

THE TOURISM CARRYING CAPACITY

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Abstract

The tourism carrying capacity can be defined as the maximum number of tourists that can be contained in a certain destination area. The capacity is dictated by how many tourists are wanted rather than how many tourists can be attracted.

This paper describes about the impact of tourism on the environment and the socioeconomic either positive impacts or negative impacts. By measuring the tourism carrying capacity, the tourism areas can reduce the negative impacts of tourism. Some standards for recreation activities can be used for measuring the carrying capacity. The purpose of measuring carrying capacity is achieving sustainable tourism development.

Keywords: *tourism carrying capacity, environmental and socioeconomic impacts, sustainable tourism development*

1. Introduction

The tourism context the carrying capacity is dependent on the location and the factors affecting the carrying capacity varies various places. The factors that influence the carrying capacity varies from one place to another place. So the quantification of carrying capacity is difficult and considerable expenditure might be required to determine even one or two carrying capacity limits for individual aspects of the natural environment. The principle "up to a point, the bigger the better, beyond that point, the bigger the worse" can be applied to the case of

carrying capacity determination (Sanal and Nanadamohan, 1999).

Tourism is often a major source of environmental and, in some cases, cultural pollution. Tourist destinations tend to follow a similar evolutionary path. First come the rich or adventurous. Next come the travel writers. At this point, a destination may become a popular spot and package tours are launched. Soon, people come back and say they had a horrible time there, it was too crowded, it was overused, they couldn't get service, which creates a spiral of decay and decline. Tourists won't go where the economy, the society, the ecology is degraded, not only that,

they won't go where they think it's degraded .

2. Impacts of Tourism on the Environment and the Socio-economic

2.1. Types of Environmental Impacts

Tourism can generate either positive or negative environmental impacts, or no appreciable impacts, depending on how its development is planned and managed (Inskeep, 1991).

Positive Impacts

Tourism, if well planned and controlled, can help maintain and improve the environment in various ways.

- a. Conservation of important natural areas
Tourism can help justify and pay for conservation of important natural areas and development of parks and reserves, including the establishment of national and regional parks because they are attractions for tourists. Without tourism, these natural areas might be developed for other uses or allowed to ecologically deteriorate, with a consequent loss of environmental heritage. This factor can be an especially important benefit in countries that have limited resources for nature conservation.
- b. Conservation of archaeological and historic sites and architectural character.

Tourism provides the incentive and helps pay for conservation of archaeological and historic sites (as attractions for tourists) that might otherwise be allowed to deteriorate or disappear, thus resulting in the loss of the cultural heritage of areas.

- c. Improvement of environmental quality
Tourism can help provide the incentive for 'cleaning up' the overall environment through control of air, water, and noise pollution, littering, and other environmental problems, and for improving environmental aesthetics through landscaping programs, appropriate building design, sign controls, and better building maintenance.
- d. Enhancement of the environment
Although a more subjective benefit, development of well-designed tourist facilities (for example, attractive, landscaped hotels) may enhance rural or urban landscapes that are otherwise dull and uninteresting.
- e. Improvement of infrastructure
An economic as well as environmental benefit, local infrastructure of airports, roads, water, sewage, and solid waste disposal systems and telecommunications can be improved through the development of tourism, which uses and helps pay for the

infrastructure, thus leading to an overall reduction of pollution problems and an enhancement of the environmental quality of areas. Water resource management may also be improved through development of tourism because of its demands for additional water supplies.

f. Increasing environmental awareness

In places where residents have limited interest in and concern about the natural environment and its conservation, observing tourists' interest in nature and realizing the importance of conservation to the economic success of tourism can encourage local awareness in this subject.

Negative Impacts

The various types of negative or undesirable environmental impacts that can be generated by tourism development if it is not carefully planned, developed, and managed include those listed below. Not all these impacts would likely take place in one area because the types of impacts often depend on the kind of tourism development and the specific environmental characteristics of the tourism area. The scale of tourism development in relation to the carrying capacity of the environment greatly influences the extent of environmental impact. Many of the types of impacts

considered here can result from various types of development, and most are not unique to tourism (Inskeep, 1991).

a. Water pollution

If a proper sewage disposal system has not been installed for hotels, resorts, and other tourist facilities, there may be pollution of ground water from sewage, or if a sewage outfall has been constructed into a nearby river, lake, or coastal sea water and the sewage has not been adequately treated, the effluent will pollute that water area. This is not an uncommon situation in beach resort areas where the hotel has constructed an outfall into the adjacent water area that may also be used by tourists for swimming. Surface water pollution in rivers, lakes, and sea waters can also result from recreational and tourist transportation motor boats spilling oil and gas and cleaning their bilges into the water, especially in enclosed harbors and places where natural water circulation is slow.

b. Air pollution

Tourism is generally considered a 'clean industry', but air pollution from tourism development can result from excessive use of internal combustion vehicles used by and for tourists in particular areas, especially at major

tourist attraction sites that are accessible only by road. Often compounding this problem are improperly maintained exhaust systems of the vehicles. Also, pollution in the form of dust and dirt in the air may be generated from open, devegetated areas if the tourism development is not properly planned, developed, and landscaped or is in an interim state of construction.

c. Noise pollution

Noise generated by a concentration of tourists, tourist road, and off-road RVs such as dune buggies and snowmobiles, airplanes, motor boats, and sometimes certain types of tourist attractions such as amusement parks or car/motorcycle race tracks may reach uncomfortable and irritating levels for nearby residents and other tourists. Very loud noise can result in ear damage and psychological stress.

d. Visual pollution

Visual pollution may result from several sources:

- Poorly-designed hotels and other tourist facility buildings that are not compatible with the local architectural style and scale or well integrated into the natural environment.
- Use of unsuitable building materials on external surfaces

- Badly planned layout of tourist facilities
- Inadequate or inappropriate landscaping
- Use of large and ugly advertising signs
- Overhead utility lines and poles
- Obstruction of scenic views by development
- Poor maintenance of buildings and landscaping

e. Waste disposal problems

Littering or debris on the landscape is a common problem in tourism areas because of the large number of people using the area and the kinds of activities, such as picnicking, that they engage in. Improper disposal of solid waste from hotels, restaurants, and resorts can generate both litter and environmental health problems from vermin, disease, and pollution as well as being unattractive.

f. Ecological disruption

Several types of ecological problems can result from uncontrolled tourism development and use. Overuse of fragile natural environments by tourists can lead to ecological damage (for example, killing or stunting the growth of vegetation in parks and conservation areas by many tourists walking through them and compacting the soil around the vegetation, trees being cut by hikers and

campers for use as fuel to make campfires, and erosion resulting from overuse of hiking and riding trails in steep-sloped areas).

- g. Environmental hazards
Poor land use planning, siting, and engineering design of tourist facilities, as well as any type of development, can generate erosion, landslides, flooding, and other problems. As was experienced in the Tyrolian region, poor design, and environmental disruption may result in the destruction of or damage to tourist facilities themselves by earthquakes, high winds, flooding, land slippage, and avalanches. There are examples in the Pacific Islands of hotels that were built too close the shoreline and are being undermined by erosion or have been damaged by high waves during storms. In some cases, good planning may not prevent damage by environmental disasters but may greatly reduce the extent of it.
- h. Damage to archaeological and historic sites
Overuse or misuse of environmentally fragile archaeological and historic sites can lead to the damage of these features through excessive wear, increased humidity, vibration, vandalism, graffiti writing, and so forth.
- i. Land use problems

If not well developed according to sound land use planning principles, tourism development can result in land use problems. Tourist facilities may preempt land that is more valuable for other types of land uses, such as agriculture and parks, or that should remain under strict conservation control.

The natural beauty and environmental quality of vacation areas has a positive influence on tourists. A survey of tourists in Spain revealed beautiful landscape (51%), water quality (27%), unspoiled nature (23%), and air quality (22%) as the four environmental factors that most influence their choice of destination (Boers and Bosch, 1994). A survey of Japanese tourists put enjoying nature (72%) as the primary purpose of the trip (WTTC et.al. 1997).

As much as the tourism industry benefits from a pristine environment, uncontrolled expansion, and mismanagement can harm the very resources on which it is based. This is particularly true for more nature-based activities. If a tourism-dependent economy suffers a loss of natural resources and environmental degradation, it may result in significant socioeconomic consequences, such as loss of jobs, reduction in private sector and government revenues, and

worsening balance of payment problems (UNEP 1997b).

2.2. Types of socioeconomic impacts

There can be both positive and negative economic and socio-cultural impacts resulting from tourism, depending on the type and intensity of tourism developed, as well as the characteristics of the host society. Whether impacts are considered positive or negative depends, in part, on objective criteria, such as income earned, but are also subject to the perceptions of the host community, with different community groups having varying reactions to their tourism development, often with no consensus reached by the total community. Socioeconomic impacts are identified and organized here based on the general acceptance of which ones are respectively positive and negative, and are applicable, except where noted, to both domestic and international tourism (Inskeep, 1991).

Positive Impacts

a. Economic benefits

Direct economic benefits include provision of employment, income, and (for international tourism) foreign exchange, which lead to improved living standards of the local community and overall national and regional economic development. In

economically depressed areas, the employment and income provided by tourism, especially to young people, may help stem out migration from those areas. Increased government revenues, through various types of taxation on tourism that can be used to develop community and infrastructure facilities and services and assist in general economic development are also a direct economic benefit. These direct and indirect economic benefits are usually the primary reasons for developing tourism in an area.

b. Conservation of cultural heritage

Tourism can be a major stimulus for conservation of important elements of the cultural heritage of an area because their conservation can be justified, in part or whole, by tourism as tourist attractions. These elements include:

- Conservation of archaeological and historic sites and interesting architectural styles.
- Conservation and sometimes revitalization of traditional arts, handicrafts, dance, music, custom and ceremonies, and certain aspects of traditional lifestyles.
- Financial assistance for the maintenance of museums, theatres, and other cultural

facilities and activities and for supporting the organization of special cultural festivals and events because they are important attractions for tourists as well as being used by residents. For example, admission fees or tickets paid by tourists at some major attractions provide substantial revenues to maintain those institution.

c. **Renewal of cultural pride**

A sense of pride by residents in their culture can be reinforced or even renewed when they observe tourists appreciating it. This is especially true of some traditional cultures that are undergoing change as a result of general economic development and are losing their sense of cultural self-confidence.

d. **Cross-cultural exchange**

Tourism can promote cross-cultural exchange of tourists and residents learning more about one another's cultures, resulting in greater mutual understanding and respect, or at least tolerance of different value systems and traditions through understanding their cultural basis.

Negative Impacts

If not well planned and controlled, tourism may generate negative impacts or reduce the effectiveness of positive ones.

a. **Loss of potential economic benefits**

Loss of potential economic benefits to the local area can occur and local resentment can sometimes be generated if many tourist facilities are owned and managed by outsiders. Also, local elites can be created if tourist facilities and services are owned and managed by only a few local persons or families, with most of the community receiving minimal benefits. Potential foreign exchange earnings are reduced when imported goods and services are utilized in tourism, although, in some places such as small island economies, there is no alternative to having a relatively high import of tourism, with the net foreign exchange and income earned still considered well worth the investment in tourism.

b. **Economic and employment distortions**

Economic distortions can take place geographically if tourism is concentrated in only one or a few areas of a country or region, without corresponding development in the other places. Resentment by residents in the undeveloped areas may ensue from this situation. Employment distortions may be created if tourism attracts too many employees from other

agriculture and fisheries, because of its higher wages and perhaps more desirable working conditions, if there is not an overall surplus of workers available. Inflation of local prices of land and certain goods and services may take place, placing a financial hardship on residents because of the demands of tourism.

c. Overcrowding and loss of amenities for residents

If there is overcrowding of amenity features, shopping, and community facilities and congestion of transportation systems by tourists, residents cannot conveniently use them and will become irritated and resentful of tourism. Domestic tourists may also become resentful of international tourists if their own attractions are congested by foreigners.

d. Cultural impacts

Over-commercialization and loss of authenticity of traditional arts and crafts, customs, and ceremonies can result if these are over-modified to suit tourist demands. The demonstration effect of tourists from different cultural and socioeconomic backgrounds on residents and especially on young people may take place. Misunderstanding and conflicts can arise between residents and tourists because of differences

in languages, customs, religious values, and behavioral patterns.

e. Social problems

Problems of drugs, alcoholism, crime, and prostitution may be exacerbated by tourism, although tourism is seldom the basic cause of such problems as pointed out.

3. Intensity of Tourism

There is no single standard integrated measure of size, scale, and degree of overall impact of tourism in a given destination (McElroy and de Albuquerque, 1998b), measures of tourism intensity and impact are linked to the concept of tourism carrying capacity, hence, need to encompass environmental as well as socio-cultural consequences of tourism development.

Commonly used indicators, such as a visitor density or average length of stay tend to correlate with the economic indicators and fail to capture tourism's range of adverse impacts on the environment through different types of tourism activities. There is also a need to measure social impacts, some of which are difficult to quantify: crime rate, real estate inflation, erosion of cultural traditions, and level of frustration felt by local residents (McElroy and Albuquerque, 1998a).

4. Tourism Carrying Capacity

"Carrying capacity" in tourism is a term used often to measure the level of tourism development an area can accommodate without adverse effects on the resident community, the natural environment, or the quality of visitor experience (UNEP and WTO, 1992). This concept can be broken down into types of limits, such as ecological or environmental, physical (threshold limit for space or accommodation), and social (level of tolerance of the host population to the presence of tourists). Tourism is growing rapidly, but the local capacity to deal with it does not grow as fast. When local capacity to deal with the level of tourism intensity is saturated, negative consequences occur. The threshold of the capacity can depend on the level of physical infrastructure, such as waste treatment, as well as social infrastructure, such as regulations or codes of conduct, that make tourism activities less harmful to the natural environment and local culture.

Carrying capacity analysis is a basic technique now commencing to be widely used in tourism and recreation planning to systematically determine the upper limits of development and visitor use and optimum utilization of tourism resources. Carrying capacity is the maximum number of people who can use a site without

an unacceptable alteration in the physical environment and without an unacceptable decline in the quality of experience gained by visitors (Mathieson and Wall, 1982). To this definition should be added, "without an unacceptable adverse impact on the society, economy, and culture of the tourism area." Establishing carrying capacities is based on the concept of maintaining a level of development and use that will not result in environmental or socio-cultural deterioration or be perceived by tourists as depreciating their enjoyment and appreciation of the area.

The measure of carrying capacity has been examined with limited success. Important factors include land area, soil and habitat types, and availability of freshwater, in addition to a range of cultural and socioeconomic factors. Perhaps there is no simple indicator of tourism carrying capacity in terms of number of tourists, but rather it is the type of tourism and nature of tourist consumption and activities that really matter.

There have been some attempts to develop carrying capacity indicators by combining the type of tourism impact indicators. It is difficult to establish the threshold at which carrying capacity is exceeded because different natural and socio-cultural settings can sustain vastly different levels of visitation (McElroy and de Albuquerque, 1998a).

The term *carrying capacity* derives from ecological science, where it indicates the number of organisms the resources of a given area can support over a given time period. Adapted to tourism management, it has a similar meaning: the number of people who can use a given area without an unacceptable alteration in the physical environment. In this case, the concept of an unacceptable alteration has ecological and social aspects. That is, under too much pressure from visitors, a site or ecosystem can degrade, thus making it less attractive as a tourism destination.

5. Measurement Criteria of Carrying Capacity

The measurement criteria presented here are for establishing carrying capacities primarily for tourist destination areas although the capacities of the transit zones, that is, the transportation facilities and services used by tourists traveling from the generating areas to their destinations, are also important to analyze in the transportation component of tourism planning. The approach explained here is basic one and taken from WTO literature (WTO 1983).

There are two aspects to be considered in determining carrying capacity are:

- The indigenous physical and socioeconomic environment-

This refers to the capacity that can be achieved without resulting in damage to the physical (natural and man-made) environment and generating socio-cultural and economic problems to the local community, and maintaining the proper balance between development and conservation. Exceeding saturation levels may lead to either permanent damage to the physical environment or socioeconomic and cultural problems, or both.

- The tourism image and tourist product- This refers to the capacity or number of visitors that are compatible with the image of the tourist product and the types of environmental and cultural experiences that the visitors are seeking. If the tourism development becomes saturated, the various attractions that visitors come to experience may be destroyed or degraded, and the destination will decline in quality and popularity.

With respect to the indigenous environment, the criteria for determining optimum capacity levels include the following:

- Physical
 - Acceptable levels of visual impact and congestion
 - Point at which ecological systems are maintained before damage occurs

- Conservation of wildlife and natural vegetation of both the land and marine environments
 - Acceptable levels of air, water, and noise pollution
 - Economic
 - Extent of tourism that provides optimum overall economic benefits
 - Level of tourism employment suited to the local community
 - Socio-cultural
 - Extent of tourism development that can be absorbed without detriment to the socio-cultural life styles and activities of the community
 - Level of tourism that will help maintain cultural monuments, arts, crafts, belief systems, customs, and traditions without detrimental effects
 - Infrastructure
 - Adequate availability of transportation facilities and services
 - Adequate availability of utility services of water supply, electric power, sewage and solid waste disposal and telecommunications
 - Adequate availability of other community facilities and services such as those related to health and public safety
- The criteria that can be applied in determining carrying capacity relative to tourism image or visitor satisfaction levels include the following:
- Physical
 - Overall cleanliness and lack of pollution of the destination environment
 - Lack of undue congestion of the destination environment, including of tourist attraction features
 - Attractiveness of the landscape or townscape, including quality and character of architectural design
 - Maintenance of the ecological systems and flora and fauna of natural attraction features
 - Economic
 - Cost of the holiday and "value for money"
 - Socio-cultural
 - Intrinsic interest of the indigenous community and culture
 - Quality of local arts, handicrafts, cuisine, and cultural performances
 - Friendliness of residents
 - Infrastructure
 - Acceptable standards of transportation facilities and services
 - Acceptable standards of utility services

- o Acceptable standards of other facilities and services

Each area and its type of tourism is unique, and the criteria for measuring carrying capacity must be specifically defined for the area. The evaluation of carrying capacity based on the criteria selected will in some cases be measurable (for example, levels of environmental pollution and employment benefits) and in certain cases they will establish maximum levels (for example, limited water supply), but many criteria such as impact on cultural traditions can only be assessed qualitatively.

Carrying capacity analysis does not replace environmental and socioeconomic impact assessment of destination areas or continuous monitoring of the impacts of tourism. Impact assessment should still be done as a complementary action to carrying capacity analysis, providing another technique of ensuring that capacities are not exceeded and especially to detect specific impact problems that may have been overlooked in the capacity analysis. With the application of any technique, none of which is infallible, monitoring of impacts with any necessary remedial action taken is essential.

6. Capacity Standards

Some carrying capacity standards are expressed statistically

in terms of number of visitors using the various tourist attractions, facilities, and services. These standards vary from one place to another, depending on the type of tourism being developed, the local environmental characteristics, the types of tourist markets aimed for, and the local community perceptions of saturation levels.

Some standards for rural and recreation activities are cited by the WTO (1983) as follows, expressed in visitors per day per hectare except where noted:

- forest park : up to 15
- suburban nature park : 15-70
- high density picnicking: 300-600
- low density picnicking : 60-200
- sports/team games : 100-200
- golf : 10-15
- for water based activities:
 1. fishing/ sailing : 5-30
 2. speed boating : 5-10
 3. water skiing : 5-15
- for nature trails in persons per day per kilometer
 1. hiking : 40
 2. horse riding : 25-80
- for ski resorts, a general guide is 100 skiers per hectare of trailways.

**7. Control Method to Avoid
Risks of Saturation
(Carrying Capacity)**

**Critical factors affecting the
carrying capacity of an area**

- Resources become critical where human interference can lead to stress, and some areas are more prone to stress, due to the fragility of the environment, than others. Here, conservation is needed to make resources sustainable
- Regions and areas refer to those areas that are relatively more fragile and prone to stress, and hence to degradation caused by tourism related activities
- Attitudes and behavior become critical when individual and collective actions increase the level of stress felt by the area. Institutions play a critical role in providing the facilities that are essential for the development of tourism
- Infrastructures play the role of providing the necessary essentials concomitant to development. Social development here refers to the level of development in the social indicators of the local population, particularly education, training, and HRD.
- Economic security is critical if the community is to engage in a trade-off between the use of resources to meet their basic needs and the conservation of non-renewable resources.

Carrying capacity seeks to establish an ecological and behavioral balance in which the quality of life of the local people does not deteriorate and the visitor has a good experience. Carrying capacity can also be seen in terms of the environment, society, and economy.

Control methods fall into two categories: regulation of volumes by rules and by prices.

Regulation by rules has the following elements:

- Permits
- Queuing
- Space allocation to activities
- Time rationing

A surprising number of accessible public goods are not priced, which is why they are overused and abused. In society with large differential in income, it is justifiable to charge more to higher income groups for access to public environmental goods. Income groups are frequently easy to identify on the basis of transport used by them. Taxes are needed that externalize impact by users. However, to be fully effective in promoting repair and maintenance of tourism assets, more taxes need to be collected and returned to the communities bearing the costs in a direct and transparent manner. Penalties can control littering and are frequently more acceptable than jail sentences for minor damage to environmental assets commonly used by tourists and local communities.

8. A Study Case

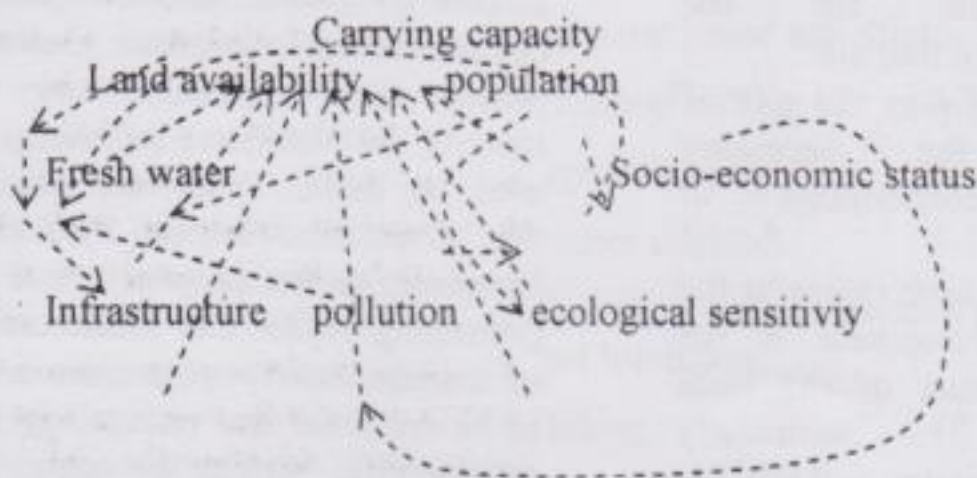
In the case of backwater tourism, the general factors which influence the environmental carrying capacity are 1) the population of the area; 2) the social and economic status of the area; 3) demand on drinking water supply; 4) land availability; 5) water quality; 6) resilience of flora and fauna to tourist disturbance; 7) transportation and communication facilities; 8) other infrastructure facilities such as shelters, restaurants, etc; 9) characteristics of tourists; 10) nature of tourism development ; and 11) political organization.

The interrelationships between all these factors need to be taken into account to ensure appropriate tourism development. The major factor we should kept in

mind while defining carrying capacity of backwater tourism is the character of the place. We should have regard to conserve the natural beauty and amenity of the villages. These places are a set of ecosystems and settlements and units of agricultural production. Its diversity, culture and history are essential elements of its value.

Model Building

Seven important variables that determine the carrying capacity have been identified from available literature on carrying capacity. They are 1) infrastructure facility; 2) land availability; 3) pollution; 4) (fresh) water availability; 5) ecological sensitivity; 6) population; and 7) socio-economic status of the region



Source: Sanal and Nanadamohan: 1999

The population of the region is an important factor that determines the carrying capacity. Carrying capacity is usually

described for the present population will inhibit the carrying capacity because it affects the land use, economy, etc. of the region. The

availability of fresh water is one of the important and vital factors determining the carrying capacity. Since fresh water being distinguished as primary commodity, the promptness in providing clean water is a significant factor. There should be open land spaces for development of tourism; hence the land availability influences the carrying capacity. The most important factor is the ecological and archaeological sensitivity of the region. Since backwaters have a fragile ecological system, carrying capacity is very much dependent on this. This is closely linked with the pollution of the waters. Backwaters are subjected to a high degree of pollution through effluent discharges from various sources. Tourists visiting the area and other tourism activities can add to pollution of the backwaters. Another important variable is the infrastructure provided. It is apparent that more infrastructure facilities will attract more tourists. The socio-economic status of the region also affects the carrying capacity. Tourists are most cherished in a society where the socio-economic status is better.

Tourism has significant value and benefits to both local and global economies. Travel and tourism-encompassing transport, accommodation, catering, recreation, and services for travelers-is the world's largest

industry and generator of quality jobs. Worldwide, analysts estimate travel and tourism to have generated US\$3.5 trillion and almost 200 million jobs in 1999 (WTTC, 1999).

In many countries, notably small island developing states, tourism contributes a significant and growing portion of GDP and is often the major source of foreign exchange. If properly managed, tourism and recreation activities in the tourism area can promote conservation of ecosystems and economic development .

9. Sustainable Tourism Development

"Sustainable tourism" has the potential for longer-term economic benefits for a community and serves to limit environmental degradation. According to the definition by WTTC, World Tourism Organization (WTO), and Earth Council, "sustainable tourism development is envisaged as leading to management of all resources in such a way that economic, social, and aesthetic needs can be fulfilled while maintaining cultural integrity, essential ecological processes, biological diversity, and life support systems" (WTTC et.al., 1997).

The tourism industry recognizes the importance of maintaining the quality of the natural environment and the cultural integrity of a local

community as a resource base of tourism attractions. Some certification of "best practices" or "eco-labeling" schemes has been developed as self-regulatory and voluntary measures to promote sustainable tourism. The certification criteria vary depending on the focus area of each scheme: from energy efficiency and waste treatment, to staff training and education (UNEP, 1998).

Role of the Tourism Industry in Promoting Sustainable Tourism Development (Inskip, 1991)

1. Protecting the biosphere, for example, by minimizing and eliminating pollution which causes environmental damage and by supporting parks and reserves at key sites.
2. Sustaining the use of resources, for example, by ensuring sustainable use of land, water, forests in tourism activities.
3. Reducing and disposing of wastes, for example, by recycling, reusing, and reducing wherever possible and by having high standards for sewage treatment and waste disposal.
4. Adopting energy efficiency practices, for example, by maximizing when possible the use of solar power, wind power, etc.
5. Minimizing environmental risks, for example, avoid hazardous locations such as near malarial swamps, favored

wildlife areas, unique features, ancient sites.

6. Undertaking green marketing, for example, by promoting 'soft' tourism that minimizes adverse environmental and cultural impacts as well as informing tourists of the impacts of their presence.
7. Mitigating damage, for example, by replacing or restoring degraded environments and compensating for local adverse effects.
8. Providing complete and credible information to tourists, for example, by disclosing hazardous locations.
9. Incorporating environmental values in management of operations, for example, by ensuring environmental representation at the executive level on board or management groups.
10. Conducting regular environmental audits, for example, by conducting independent assessments of environmental performance of the entire business operations (e.g. monitor water quality, carrying capacity, energy consumption, environmental aesthetics, sewage).

In 1994, the WTTC launched Green Globe, a worldwide environmental management and awareness program for the travel and tourism industry. The program includes a series of packages

designed to help staff at all levels bring about environmental improvements. A number of national tourist associations and businesses are participating in this program, which provides standards and mechanisms for "green" certification of hotels and resorts (UNEP,1998).

10. Information status and needs

Conventional economic statistics do not properly capture the contribution of a pristine environment to the growth of tourism. The relative importance of nature-based tourism to the whole tourism sector needs to be measured not only in terms of total foreign exchange revenue but also non-monetary indicators, such as local employment. Because diverse types of business constitute the industry, it is not easy to differentiate tourism as an economic sector. Moreover, the value of ecosystems to sustain the tourism industry has been under-appreciated because of information limitations.

Although tourism plays a vital role in the economies of many countries, the existing information does not provide a comprehensive view of the full costs and benefits of the industry. This is due to a lack of information on both sides of this equation: *benefits* from income and employment generation; and environmental and socio-cultural *costs* from adverse impacts of

rapid, uncontrolled tourism development. Reliable data or an adequate framework to measure the actual benefits of tourism to the local economy and people are currently lacking. Many of the benefits often go to foreign investors and outside service providers. Identifying who benefits from tourism development and who bears the environmental cost would lead to more rational and conscious decisions on the trade-offs involved in tourism development, which are key to more equitable and sustainable management of the ecosystems.

One can only assess the effectiveness of existing sustainable tourism initiatives and certification programs if one develops the criteria and the indicators of "sustainability". Since each program has its own concerns about what to "sustain", such criteria and measures can also vary. Although some useful concepts such as carrying capacity have been developed, there are critical gaps in the type of information that is necessary to quantify them.

11. Conclusion

Tourism can generate either positive or negative impacts, or no appreciable impacts, depending on how its development is planned and managed. Tourism, if well planned and controlled, can help maintain and improve the environment in various ways. The

various types of negative or undesirable environmental impacts that can be generated by tourism development if it is not carefully planned, developed, and managed. There can be both positive and negative economic and socio-cultural impacts resulting from tourism, depending on the type and intensity of tourism developed, as well as the characteristics of the host society. There is no single standard integrated measure of size, scale, and degree of overall impact of tourism in a given destination, measures of tourism intensity and impact are linked to the concept of tourism carrying capacity.

“Carrying capacity” in tourism is a term used often to measure the level of tourism development an area can accommodate without adverse effects on the resident community, the natural environment, or the

quality of visitor experience. Establishing carrying capacities is based on the concept of maintaining a level of development and use that will not result in environmental or socio-cultural deterioration or be perceived by tourists as depreciating their enjoyment and appreciation of the area. The concept of carrying capacity is one of useful concepts that maintain the quality of the natural environment and the cultural integrity of a local community to achieve a sustainable tourism development. Sustainable development is aimed at protecting and enhancing the environment, meeting basic human needs, promoting current and intergenerational equity, and improving the quality of life of all peoples.

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