

# Assessment of Carrying capacity of tourist destinations in The Nilgiris district

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**Abstract:** Nilgiris, the well-known district of Tamilnadu famous for its natural scenic beauty start getting affecting because of the excessive tourism growth from past few years. The district having more than 30 destinations which makes tourism as an important source of economy in the district. Growing tourism brings positive as well as negative impact on tourist destinations which is mainly happening due to mass tourism and overcrowding. Mass tourism directly related to excess carrying capacity of the destinations which can destroy the natural tourism environment. In this study, we gave the attempt to understand the concept of carrying capacity and assessing the carrying capacity of important destinations of Nilgiris district to identifying the destination which is experiencing the mass tourism and overcrowding which will give the idea of the destinations where interventions and strategies required to control the impact on tourism environment.

**Keywords:** Tourist destinations, Carrying capacity, Quality of tourist destinations, Mass tourism.

## I. INTRODUCTION

Over the past few decades, tourism is growing in around the world and it became one of the important aspect for growing economy generation sources in the world. There is many countries and cities whose economy complete dependent on tourism. This increasing tourism lead to increase in number of arrivals to destinations which has the positive impact to the destinations and economy also it lead to negative impact to the tourist destinations and environment of tourism. This uncontrolled flow of tourist and unstoppable development of tourism also altering the environmental equilibrium which lead to many environmental problems eg. Pollutions, degradation of natural resources Etc. The rapid but unplanned exploitation and utilization of natural resource around the tourism, making a risk of destroying the true identity of the destination. (Tran Nghi, 2007)

The relation between tourism and environmental is obvious that may be degradation of environment can cause degradation of tourism itself which lead to loss in economy and value of the place (Coccosis & Mexa, 2004). Therefore, there is need to conserve or protect the tourism environment in terms of values, culture, nature and natural environment which can be done by promoting the sustainable tourism. One of the important indicator used to promote sustainable tourism is Tourism carrying capacity (Manning, 2002). Carrying capacity can also assess the impact of tourism on tourist destinations due to the overflow of tourists to the destinations. Assessment of carrying capacity of a destination measure the threshold over which arrival of tourist or human can be the negative impact on the destinations. Carrying capacity gives an idea of a threshold visitors that can be accepted at a destination (PAZIENZA, n.d.).

Initially in biology the concept of carrying capacity introduced which tells the limit or level a species population size attains, given the environmental resistance indigenous to its location. (Candela, n.d.). In the field of civil engineering it's define as the maximum capacity that a building, an infrastructure or a facility could sustain as regards the number of its users. This concept were also used by urban planners, architects, engineers and policy makers which taking lot of decisions. There are many definitions of tourist carrying capacity has been given, but commonly used definition is by World Tourism Organization. (Coccosis & Mexa, 2004). According to world Tourism Organization, Tourism Carrying Capacity defined as "the maximum number of persons which could visit a location within a given period, such that local environmental, physical, economic, and socio-cultural characteristics are not compromised, and without reducing tourist satisfaction". (WTO, 1999) .The definitions of carrying capacity of a destination explain the quantitative carrying capacity assessment by defining the number of tourists which represents the limit within which any type of degradation will not occur. (Turner & Brown, 1997).

The carrying capacity assessment differs between different type of place, destination eg. Coastal areas, islands, rural area, natural place, mountains and historical settlements. The study focuses on the natural destinations, which is experiencing the mass tourism, extra pressure, land transformations, and urbanization. Considering all the problems associated with natural destinations, the study will focus on the sustainability of tourist destinations with the aim to

assessing the carrying capacity of the different destinations, to understand the present condition of tourist destinations in terms of tourist arrivals which directly affect the quality of the tourism environment, services at destinations and natural resources.

## II. OBJECTIVE OF STUDY

The objective of this study is to assessing the carrying capacity of the important tourist destinations in Nilgiris district.

## III. INTRODUCTION OF THE CASE AREA

Nilgiris is the southern Indian state of Tamilnadu. It is the name given to a range of mountains spread across the state. Tourism is an important source of revenue for the district and it is home for several hill stations which are visited by tourists in different seasons. Climate is one of the major pulling factors of the Nilgiris. April, May and June are the hottest months with temperature varying between 10° C to 25° C which attracts summer tourists. December, January and February are the coolest months with temperature varying between 20° C and 0° C. Nilgiris district ranked 3<sup>rd</sup> in the state for the highest number of tourist arrivals. The district is also renowned for its eucalyptus oil and tea, and also produces bauxite.

## IV. TOURIST DESTINATIONS IN NILGIRIS DISTRICT

The Nilgiris has more than 30 tourist places, which attract tourists from different parts of the state and country. Map showing the total number of tourist arrivals at each destination in 2016.

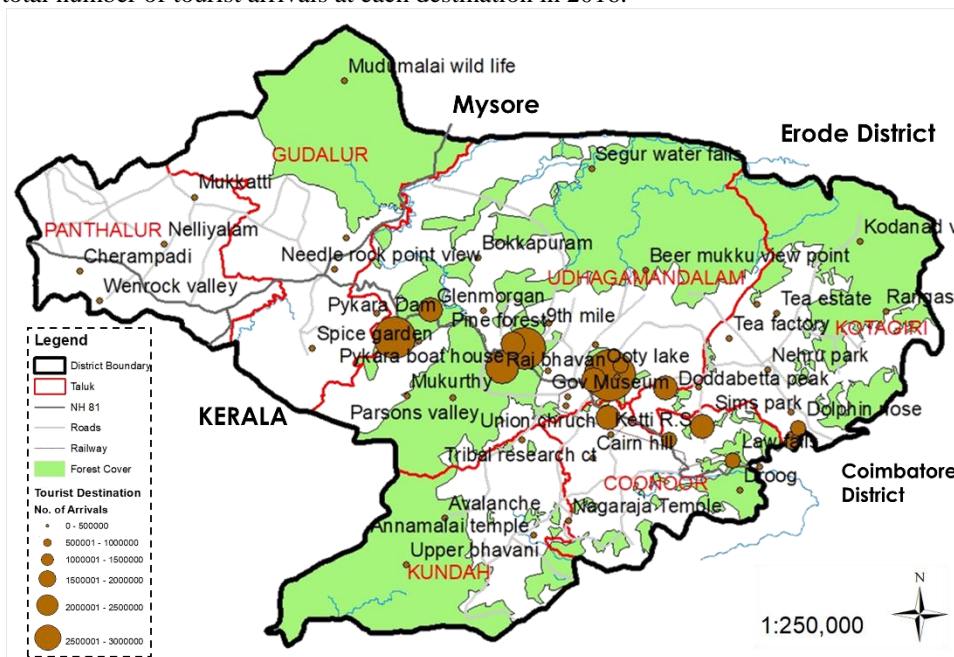


Figure 1: Number of tourist arrival to each destination in 2016

The above map shows the tourist flow in each of the destinations in Nilgiris district and it is seen to be much concentrated in some of the destinations. Due to overflow of tourist in these destinations, infrastructure and other tourism services are getting degraded. This situation can be controlled by diverting the tourist flow from destinations where the carrying capacity is exceeding, to the destinations where the tourist arrival is below the capacity so that development and economy generation will be uniform in all over the district.

## V. METHODOLOGY

Nilgiris district having nature-based tourist destinations. According to (Maldonado, 1992), for nature-based destinations two type of carrying capacity can be assessed eg. Physical carrying capacity (PCC) and Real carrying capacity (RCC). These carrying capacities can be calculated or assessed by Cifuentes methodology (Cifuentes & , 1992) which is also suggested by International conservation of nature and natural resources (IUCN).

- **Physical Carrying Capacity (PCC):** PCC is defined as maximum visitors can physically fit into a destination over a given time. Physical carrying capacity can be calculated with formula:

**PCC**= Length (Trail distance)\*Tourists Meter\*Daily Duration (hrs/day).

- **Real Carrying Capacity (RCC):** The RCC refers to the maximum number of visitors that the environment conditions and management capacity allows without influencing the tourists demand. In the event of the occurrence of heavy rain at any time during the winter, summer and monsoon season, or any natural disturbance the destinations may be closed and tourist may be prohibited to enter into the place. Real carrying capacity can be calculated with formula :

$$RCC = PCC * (Cf 1 * Cf 2 * \dots - Cfn)$$

**Example of botanical garden**

For botanical Garden’s length has been taken for the calculation: 600 meters

Every visitor needs one meter of the separation at any given development.

The Botanical Garden stays opened to the visitors for seven hours for each day for whole year.

An average time of one hour is sufficient for a tourist to visit the Botanical Garden.

$$\begin{aligned}
 PCC &= \text{Length (Trail distance)} * \text{Tourists Meter} * \text{Daily Duration (hrs/day)} \\
 &= 600 * 1 * 1 * 7 \\
 &= 4200 \text{ per Day} \\
 &= 4200 * 365 \text{ visitors per Year} \\
 &= 15,33,000 \text{ visitors per Year}
 \end{aligned}$$

$$RCC = PCC * (Cf 1 * Cf 2 * \dots - Cfn)$$

Correction factors taken is Rain, Natural Disturbances, Weather Condition

$$CF = 1 - \left[ \frac{ML}{MT} \right] \text{ Where: ML = limiting magnitude of variable, MT = total magnitude of variable}$$

Rain= 45 days, Natural Disturbance= 32 Days and weather condition= 30 Days

$$CF 1(\text{Rain}) = 1 - \frac{45}{365}, CF 2(\text{Natural Disturbances}) = 1 - \frac{32}{365}, CF 3(\text{Weather Condition}) = 1 - \frac{40}{365}$$

$$\begin{aligned}
 RCC &= 4200 * ((1-0.123) * (1-0.088) * (1-0.110)) \\
 &= 2991 \text{ per Day} \\
 &= 2991 * 365 \text{ Tourists per Year} \\
 &= 1091795 \text{ Tourists per Year}
 \end{aligned}$$

As Nilgiris receive lot of rains and natural disturbance it is essential to calculate Real carrying capacity at the end. Similar way carrying capacity for other destinations can be calculated shown in results.

**VI. RESULTS AND DISCUSSION**

After assessing the carrying capacity of important destinations, the comparison has been done with the Actual arrival of tourist in each of the destinations to understand which destination is exceeding its carrying capacity. Which will give clear idea about the tourist spots where mass tourism or overcrowding is happening, those spots need to be taken care immediately before impact becomes extensive.

Table 1: Comparison of PCC, RCC with the Actual arrival of tourist to each destination

S.No	Destination	PCC(YEARLY)	RCC(YEARLY)	Actual arrival	Status
1	Botanical garden	1533000	1091795	2865728	Red
2	Rose Garden	2044000	1490953	610002	Green
3	Boat House	992800	683159	1415422	Red
4	Dobabetta Peak	657000	458773	1380000	Red
5	Tea Museum	389333	283991	1260000	Red
6	Pykara Water Fall	1277500	887638	1440000	Red
7	9th Mile	1752000	1217333	2100000	Red
8	Avalanche	1971000	1376318	120000	Green
9	Sim's Park	958125	698884	1080000	Red
10	Kethi Valley View	547500	399362	1440000	Red
11	Lamb's Rock	985500	688159	600000	Green
12	Kodanad View Point	657000	458773	270000	Green
13	Nehru Park	1916250	1397768	432000	Green

Red colour in the table indicates the tourist's places where the actual arrival is exceeding the carrying capacity of place. Green colour shows the places where the actual arrival of tourist is within the carrying capacity limit. So the table clearly shows the tourists places where there is a need for interventions or control mechanisms to reduce the tourist flow, because too many visitors can lead to serious problems in the destination. Also promoting other destinations can help in diverting the tourist flow from main effected places to other tourist places, which can help in having a balanced tourist flow in all the tourist destinations.

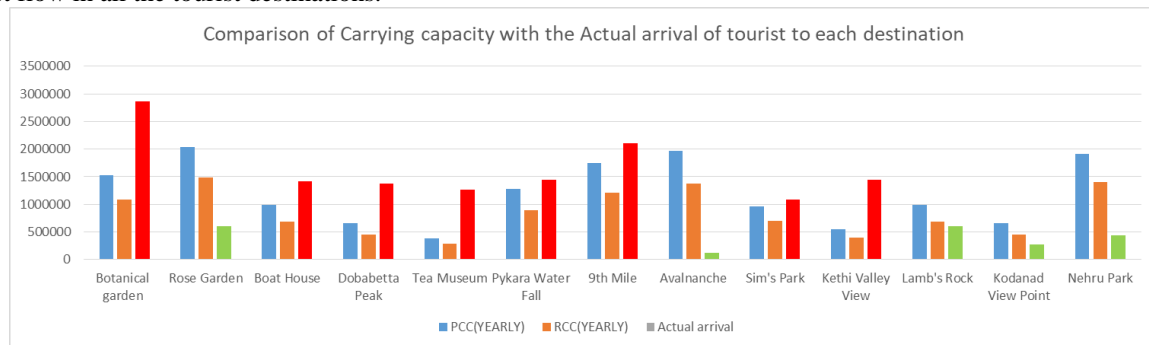


Figure 2: Graph showing comparison of carrying capacity with actual arrival to each destination

The above graph shows the comparison of carrying capacity with actual arrival of tourist in each of the destinations. It is seen that out of 13 destinations in Nilgiris eight destinations is exceeding the carrying capacity and five destinations arrivals are within the carrying capacity.

## VII. CONCLUSION

Assessing the carrying capacity is very important when we talk about sustainable tourism. Since Nilgiris district tourist destination is going through by the mass tourism at many tourist destinations. Assessment of carrying capacity will directly tell about the capacity of people which one destination can hold, which is very important to calculate to control mass tourism. The results of the study directly depicts the destinations which are exceeding their carrying capacities and the ones which are in limit of carrying capacity.

This assessment will also give the concern to the policy makers and officials of Nilgiris district about the need to focus on tourism and its flow so that strategic and policy level interventions can be applied to control the mass tourism or overcrowding at destinations before ruining its value or importance. Finally, research can be further studied to extend the measurement of carrying capacity in each year so that more clear result will evaluate. Carrying capacity assessment should be promoted as a part of sustainable tourism development of nature based destinations in the Nilgiris district for providing better experience to the tourist.

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