CHAPTER-8
THE CHALLENGE FOR SUSTAINABLE TOURISM DEVELOPMENT

8.1 BACKGROUND OF SUSTAINABLE TOURISM DEVELOPMENT

In the last few decades, since the resurgence of organised travel in 1948, tourism as an international phenomenon has passed through stages until it has become a gigantic instrument in the development strategy of a good number of countries. Over this long period of transition it shows a wide range of interaction with the host environment. Initially it was thought that there is a mutual interdependence between tourism and environment i.e. a kind of symbiosis between these two variables observed. But in the post 1945 period with the introduction of mass tourism (both in scale and into new destination) there have, however emerged very real sign that the nature of symbiosis has become unbalanced. Tourism, far from being a source for enhancement or protection of the environment actually has shown itself to be a major generator of environmental problem with considerable capacity to destroy the resources upon which it depends. The fact is also proved by the prevailing condition in Darjiling and Gangtok area. Even the World Tourism Organisation (WTO) has considered tourism as a ambivalent process. On the one hand it can contribute positively to socio-economic and cultural achievements while at the same time it may cause degradation of the environment and the loss of local identity. There should be an approach with global methodology to tackle the problem (Lanza ete, 1995). It is incumbent upon the destination to orient its tourism growth towards meeting its socio-economic objectives and environmental requirements. Moreover, tourism growth must coincide with the destination's prevailing value system and cultural integrity and satisfy the needs of its local population.

These global concerns for sustainability and the environmental management processes which contribute to it, is of critical importance in the future growth of tourism. Environmental issues are becoming of increasing significance in the world of tourism and resolution of this issue will demand far-reaching changes in the way the industry operates. So much so that sustainable tourism has became the focus of widespread attention and research.
8.2 The Concept of Sustainable Development

The notion of sustainable tourism has its root in the concept of sustainable development credited to the Brundtland Commission (1987) who defined it as “Development that meets the need of the present generation without compromising the ability of the future generation to meet their own needs (WCED, 1987: 4). Thought the term is fully credited to the commission but the concept of sustainability can be traced back to the conservation movement of the mid 19th century (Stabler and Goodall, 1996) in particular to the debate on the resource in the study “The limits to growth” (Meadows et al., 1972) and the UN symposium on the relation between resources, environment and development which was held in Stockholm in 1979.

The relationship between economic development and environmental degradation was first placed on the international agenda in 1972 at the UN conference held in Stockholm. After the conference set up the United Nation Environment Programme (UNEP) which today continues to act as a global catalyst for action to protect the environment. Little, however was done in the succeeding year to integrate environmental concern into national economic planning and decision making over all the environment continued to deteriorate. By 1983, the UN set up the world commission on environment and development. Environmental degradation was understand to be a matter of survival for developing nations. Led by Gro Hurlem Brundtland of Norway, the commission put forward the concept of sustainable development as an alternative approach to one simple based on economic growth (UN, Dept. of Public Information, 97).

The main component of sustainability as interpreted by Brundtland was:

- Revive growth
- Change quality of growth
- Meet basic needs
- Stabilise population
- Conserve and enhance resource
- Reorient technology and manage risks
- Put environment into economics.

Clearly, the Brundtland statement has a strong people centred, ethical stance, concentrating on the satisfaction of human needs rather than for example, as
protection of the environment in general as was (in world conservation strategy) (IUCN, 1980) in which the concept of sustainable development first appeared.

A summary of the goals and legal principles of sustainable development as proposed by the World Commission on Environment and Development (1987) is given below in the tabular format. (Table 8.1).

**Table 7.1.** A summary of the goals and legal principles of sustainable development, as proposed by the World Commission on Environment and Development (1987)

<table>
<thead>
<tr>
<th>Goals</th>
<th>Legal principles</th>
</tr>
</thead>
<tbody>
<tr>
<td>• a political system that secures effective participation in decision</td>
<td>• All human beings have the fundamental right to an environment adequate for their health and well being</td>
</tr>
<tr>
<td>• an economic system that is able to generate surpluses and technical knowledge on a self-reliant and sustained basis</td>
<td>• states shall conserve and use the environment and natural resources for the benefit of present and future generations</td>
</tr>
<tr>
<td>• a social system that provides for solutions for the tensions arising from disharmonious development</td>
<td>• states shall maintain ecosystems and ecological processes essential for the functioning of the biosphere, shall preserve biological diversity, and shall observe the principle of optimum sustainable yield in the use of living natural resources and ecosystems</td>
</tr>
<tr>
<td>• a production system that respects the obligation to preserve the ecological base for development</td>
<td>• states shall establish adequate environmental protection standards and monitor changes in and publish relevant data on environmental quality and resource use</td>
</tr>
<tr>
<td>• a technological system that can search continuously for new solutions</td>
<td>• states shall make or require prior environmental assessments of proposed activities which may significantly affect the environment or use of a natural resource</td>
</tr>
<tr>
<td>• an international system that fosters sustainable patterns of trade and finance</td>
<td>• states shall inform in a timely manner all persons likely to be significantly affected by a planned activity and to grant them equal access and due process in administrative and judicial proceedings</td>
</tr>
<tr>
<td>• an administrative system that is flexible and has the capacity for self-correction</td>
<td>• states shall ensure that conservation is treated as an integral part of the planning and implementation of development activities and provide assistance to other states, especially to developing countries, in support of environmental protection and sustainable development</td>
</tr>
<tr>
<td>• states shall co-operate in good faith with other states in implementing the preceding rights and obligations</td>
<td></td>
</tr>
</tbody>
</table>

Source: WCED (1987)

After considering the 1987 Brundtland report, the UN general assembly called for the UN conference on Environment and Development (UNCEO) which was
Chapter 8 - The Challenge for Sustainable Tourism Development

held in Rio-de Janeiro, Brazil in 1992 - commonly known as “The Earth Summit” was the follow-up to Brundtland and the intention was to build on Brundtland’s hope and achievements to respond to pressing global environmental problems and to achieve agreement on principles and action for sustainable development “The primary goals of the summit were to care to an understanding of development” that would support socio-economic development and prevent the continued deterioration of the Environment and to lay a foundation for a global partnership between the developing and the more industrialized countries based on mutual needs and common interests that would conserve a healthy future for the planet” – (UN, 1992).

Among the outcomes were Agenda-21 and the Rio-declaration on Environment and Development and the statement on forest principles.

Agenda 21 a comprehensive programme for global action in all areas of sustainable development. It addresses today’s pressing problems and aims to prepare the world for the challenges of the next century. Four groups of topics are considered in Agenda 21:

1. Social and economic development
2. Resource management
3. Strengthening the participation of major groups

The Rio Declaration on Environment and Development Supports Agenda-21 by defining its rights and responsibilities of the state and comprising of 27 principles for the achievement of sustainable development.

8.3. CONCEPT OF SUSTAINABLE TOURISM DEVELOPMENT

Sustainable tourism development recognises the interdependency between the long-term viability of the economic investment in tourism projects, programmes and policies and the successful management of the resource basis. Therefore sustainable tourism development seeks to maintain and enhance the quality of life, and the quality of the tourist experience at destination areas through the promotion of economic development, which conserve (where necessary preserve) local natural, built and cultural resources. Moreover, it recognises the links which exist between destination areas and the wider environment and therefore seeks to contribute to
regional, national and global resource conservation and preservation measures in order to advance intra- and inter generational equity of access to wealth-generating natural resources."

It was Krippendorf's seminal book "The Holiday Makers" (1984) introduces to tourism some of the basic idea inherent in sustainable development (Croall, 1995). Earlier in 1980, the "Manila declaration" of the WTO had shown a great concern about the environmental value. "The protection, enhancement and Improvement of various components of man's environment are among the fundamental condition for the harmonious development of tourism. Similarly rational management of tourism may contribute to a large extent to protecting and developing the physical environment ...." – Manila Declaration.

One of the first action strategies on tourism and sustainability emerged from the globe'90 conference in British Columbia, Canada. The conference suggested that the goals of sustainable tourism are

(i) to develop greater awareness and understanding of the contributions that tourism can make to environment and the economy
(ii) to promote equity and development
(iii) to improve the quality of life of the host community
(iv) to provide a high quality of experience for the visitor
(v) to maintain the quality of the environment on which the foregoing objectives depend (Globe 90, 1990 : 6).

This was followed by Globe'92 (Hawkes and William, 1993) as in Chawla R. (2003) and the more from principles to practice in implementing sustainable principles in tourism.

The Brundtland Report (WCED, 1987) and the subsequent Rio-conference in 1992 led to a wider dissemination of the concept of sustainable tourism development. The world conference on “Sustainable Tourism” in Lanzarote, Canary Island, Spain in 1995 was just a thematic successor to the Rio conference. The basic principles and objectives of this conference are given in the following table 8.2.
### Table 7.2. Charter for sustainable tourism outline of principles and objectives

1. Tourism development should be based on the criteria of sustainability. It should be ecologically viable; and ethically and socially equitable for local communities.

2. Tourism should contribute to sustainable development and be integrated with all aspects of the environment, respecting fragile areas and promoting the assimilation of impacts so that these the within capacity limits.

3. Tourism must consider its effects on the cultural heritage and traditions of local communities.

4. Participation of all actors in the process is essential.

5. Conservation of the natural and cultural heritage involves cooperation, planning and management.

6. The satisfaction of tourists and preservation of destinations should be determined together with local communities and informed by sustainable principles.

7. Tourism should be integrated into local economic development.

8. Tourism development should improve the quality of life.

9. Planning tourism is important.

10. Equity of the benefits and burdens of tourism should be sought.

11. Special priority should be given to environmentally and culturally vulnerable areas and areas already degraded.

12. Alternative forms of tourism compatible with sustainable principles should be promoted.

13. Research should be promoted.

14. Environmentally compatible management systems should facilitate a sustainable tourism policy.

15. The travel industry should promote sustainable development, exchange experiences etc.

16. Particular attention should be paid to transportation and the use of nonrenewable energy.

17. Codes of conduct should be established for the main actors.

18. All necessary measures should be implemented to promote awareness of sustainable tourism among all involved in tourism.

Source: Martin, 1995
8.4. GENERAL CONCEPTS IN THE PLANNING OF SUSTAINABLE TOURISM

Real progress towards the sustainable tourism growth has to be made through the integration of the viewpoints of at least 3 disciplines (Sevageldin, 1993).

(i) That of the economists whose method seek to maximise human welfare within the constraints of existing capital stock and technologies.

(ii) That of the ecologists who stress on preserving the integrity of the ecological subsystems viewed as critical for the overall stability of the global ecosystem. Environment is part and parcel of this global ecosystem.

(iii) That of the sociologists who emphasises that the key actors are human beings whose pattern of social organisation is crucial for deriving viable solution to achieving sustainable development.

For sustainable tourism growth, the above viewpoints have to be integrated under the guidance of tourist expertise to forecast future demand, plan effective typologies and induce values for the harmonious integration of tourism development projects into a framework that is sustainable. There consideration have to be added to design interior and land resource use conceptualisation introduced by the architect – planner. (Wahab S. and Pigram J., 1997).

Sustainable tourism needs to be implemented in harmony with the following relevant international agreements and declarations.

- The international convention on the rights of the child.
- The various United Nation declaration on tourism, environment and protection of cultural heritage.
  - including the 1963 United Nation Conference on International Travel and Tourism.
- The international agreements impacting upon tourism, including the
  - convention on Biological Diversity (BD).
  - UN framework convention on climate change
  - World Heritage convention
  - Ramser convention
  - Washington convention and
  - various regional agreement.
• Declaration in the field of tourism, such as the
  - Manila declaration on world tourism
  - The Hague declaration
  - Tourism bill of rights and tourist code.
  - Charter for sustainable tourism (Lanzarote, 1995).
  - WTO, Manila declaration on the social impact of tourism
  - Berlin declaration of the International conference on Biological diversity and tourism (March, 1997).
  - WTO/WTTC Agenda-21 on environmentally sustainable tourism.
  - Global code of ethics for tourism currently to be developed by WTO.
  - Agenda for action adopted at the world congress against the commercial seasonal exploitation of children (Stockholm, 1996).

8.5. SUSTAINABLE DEVELOPMENT AND THE CONCEPT OF CARRYING CAPACITY

Carrying capacity is a central theme of environmental protection and sustainable tourism development. It determines the maximum use of any place without causing negative effect on the resources of the community, economy and culture or reducing visitor satisfaction. The principle of tourism carrying capacity implies a limitation on tourism growth that may degrade scarce resources and at the same time offers a criterion of sustainable tourism development. Carrying capacity therefore represents the point beyond which the tourism industry in any destination becomes unsustainable. In other words, carrying capacity whether national, regional or local denotes how much tourism is sufficient to yield positive return and avoid its blights (Wahab S.& Pigram J., 1997).

Malthes and Wall (1982 : 21) stated “carrying capacity is the maximum number of people who can use a site without any unacceptable alteration in the physical environment and without an unacceptable decline in the quality of the experience gained by the visitors”. According to O'Reilly (1986) there are two facets to tourism carrying capacity. The first deals with the ability of the destination area to absorb the impacts of tourism development in a variety of ways before negative impacts became evident. The second relates to the tourists' perception of environmental quality, i.e., the risks that tourists number will decline because
perceived capacities have been exceeded and the destination area ceases to attract (a psychological carrying capacity). Further he describes various carrying capacities as follows.

**Physical carrying capacity** – The limits of a site beyond which wear and tear will start taking place and environmental problem will arise.

**Psychological or perceptual carrying capacity** – The lowest degree of enjoyment tourists are prepared to accept before they start seeking alternative destination.

**Social carrying capacity** – The level of tolerance of the host population for the presence and behaviour of tourists in the destination area and the degree of crowding, users are prepared to accept by other.

**Economic carrying capacity** – The ability to absorb tourism activities without displacing or disrupting desirable local activities.

World tourism organisation (1992 : 23) defines carrying capacity as being; “fundamental to environment protection and sustainable development. It refers to maximum use of any site without causing negative effects as the resources, reducing visitor satisfaction or exerting adverse impact upon the society, economy and culture of the area. Carrying capacity limits can sometimes be difficult to quantify but they are essential to planning for tourism and recreation.

Factor which influence capacity thresholds can be divided into two categories: the characteristics of the tourists and the characteristics of the destination area. O’Reilly (1936) argues that the interrelationship between all these factors need to be taken into account to ensure appropriate tourism development. Early attempt in the field of tourism planning at identifying the carrying capacity of destination areas were preoccupied with trying to quantitatively determine the number of tourists that could be accommodated in an area without causing, “unacceptable environmental and social changes”. However owing to the highly complex nature of tourism, the nation of quantifying capacity limits is extremely problematical.

Today the concept of a fixed ceiling or a threshold number of tourists is largely discredited (WTO, 1992 : Miller & Gill, 1994) owning to the difficulty of quantification and fixed carrying capacity limits, more emphasis is being placed on indicator monitoring system to identify potential problems, rather then trying to set absolute numerical limits of tourists number for destination. As Wagar (1964 : 21) has pointed out, carrying capacity is not an end itself, but is a mean to an end, changes to
8.6. DEFINING CARRYING CAPACITY IN THE STUDY AREAS

Estimation of carrying capacity needs to be done at two levels, basically physical and psychological. The former is easily quantifiable provided the necessary data is available but the latter require more subjective judgment. Hence it is really difficult to assess the carrying capacity of a place precisely. Even the complexity increases in areas of mountain environment and this is particularly true for both the study areas, Darjiling and Gangtok. In the absence of any set of norms or standards for a hill town estimation of any exact number pertaining to the tourists carrying capacity may prove hazardous at this stage.

Here reference can be made of the Resource Assessment Organisation (1993). According to it carrying capacity should be treated as rough rather than an absolute limits of threshold. It also noted that the problems with the carrying capacity concept is in its demand for technical solution to an objective question. As a management tool carrying capacity appeals to a recognised need to limit and control tourism, which may threat the sustained use of limited resources (Willian and Gill, 1994).

Here in this present study the nation behind the assessment of tourism capacity is not only to provide an exact figure of threshold but to create a framework of analysis and assessment that could be used to make more informed decision in future planning and environmental management of the study area keeping in view the principles of sustainable development.

8.7 ESTIMATION OF TOURISM CARRYING CAPACITY IN THE STUDY AREA

According to the Encyclopedia of tourism management - the physical deterioration of the environment is mainly due to an imbalance between tourist demand and physical carrying capacity of destination area. If the concentration of visitors both in spatial and seasonal term exceeds a community's physical carrying capacity, deterioration of such basic resources as landscape and water supply can occur. It will transform what was intended to be a non-consumptive renewable
resources industry into yet another short-term excessive consumption of valuable resources. Hence the estimation of carrying capacity becomes essential to ensure sustainability of tourism. The estimation of tourism carrying capacity for both the Darjiling and Gangtok has been done both at the physical level and at psychological level (both tourists and residents). The physical capacity has been estimated in terms of the supportive capacity of the infrastructure. The psychological carrying capacity has been estimated intern of perception of tourists and residents.

8.7a. Estimation of Tourism Carrying Capacity of Darjiling Town

(i) Infrastructural carrying capacity

Estimation of infrastructural carrying capacity has a great importance in the study of sustainability of a region. Each parameter of this infrastructure has certain threshold limits beyond which the development might get inflicted on the deterioration of the environment. This facts can be proved very well by the present status of the infrastructural set up of Darjiling Municipality which has nearly about 1,07,197 population and in addition to this 1-1½ lakh floating population including tourists, serviceman, students etc. In chapter III the infrastructural set up of Darjiling Municipality has already been discussed in detail that proves that whatever development has taken place there from the infrastructural point of view, it is beyond its carrying capacity.

Here again an attempt has been made to highlight the real scenario of the infrastructural capacity.

Carrying capacity of water supply

The 2001 census reveals that the town has a population of about 1,07,197 persons and with the opening of school and colleges and with the onset of tourist season another 15-20,000 population (per day) added to this figures resulting into a total population of some 1.27 lakh for whom the water has to provide.

Considering the all available water sources (using maximum potential) the total water availability per day is 711900 Gallon. While the total water demand for this 1.27 lakh population considering the demand taking 10 Gallon per day per person as against 30 Gallon/day/person as per I.S. 1172-1971 has estimated to be 1714500 Gallon per day. So there is a huge gap of 1002600 Gallon between the demand and
supply of water in Darjiling town. Even at this rate per capita water demand is 13.5 Gallon per day. Considering the supply delivery norm (IS 1172-1971) of 30 Gallon per day per person, it has the supportive capacity for only 23730 population while its own population according to the 2001 census has crossed more than a lakh. Even at a lower rate considering 10 Gallon/day/person, it can only support 711900 population.

So it is proved by the above said fact that the present water supply system is incapable of supporting even its own population apart from huge crowd of tourists. So there is always a hue and cry for water during there dry period. Unfortunately which coincides with the peak tourist season worsening the situation further.

*Carrying capacity of the sewage system*

The age old sewerage system of Darjiling only cover 35% of the form area consider only 10% of households collecting 6.6 MLD of sewage from about 2500 holdings and 50 community toilets. The sewerage system was initially designed to support 20,000 persons in 1906 and has never expanded later. Hence the carrying capacity of the sewer lines as well as treatment capacity of the septic tanks has been largely exceeded due to its rapid growth in population during past few decades. The total carrying capacity is only 21600 person while as it has its own population of 1,07,197 (2001) and 15-20,000 floating population. So already carrying capacity in respect of sewerage system has exceeded.

*Carrying capacity of solid water management*

On an average more than 30 metric tonnes of solid waste is generated in Darjiling Municipality daily. The average goes upto 45-50 metric tonnes per day in a peak tourists season. With the existing infrastructure only about 12-15 metric tonnes are transported daily to the disposal ground and among the 5-6 MT are discharged in near by jhoras. In this present situation, the peak season per capita production (1.27 lakh per) is about 394 gm per day while the off season per capita per day production of solid waste is about 280 gm. Considering it's present disposal capacity it can support only 38100 (approx.) population in peak season only 53,598 person in off season.

Hence for both the peak season and lean season, carrying capacity has been exceeded.
Carrying capacity of the accommodation system

At present in Darjiling there are about 270 hotels which have altogether a total bed capacity of 10,750 (approx.) and the picture is quite satisfactory considering the flow of tourists.

Carrying capacity of the transport system

Over the last few years, the number of small vehicles playing between Darjiling and Siliguri has rises considerably and there were about 206 jeeps and 62 cars (RTO, 1997). So the carrying capacity is around 5000 people including jeeps, sumo, maruti and private bus.

But the problem is with the parking space. In Darjiling till present day there is no proper arrangement for parking space. Near Chalkbazar about 2000 sq. m. area is only available for parking which is not sufficient for the car coming from Siliguri, Gangtok and surrounding tourist spots.

(ii) Psychological carrying capacity

Psychological carrying capacity is the level of tolerance about the changes in the destination environment, accepted by tourists before they start seeking alternative destination. It depends on the perception of the quality of the experience gained by the tourists in destination environment. The estimation is based on the primary survey among the domestic and foreign tourists to understand the level of satisfaction. This subjective judgment would indicate the areas where the carrying capacity has exceeded (Table 8.4).

Table 7.3. Domestic tourist perception about the satisfaction level in Darjiling

<table>
<thead>
<tr>
<th>Factors</th>
<th>Good</th>
<th>Modern</th>
<th>Bad</th>
<th>Must change</th>
</tr>
</thead>
<tbody>
<tr>
<td>(a) Water availability</td>
<td>13.33</td>
<td>28.33</td>
<td>5</td>
<td>18.33</td>
</tr>
<tr>
<td>(b) Sewerage</td>
<td>54.33</td>
<td>40.33</td>
<td>5.33</td>
<td>-</td>
</tr>
<tr>
<td>(c) Solid waste arrangement</td>
<td>-</td>
<td>15.00</td>
<td>50</td>
<td>35.00</td>
</tr>
<tr>
<td>(d) Public transport</td>
<td>28.33</td>
<td>50.00</td>
<td>18.33</td>
<td>3.33</td>
</tr>
<tr>
<td>(e) Road condition</td>
<td>2.67</td>
<td>45.67</td>
<td>49.33</td>
<td>2.33</td>
</tr>
<tr>
<td>(f) Power supply</td>
<td>61.67</td>
<td>25.00</td>
<td>13.33</td>
<td>-</td>
</tr>
<tr>
<td>(g) Accommodation</td>
<td>57.67</td>
<td>40.33</td>
<td>2.00</td>
<td>-</td>
</tr>
</tbody>
</table>

Source: Primary data, Domestic tourists survey in Darjiling, 2002-2005
Note: Figures indicate % of the total domestic tourist surveyed.
Table 7.4. Foreign tourists perception about the satisfaction level in Darjiling

<table>
<thead>
<tr>
<th>Factors</th>
<th>Level of satisfaction</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Good</td>
</tr>
<tr>
<td>(a) Water availability</td>
<td>20</td>
</tr>
<tr>
<td>(b) Sewerage</td>
<td>40</td>
</tr>
<tr>
<td>(c) Solid waste arrangement</td>
<td>40</td>
</tr>
<tr>
<td>(d) Public transport</td>
<td>30</td>
</tr>
<tr>
<td>(e) Road condition</td>
<td>40</td>
</tr>
<tr>
<td>(f) Power supply</td>
<td>50</td>
</tr>
<tr>
<td>(g) Accommodation</td>
<td>40</td>
</tr>
</tbody>
</table>

Source: Primary data, Foreign tourists survey in Darjiling, 2002-2005
Note: Figures indicate % of the total Foreign tourist surveyed.

The tourist were also asked that their perception matched with the experience and 45% of the total surveyed tourists opined in favour of this while 55% commented that their prior perception about the area did not match with their experience.

Among those people whose perception did not match with the experience, 97.58% said that it is because of the worst situation, which they did not expect in Darjiling. Factors behind these are the much crowd (100%), inefficacy of infrastructure (90.06%), environmental changes (74.53%) and the non-satisfactory service by the people (54.04%). About 48.33% of the tourists travelling in Darjiling would prefer for Gangtok for their next visit mainly because of better service, lower crowd, much better tourists spot, no water scarcity etc. They thought that the development of other tourist spot would gradually force away the flow from this town in near future.

8.7(b) Estimation of tourist carrying capacity of Gangtok

(i) Infrastructural carrying capacity

It already has been discussed in chapter III that presently there is no municipal body in Gangtok and the infrastructural amenities are being provided by PHE and UD & HD.
Carrying capacity of water supply

At the present Rateychu, a glacial fed Rivulet is the main source of water supply for Gangtok town which is tapping into Selep treatment plant and from there it is transported to various reservoirs and from there to consumer points. The Selep treatment plant has the capacity to supply 36.36 million litres raw water daily to the town while it has the treatment capacity of 13.36 million litres daily. Considering the per capita per day water demand of 150 litre/ per person, the total water demand in lean season is \((29354 \times 150) = 4403100 \text{ litre per day} = 4.4031 \text{ million liter of water per day. Where as in peak season considering another floating population of 20,000 the total water demand became 9.3 million litres daily.} \)The water demands in various sectors are given below;

(i) Domestic demand taking 150 litre/day per  
\[7403100 \text{ litre} \]

(ii) Industrial and commercial water demand  
\[(\text{Hotels and restaurant} / \@ 10\% \text{ of total water demand}) \]
\[740310 \text{ litre} \]

(iii) Water demand for public use @ 5% of water demand  
\[370155 \text{ litre} \]

(iv) Fire demand (no extra provision)  
\[1480620 \text{ litre} \]

(v) Water required to compensate losses in leakage, waste etc. @ 20% of total water demand  
\[1480620 \text{ litre} \]

So water supply is quite sufficient to satisfy the needs of the people  
\[9327906 \text{ litre} \]

\[= 9.327906 \text{ million litre daily} \]

Considering all sector, schools, colleges, the estimated existing demand is 27.00 million litres per day. Therefore present quantum of water brought from the source including raw water is sufficient. At present considering the raw water supply, the carrying capacity is about more than 200000 populations. But in respect of treated water there are some shortfall in the supply.

Carrying capacity of sewerage system

Only 24% area of the town are under the sewerage coverage and the sewerage production is about 7.65 MLD out of which only 2.28 MLD is treated in a plant near Adampool. The rest of the untreated sewerage are disposed off in septic tanks, soak pits and jhoras, which ultimately create pollution in down stream. Even in the peak tourist season sewerage production increases which in beyond its carrying capacity. Since there is a lacuna of data regarding the septic tanks, its household...
conservation and the number of users the exact figure of its carrying capacity cannot estimated but from the present situation it is clear that sewerage system is incapacitate to provide service to all its people apart from the huge floating tourists in peak season.

Carrying capacity of solid waste management system

The solid waste generated by the average Gangtokian or the over night tourist is estimated to be 450 gm per day. Hence in the lean season the total production became 13209300 kg = 13209.3 kg = 13.2093 kg, while in the peak tourist season at may goes upto = 19.95 tonnes (20) tonnes per day. But fortunately the PHE is quite efficient in providing infrastructure to disposed all trashes and garbage and transport it to land filling site at Marchack.

Carrying capacity of the accommodation system

Presently in Gangtok there are about 170 hotels and the total estimated carrying capacity is about 6000. But considering the trend of tourist inflow the carrying capacity should be extended to satisfy the demands.

Carrying capacity of the transportation system

Over the last few years, the vehicular population of Gangtok has increased considerably. According to 2000-2001 statistics presently there are about 254 jeeps, 179 cars, 10 bus, having a total carrying capacity of about more than 3000. Even jeeps registered under Govt. of WB are also plying between Sikkim and Siliguri. So in respect of transport carrying capacity, it can be concluded that it is quite sufficient to provide service to the people or tourists.

Even just beside police head quarter, a 2 storied parking space has been allotted to the vehicles related to tourism activity, which can accommodate near about 50 cars or jeeps at a time.

(ii) Estimation of psychological carrying capacity in Gangtok town

As previously it has already been mentioned that psychological carrying capacity of the tourists is the maximum accepted level of the environmental deterioration in the host environment which then tend to seek other destinations. The estimation here is based on the subjective judgment of the satisfaction level expressed by the tourists in the cause of survey.
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Table 7.5. Domestic tourists satisfaction level in Gangtok

<table>
<thead>
<tr>
<th>Factors</th>
<th>Level of satisfaction</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Good</td>
</tr>
<tr>
<td>(a) Water availability</td>
<td>82.0</td>
</tr>
<tr>
<td>(b) Sewerage</td>
<td>69.0</td>
</tr>
<tr>
<td>(c) Solid waste arrangement</td>
<td>85</td>
</tr>
<tr>
<td>(d) Public transport</td>
<td>87</td>
</tr>
<tr>
<td>(e) Road condition</td>
<td>49.5</td>
</tr>
<tr>
<td>(f) Power supply</td>
<td>88</td>
</tr>
<tr>
<td>(g) Accommodation</td>
<td>82.5</td>
</tr>
</tbody>
</table>

Source: Primary data, Domestic tourists survey in Gangtok, 2002-2005
Note: Figures indicate % of the total domestic tourist surveyed.

Table 7.6. Foreign tourists satisfaction level

<table>
<thead>
<tr>
<th>Factors</th>
<th>Level of satisfaction</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Good</td>
</tr>
<tr>
<td>(a) Water availability</td>
<td>50</td>
</tr>
<tr>
<td>(b) Sewerage</td>
<td>25</td>
</tr>
<tr>
<td>(c) Solid waste arrangement</td>
<td>25</td>
</tr>
<tr>
<td>(d) Public transport</td>
<td>62.5</td>
</tr>
<tr>
<td>(e) Road condition</td>
<td>62.5</td>
</tr>
<tr>
<td>(f) Power supply</td>
<td>100</td>
</tr>
<tr>
<td>(g) Accommodation</td>
<td>87.5</td>
</tr>
</tbody>
</table>

Source: Primary data, Foreign tourists survey in Gangtok, 2002-2005
Note: Figures indicate % of the total Foreign tourist surveyed.

Among the total surveyed domestic tourists 85% opined that their perception about the area really match with their experience and while 15% of them comment that their perception did not match with the experience in Gangtok and among those peoples 16.67% said that the situation is far better than their perception and 83.33% comment on environmental change that have been taken place. Even 69.5% were preferred Darjiling while they have been opted to select between Darjiling and Gangtok mainly because of scenic beauty. This means that while infrastructure is fully capacitated to accommodate the tourists their psychological satisfaction level is somewhat decreasing.
8.8. **Comparison between the Carrying Capacity of Darjiling and Gangtok**

From the previous analysis it is evident that carrying capacity in case of Darjiling has already exceeded in respect of its own population or even considerable flow of tourists while the present growth of tourism in Gangtok is still within its carrying capacities. So it is necessary to expand the carrying capacity of Darjiling in respect of every infrastructural facilities in order to attract more tourists even to satisfy its own people. The over stress on the urban carrying capacity is responsible for the maximum deterioration of the environment. So to protect the environment and to achieve sustainable development which will be much more beneficial in long run, it is necessary to expand carrying capacity within its limits or to disperse the population or tourists to other destination in order to relief the stress on infrastructure.

REFERENCES

Chapter 8 – The Challenge for Sustainable Tourism Development