist's satisfaction. The management has resulted in a zoning scheme based on the segmentation of the main categories of visitors (conservationists, nature-lovers and pleasure seekers), providing different facilities for each category and taking into account the vulnerability of the area:

- Facilities for *conservationists* have the lowest possible impact (ex. paths and tracks are not paved).
- Facilities for *nature lovers* (marked trails for walking, cycling and horse-riding) are concentrated in the central part of the island and are supported by informative and educational facilities, with the purpose to guide the large number of visitors.
- A zone for *pleasure seekers* has been created in one part of the beach with a small dune lake, parking area, and a path connecting the beach and the campsites. Facilities for recreation are provided. Safety issues and prevention of damages or nuisance are properly taken care of.

Although the number of tourists increased in the last twenty years, the number of birds and species has increased too. Monitoring of tourism is essential so as to prevent negative impacts.

Prespa, Greece

Prespa is located in northwestern Greece, across the Greek borders with Albania and the Former Yugoslavian Republic of Macedonia. The area consists of two lakes, Mikri Prespa and Megali Prespa and the surrounding forested mountain slopes. It is well known for its natural beauty, great biodiversity, and the populations of rare waterbirds, cultural heritage (Byzantine monuments) and traditional architecture. Due to all these distinctive features, many tourists visit the area. In order to highlight the need for concerted policies and actions at the higher level, an agreement was signed by the prime ministers of the 3 states sharing Lakes Prespa declaring the region as the 1st Trans Balkan Natural Area.

The Society for the Protection of Prespa (SPP) initiated several activities in order to promote tourism in accordance with the natural and socio-economic characteristics of the area. Dissemination of information and public awareness were some of the key actions implemented by the SPP.

In 1993, within EU's PETRA initiative, young local people from the area participated in a two-month training course in UK. The seminar concerned management of protected areas, environmental interpretation and ecotourism in National Parks. Some of the people that attended the seminar are presently employed as ecoguides in the Prespa's Information Centre.

In addition, a program for visitors was organised containing activities for those visitors who intended to remain in the area from one to ten days. There was also an opportunity to promote and develop co-operation between ecoguides and tourist agencies. Publications and informative material for the visitors have been prepared.

The significant increase of visitors during the last years has justified SPP's choice to train young people as ecoguides. Today, there is a very well organised network of ecoguides and tour operators, which operate without depending on the financial support from SPP.

Dadia, Greece

In the forest of Dadia, planning for visitor flows has been promoted taking into consideration existing human resources, trends in tourist demand, geographic and spatial particularities of the area. The participation of all key stakeholders in the planning process has been secured. Within this context several measures have been implemented like the placing of signs so as to guide cars, avoiding their dispersal into the area. Other measures included the designation of an upper limit for the number of visitors, (14 people can visit the observatory every half an hour). The guide takes care so as not to arrange many appointments for conducted tours within the same day. For safety reasons the visitors are asked to leave their personal ID in the park authorities. Written and oral instructions for the way that one should behave during the visit are provided. Data is selected on a permanent base. It should be stressed that there is only one entrance to the area, which renders the control of tourist's flows extremely easy. However the

distribution of the benefits in the area, particularly in the neighboring community is insufficient

The utilization of modern tools (e.g. use cameras) will be promoted, so as to decrease the pressure in the area where the observatory is located.

Capo de Gata, Spain

In the natural Park of Capo de Gata on the southeastern coast of Spain it is hard to control visitor flows, due to free access to the area. The area was declared protected only in 1997. Till then several activities, including fishing and tourism had been developed. The continuation of these activities remains a priority for the management of the area.

Papigos, Greece

The village of Papigos in the northern part of Greece is the departure point for most of the well-known mountain routes in the broader region. This in combination with the unique beauty of the settlement provides competitive advantage to the area in comparison to the neighboring settlements.

The management of the area aims at the:

- ✓ Promotion of certification systems
- ✓ Training (i.e for eco-tourism)
- ✓ Implementation of monitoring and evaluation mechanisms.
- ✓ Improvement of know-how of tourism business
- ✓ Implementation of pilot projects
- ✓ Re-investment of profits from ecotourism development to the management of the area.

C.3. Examples from non EEA countries

In the Mediterranean, PAP has conducted and/or advised national authorities in several CCAs. In early 1990s, these studies were carried out in Croatia (islands of Vis and Brijuni) and in Greece (northeastern part of the island of Rhodes). Recently, three more studies were prepared or initiated: in Egypt (Fuka-Matrouh area), in Malta and initiated in Albania (Lalzit Bay).

Fuka-Matrouh -Egypt

CCA in Fuka-Matrouh (Egypt) was prepared in mid 1990s as part of a larger exercise: the Coastal Area Management Programme (CAMP) of MAP (PAP/RAC, 1999). Therefore, it was closely related to the ICAM activities in the area. The area is located 210 km west of Alexandria, with the city of Matrouh being the major settlement there. This zone was once highly productive, especially during Roman times who used dry land farming practices based on development of water resources and storage of rain water in underground reservoirs. The length of the coastline is approximately 100 km. The area is scarcely populated (about 300,000 inhabitants). Trying to avoid mechanical calculation of capacities, the CCA study introduced socio-economic and cultural parameters. It turned out that these were crucial for the CCA definition. The existing tourist development patterns, dominated by secondary residence resorts for domestic population, tend to produce tourist saturation of the area in a relatively short period. Three possible scenarios of future tourism development were considered: (1) continuation of the existing trend of almost uncontrolled development with short-term benefits and extensive use of resources, (2) an enclave concept of tourism development – tourism oasis for foreigners with low contribution for local economic development, and (3) balanced, sustainable tourism development. The sustainable option is based on tourism product designed to attract domestic as well as international market and, as a result, to extend tourist season. Carrying capacity, based on the third option was further elaborated using three main categories of parameters (physical-ecological, socio-demographic and political-economic). Finally, the estimated maximum accommodation capacity of the entire area is between 80,000 and 100,000 beds. Having in mind the existing accommodation capacities, together with the so-called «tourist resorts», the future commercial tourism development can count on additional 40,000 to 50,000 beds. This was an important input for planners in the preparation of the integrated coastal area management plan of the area.

Malta

The CCA for Maltese islands is a comprehensive study undertaken by the National Tourist Organisation of Malta, with the advisory support of PAP. Owing to the multidisciplinary nature of the exercise a team composed of representatives of various bodies was set up, including: Ministry of Tourism, Malta Tourism Authority, Planning Authority, Air Malta, MHRA, and University of Malta. Additional contributions were

received from Water Services Corporation, Malta Transport Authority, and Ministry for the Environment. Main objective of the study was the formulation of the optimal level of future tourism development of the Maltese Islands. The Maltese Islands have an area of 316 square kilometres; the population is 383, 418 inhabitants. Visitor population is about 1.2 million per annum (approx. 11.3 million guestnights). Population density is ranging from 166 per km² in Mgarr to 21,092 per km² in Senglea.

Tourism in the Maltese Islands has now reached a critical stage and warrants a careful study to determine the future strategy for its development. Different scenarios were envisaged:

- free development scenario;
- limited growth scenario;
- no growth scenario; and
- up- market scenario.

The CCA Committee established that the limited growth scenario for the next ten years is to be followed. Major influential factors for such a decision were the following: prevailing contribution of tourism to the Maltese economy; ideal occupancy rate for the industry's accommodation sector bearing in mind current and planned bed stock characteristics; seasonality spread of tourism demand to Malta; impact of tourist flows on utilities, attractions and facilities and environmental resources; changes in the Maltese demographic profile with the resulting social consequences; local population's perceptions of the tourism industry and their expectations; and visitor satisfaction levels may be reduced as a consequence of saturation, mainly during peak periods and in particular areas. The selected scenario's directions are the following: aim at increasing total foreign exchange earnings and tourist per capita expenditure; direct investment to segments crucial for attracting increased earnings; need assessment of which segments have increased investment potential; resource allocation directed to increase employment and value added; and need to offer opportunities for spending. In terms of accommodation parameters, the scenario directions are: stabilise bed stock and not increase supply; improvements in the quality of service of existing establishments; aim at increasing current occupancy rate; eventually be in a position to charge more feasible room rates; and develop specific types of accommodation. Social implications of this scenario are: in peak summer months arrivals often exceeded 115,000 but never 160,000 per month (indications show that 160,000 per month is past the maximum socially acceptable level due to problems of overcrowding, traffic, urbanisation and too many visitors at a very low price); stabilise summer volumes as levels of saturation are being reached and experienced; growth is to take place within the winter months but not to repeat summer experiences; human resources to service both tourism and other industries require forward planning in order for training and recruitment to take place; improve presentation and build on existing assets which could assist in raising visitor satisfaction, etc.

Lalzit Bay -Albania

The CCA study for the Lalzit Bay in Albania started in 1996. It was the zone in the “take-off” stage of tourism development. Unfortunately, due to the unsettling political situation in the country, which occurred soon after the works started, the study had to be discontinued. However, it is useful to see what methodology for CCA was then proposed. The following elements were to be taken in consideration: type, size and sensitivity of the elements of tourist offer; national and regional requirements, tourism and environmental policy; type of tourism and level of tourism development in the regional context; all interrelations between the region and the site; and political, cultural and economic preferences of the resident population. Tourism development options to be proposed were the following: semi-spontaneous development options; option of the free transfer to commercial interests for overall development; option of alternative tourism; and sustainable tourism development. Unfortunately, the current situation in the area is not very encouraging. Because of the lack of CCA, the government has been freely issuing building permits for new tourist development and today, the area is in a serious danger of being saturated by low quality tourism development.

Other cases

The evidence shows only a limited number of CCA actually being undertaken all over the world. Clark (1997) cites several examples. In **Bermuda**, capacity was established at 1.5 million visitors annually, based on physical carrying capacity levels (a maximum of 14,500 hotel rooms). **Barbados** used limitations on docking space, and at **U.S. Virgin Islands** a limited number of commercial tour boats were allowed to some of the most important coral reefs. Ecuador set a limit on **Galapagos Island National Park** of 12,000 visitors/year, although this was later raised to 25, 000, and 47,000 were actually allowed. But some sensitive sites are restricted to a maximum of 12 visitors, while less vulnerable ones have a carrying capacity of 90 visitors per day. Some areas are limiting the number of special boat moorings. Costa Rica set a limit of 25 visitors per night to the turtle nesting area of **Nancite Beach** in Santa Rosa National Park. The State of Queensland in Australia limited visitors to a total of 100 at **Michelmas Bay** to protect seabirds. The above are examples of CCA where it has been used as a regulatory tool. Clark also mentions that many carrying capacity limits are never implemented in practice.

Wise Coastal Practices for Sustainable Development web site (2001) offers several examples of CCA implemented in small tropical island states. These states are characterised by a high level of social and environmental vulnerability. It is the result of rapid population growth and coastal development; high human pressures on coastal resources; tourism being considered as the only development option; increasing conflicts between the interests of tourists and residents; and physical constraints.

In **La Reunion** the CCA methodology consisted of three steps: (1) coastal zoning to define consistent management units; (2) environmental and social studies to determine the carrying capacity of each geographical unit; and (3) development of a general coastal

land use plan. Also, environmental and social vulnerability assessments were made. The level of environmental and social impacts was taken in consideration while determining the carrying capacity.

More specific case was prepared for the **Bird Island in Seychelles**. It is a small private island of 70 hectares, where the owner wanted to develop a small number of bungalows. The number of tourists was set to no more than 20 per day and an accommodation for 48 persons. Socio economic and environmental evaluations were carried out.

Conclusions

Tourism is incontestably a key economic activity for most of the EEA countries. Its significance for local and regional development is expected to grow further, along with the pressures exerted particularly to local environmental and cultural resources, although its contribution to global phenomenon such as climate change need not to be overlooked.

Planning and management for tourism growth is becoming essential in the context of sustainable development. As recreation is gaining a central place in modern lives, along with the demand for environmental quality, the development of tourism in accordance with sustainability principles becomes a real challenge for both planners and managers. The emergence of new tourist destinations will only increase the pressure on existing tourist destinations to keep their position in a rather competitive market. Mature destinations, either coastal or mountain resorts are already focusing in the diversification of their tourist product in an effort to expand their clientele. Peaks, either in the winter, summer or in national holidays are not avoided, on the contrary opportunities for further development are sought since tourism remains a vital factor for local employment and income.

Although prospects for growth are promising, there is still high uncertainty in respect to the way that tourism will evolve in the future. Its management is becoming a rather complex task as tourism by itself is transformed into a complex and diversified activity. How long will future holidays last? How often will people travel? In what way will climate change affect tourism development? What kind of holidays will the new elderly people seek? How many Disneylands could be developed following market demand? Could terrorism and other international incidences affect for longer period's tourism development? The list of questions could be endless. Local communities as most business in out days need to take into consideration broader changes and factors as a result of emerging globalisation. They are already encounter with the effects of this process. Furthermore European entrepreneurs are realising that tourism development implies important costs in respect to infrastructure development, environmental protection and enhancement of cultural heritage, while they also recognise the strong dependence of tourism on environmental quality. Along with these there is a need to tackle other issues such as equal distribution of economic benefits, participation of local communities in planning and management of tourism growth, even safeguarding the potential for development for future generations. A strategy for tourism needs to be elaborated as part of a broader strategy for local or regional development, taking into account uncertainty arising from broader changes along with local particularities and priorities.

Evidence from practice indicates that in most cases the response has been reactive and remedial: planing and management often follows tourism growth, the appearance of impacts, the provocation of conflicts among users. In very few cases mainly in the case of areas with high ecological significance, policy for tourism has been proactive. The regime that characterises these areas plays a decisive role in their protection since it provides the opportunity for the early adoption of guidelines and limits for any kind of

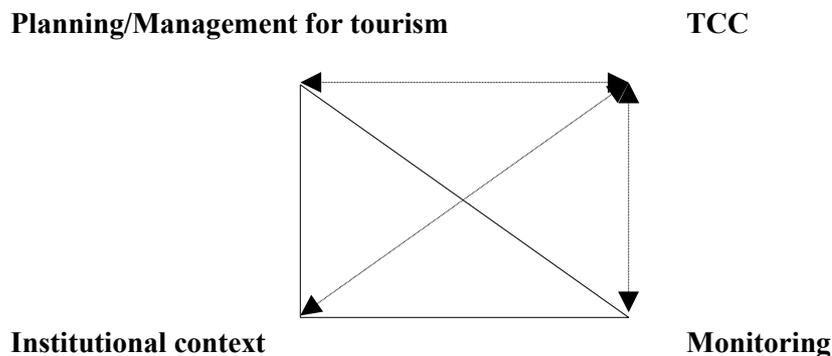


Figure 5: Implementing TCC

development including tourism. In this respect tourism needs to be developed in accordance with certain rules and implementation of measures should be strict and the monitoring effective. The use of various tools such as TCC assessment, with the aim to impose limits (for entering or exercising various activities), is appropriate since they conform to the prevailing concerns for conservation of natural and cultural heritage.

Could Carrying Capacity Assessment prove a useful tool in the case of other tourist resorts, where pre-growth attitudes dominate? If yes, under which conditions? Some of these conditions have been discussed in the previous paragraphs, mainly in the section referring to the implementation of TCC and the major issues that need to be considered in implementing TCC. TCC can be a valuable tool in identifying limits. However TCC needs to be regarded as a management tool and not as a rigid technique, which could lead to the definition of a unique numeric value.

Particular emphasis should be placed on implementing TCC. The implementation can be seen as part of a continuous (on-going) *planning and management* process for sustainable tourism development. Capacity limits are not only perceived in ecological terms but also in physical, economic and cultural. CC limits are changeable and quite often negotiable, in the sense that several of the existing constraints can be altered. Carrying capacity limits could change as the organisational and technical capacity of the destination improves.

Legislation remains also a significant tool for the implementation of TCC. Regulatory tools can be useful particularly in the cases of tourism development in areas with high ecological value.

Last but not least *monitoring* is essential for implementing and even re-defining TCC. Monitoring can be based on a set of selected indicators. Particular attention is required for the selection since the demand and respectively the cost for data and information is not always affordable. Preferably indicators could focus on key factors.

The above relationships are briefly presented in figure 4. The implementation and (re)definition/(re)assessment of TCC can be based on a “triangle” consisting of planning and management activities, of monitoring and of institutional interventions.

Management of tourism can contribute to the implementation of TCC limits but it can also lead to the (re)appreciation of these limits.

Monitoring can assure that no violation of TCC limits takes place. Monitoring can also lead to the identification of new threats and problems and therefore to the reconsideration of TCC limits.

Institutional measures still remain the most preferable and often the most effective mean for protection and therefore for imposing TCC limits. New institutions reflecting new priorities, goals and principles can also lead to new TCC limits

TCC can be an effective tool if properly integrated within such a process. Within this context the utilization of other tools (i.e economic) will be necessary.

Furthermore stakeholders participation is essential at all stages since TCC incorporates and reflects aspirations and goals of local community.

In addition to all these it is necessary to promote pilot studies to test methodologies for defining and implementing TTC in the various European destinations. Implementing these studies is essential since evidence from practice is limited. Dissemination of the experience gained is critical and it could be accomplished through proper networking. The forthcoming Environmental Action Program promotes such initiatives

In conclusion it should be stressed that assessment of TCC does not provide necessarily limits for development but opportunities for *re-orientating* tourism development. TCC need not to be regarded as a mean to cease development, instead as an opportunity to safeguard development, even secure further growth through the adoption of appropriate measures. TCC can also serve as a tool for education and awareness. Managers and decision- makers could understand and appreciate, through the utilisation of TCC, the critical relationship between tourism development and environmental quality.

Glossary

Tourism Carrying Capacity (TCC): according to the definition given by WTO, the carrying capacity of a tourist destination may be defined as "the maximum number of people that may visit a tourist destination at the same time, without causing destruction of the physical, economic and social environment". In paragraph B.1. some more definitions for TCC are included.

Limits of Acceptable Change (LAC): A framework for establishing acceptable and appropriate resource and social conditions in recreation settings. (Stankey et al, 1984)

Visitor Impact Management (VIM): An eight step sequential process for assessing and managing visitor impacts aimed at: identification of problem conditions (unacceptable visitor impacts); determination of potential causal factors affecting the occurrence and severity of the unacceptable impacts; selection of potential management strategies. (Graefe, Kuss and Vaske, 1990)

Sustainable Tourism Development (WTO): "Sustainable tourism development meets the needs of present tourists and host regions while protecting and enhancing opportunities for the future. It is envisaged as leading to management of all resources in such a way that economic and, social and aesthetic needs can be fulfilled while maintaining cultural integrity, essential ecological processes, biological diversity, and life support"

Sustainable Development as defined at the United Nations Conference on Environment and Development in Rio (1992) is "... the development that meets the needs of present without compromising the ability of future generations to meet their own needs"

Driving forces - Pressure - State- Impact - Response (DPSIR) Model (OECD): according to this framework there is a chain of causal links from "driving forces" over "pressure" to environmental "state" and "impact" on ecology and society, finally leading to political "response". The framework provides a classification into sectoral indicators, which have been organised as follows:

- Indicators to reflect sectoral trends and patterns of environmental significance (i.e. indirect pressures and/or related driving forces)
- Indicators to reflect interactions between the sector and the environment (i.e. direct pressures), as well as effects of environmental changes on sectoral activity (i.e. state)
- Indicators to reflect economic linkages between sector and the environment, as well as policy considerations. This category includes environmental damage (impacts) and environmental responses, economic and fiscal instruments, and trade (i.e. responses)

Destination Life-Cycle Model: according to Butler (1980) a tourist destination follows a six-stages development model. In early stages of developments the destination attracts limited and sporadic visitors ("pioneers"). The locality may never become a destination for overnight stays. But if it does investments will be necessary for the development of infrastructures, provision of services and advertisement. The locality may enter a

development stage, with accrued material and immaterial benefits increasing dramatically and boosting local economy. As maturity stage is reached, the industrial organisation of tourism changes, as non-local actors dominate the production of goods and services. In the stagnation stage the capacity levels for many relevant factors are reached or exceeded resulting in economic, social or environmental problems. Artificial attractions supersede the natural and cultural ones and the destination is no longer considered fashionable. The tourist destination enters a decline stage, tourists are drawn away by newer destinations. Tourism facilities are replaced by non-tourism establishments. A dramatic change in the resource (creation of a new set of artificial attractions is or utilisation of a previously unexplored natural resource) may lead the locality to a rejuvenation stage.

Butler R.W., 1980: The concept of a tourist area cycle evolution: implication for management of resources. *Canadian Geographer* 24: 5-12

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
 - Revue 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)
- Society for the Protection of Prespa (www.spp.gr)
- 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)