



Estimation of Tourism Carrying Capacity for Neil Island, South Andaman, India

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ABSTRACT

Andaman and Nicobar group of islands are unique for its natural landscape and scenic beauty. It has good tourism potential, which attracts both the domestic and international tourists each year. Neil is one of the most visited tourist spot among Andaman, with unexplored coral reefs, brilliant bio-diversity, white sandy beaches, tropical forest and mangrove vegetation. Increasing tourism pressure had negative impacts on social-cultural and natural environment of the island. So, better understanding regarding tourism carrying capacity (TCC) as an environmental management tool is needed to maintain the exploitation and conservation ratio of the Island. In the present study estimation of tourism carrying capacity being the central objective of this research, has been highlighted in the light of the environmental management and planning of the island. Four main beaches namely Bharatpur, Sitapur, Natural arch and Sunset point of Neil Island have been selected as study stations. Tourism capacity has been determined by means of Physical Carrying Capacity (PCC), Real Carrying Capacity (RCC) and Effective Carrying Capacity (ECC). Sunset point beach and Sitapur beach have the highest and lowest TCC respectively in the island. Effective Carrying Capacity for Neil Island is 2134 visitors/day and 64020 visitors/month, which indicates that the tourism carrying capacity of Neil Island is within the optimum range.

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1. Introduction

Andaman and Nicobar group of islands (ANI) are unique for its natural landscape and scenic beauty. It has good tourism potential, which attracts both the domestic and international tourists every year. According to Rajavel, (1998) Andaman and Nicobar Islands (ANI) have vital resources and potentialities for the development of tourism, which perhaps no other part of the mainland of India and no other country in the world possess, because of their unique geographical location, lush green scenic beauty, historical importance, multilingual cultural heritage, colorful cultural and social life, fairs and festivals. Andaman and Nicobar administration gives more emphasis on tourism sector due to the limited scope of industrial activities in the islands. Therefore, tourism becomes most important sector for economic development, revenue collection and employment generation in the islands. The tourism industry is not so old in Andaman and Nicobar Islands. According to statistics of the IP&T, A&NI Administration, both the domestic and international tourist arrivals are increasing gradually from 1980 onwards. Tourism has had negative socio-cultural and environmental impacts in the Andaman and Nicobar Islands (Reddy, 2004b), which underlines the need to undertake detail impact assessment. Keeping in view of the fragile ecology and limited carrying capacity of the islands, the objective of A&N administration is to strive for sustainable tourism. Local conservation groups and NGOs (such as

the Andaman and Nicobar Environmental Team-ANET, the Society for Andaman and Nicobar Ecology-SANE) argue that an extensive environmental impact assessment is needed for the ANI, as most part of the island are exploited and/or not properly managed (Reddy, 2006). Under the circumstances it is necessary to offer some valuable suggestions for the promotion of tourism in the context of environmental protection and its conservation in the Andaman and Nicobar Islands.

World Tourism Organization (WTO) in 2005 declares that tourism operations in protected areas need to be carefully planned, managed and monitored to ensure their long-term sustainability. Otherwise, such operations will have negative consequences, and tourism will contribute to the further deterioration of these areas. While the negative effects of tourism are of significant concern, many protected areas have promoted tourism development to improve their economic conditions, particularly in generating revenue to finance other social and economic development activities and to provide direct income and employment opportunities for local people (WTO, 2005). Every developmental activity leads to environmental change (positive or negative) and tourism is no exception to this (Buckley, 2009). Tourism often has the potential to contribute in a positive manner to local development but at the same time, its fast and sometimes uncontrolled growth, can be the major

cause of environmental degradation and loss of local identity and traditional culture (Syamlal, 2008). The environment of the destination is negatively influenced by the increase of tourism (Gossling, 2002; Ramdas and Badaruddin, 2014), whereas the growth of tourism depends on the quality and characteristics of the environment. As tourism activities become more widespread, there tend to be marked changes in the environment (Smith, 1989), the capacity to absorb large numbers of people will be challenged (WTO, 1990). However, the degree of environmental impact varies, depending on the type of tourist and the intensity of site use (Gartner, 1996).

Starting as early in the 1960s, outdoor recreation research used the concept of Tourism Carrying Capacity (TCC) to address the resource and social effects of visitor use (Manning et al. 1999; Lawson et al. 2003). The concept has been adopted by researchers and managers in the context of tourism and environmental sciences to address financial resources and avoid negative social impacts (Manning et al. 1996). It mainly includes ecological and social parameters, such as environmental quality and visitor experience respectively. Clearly, the basic element of this concept is the need to establish a limit on tourist activity that reflects the concerns and priorities of local managers and planners (Coccosis and Mexa, 2004). By the early of 1990, the concept of TCC was largely replaced by the idea of sustainable tourism, but many of the challenges outlined for this new concept are similar to past issues concerning TCC in terms of definition of objectives, practices, utility and diversity of types (Navarro Jurado et al. 2012). Sustainable tourism is defined as the “tourism which is economically viable but does not destroy the resources on which the future of tourism will depend, notably the physical environment and the social fabric of the host community” (Swarbrooke, 1999). The discourse on sustainable tourism development revolves around a central issue of how to manage the resources of host communities in order to meet the fundamental criteria of promoting their socio-economic wellbeing while satisfying the needs of tourists (Ko, 2001). The concept of TCC occupies a key position with regard to sustainable tourism (Tribe et al. 2000). It is interpreted as an application of sustainable tourism, implying that the two can co-exist and could be useful frameworks for analyzing the impacts and limits of development (Butler, 1996). Over the years, TCC has been evaluated for individual tourist destinations around the world (e.g., Barancok and Barancokova, 2008; Lone and Malik, 2013; McCool and Lime, 2001; Nghi et al. 2007; Sayan and Atik, 2011; Malik and Bhat, 2015). It is suggested that destinations should not be developed beyond their innate capacities for tourism. Despite the limitations associated to the TCC concept, it has been described as an appropriate tool for management, as it enables the preservation of resources (Queiroz et al. 2014). Although not always consensual, the TCC assessment remains one of the most useful and applied techniques (Zacarias et al. 2011) for tourism and recreation planning, and management, especially if combined with other management tools (Queiroz et al. 2014).

Much consideration has recently been given to increase in coastal population, with the implication that the carrying capacity of the world's coast is finite and such considerations form part of several coastal management initiatives (UNEP, 1996). Johnson and Thomas (1996) argues that the present interest in tourism capacity is due to growth in tourism combined with increasing awareness of environmental issues. The concept is particularly important in the coastal zone which is undergoing rapid change as a result of demographic changes and industrialization in the context of global climate and sea-level change. In its broadest sense, carrying capacity

refers to the ability of a system to support an activity or feature at a given level. Tourism carrying capacity is defined as “the maximum number of people that may visit a tourism destination at the same time, without causing destruction of the physical, economic and social-cultural environment and an unacceptable decrease in the quality of the visitor satisfaction”(WTO, 1981). TCC can also be defined as “the maximum number of people that use tourism site without unacceptable effect on environmental resources while meeting the demand” (Hens, 1998). It is the highest bearing capacity of a natural, environmental and socio-economic system beyond which facilities are saturated (physical carrying capacity), the environment is degraded (environmental carrying capacity) or visitor enjoyment is diminished (perceptual or psychological carrying capacity) (Pearce, 1989). Mexa and Coccosis (2004) indicated that despite several criticisms, carrying capacity assessment remains a powerful concept that can be used for planning and management of sustainable tourism. Segrado et al. (2008) reported that apart from outlining all factors that limit tourism growth, the concept of carrying capacity also indicates compensatory tool to manage tourism flows to a destination; whilst Bonilla and Bonilla (2009) indicated that this concept should be seen as a positive and dynamic prism contemplating the temporal space as a basic value for implementation of sustainable beach management principles.

Understanding that good beaches are worth billions of tourist dollars and degraded beaches are worth little (Clark, 2005), the main objective of this paper is to assess the recreational carrying capacity of Neil Island by means of assessing the physical carrying capacity (PCC) (assuming that every beach has a limiting size of people that it can accommodate), real carrying capacity (RCC) and the effective carrying capacity (ECC). To meet the objective, three major research questions were developed: (1) what is the maximum number of people that should be allowed at Neil Island? (2) Has the Tourism carrying capacity at the beach been exceeded or is it still in the optimum range? And (3) what is the optimum allowed number of people on the beach?

2. Study area

This study was conducted at Neil Island. Neil Island lies in the southern part of Richie's Archipelago. The island is located 37 km north east of port Blair, the capital of Andaman and Nicobar Islands (ANIs). It was extended between 11°48'27" and 11°51'03" North Latitude and 93°00'43" and 93°04'29" East Longitude covering an area of 18.90 sq. km. Total shoreline length of the island is 18.6 km. It is inhabited by 2868 people and the low lying foothills, central and western part of the island is occupied by the inhabitants for cultivation purpose. The Climate of ANIs is described as Tropical climate. ANIs Islands has a humid Weather and has no winter season. Rain season lasts for four months in a year. The southwest monsoon touches the Indian soil first in the Andaman and then proceeds towards the Indian mainland. Temperature ranges in between 23°C-28°C, with an annual rainfall of 3000mm in Andaman. ANI is always warm, with pleasant sea-breeze. The rainy season happens twice a year under the influence of Southwest monsoon in mid-May to September, and Northeast monsoon in November to January. There is medium to heavy rain during the monsoon, in the months from May to mid-September and November to mid-December. There is no extreme climate except rains and tropical storms in late summer. The weather is calm only from January to April and to some extent in October. It is quite hot in the months of March to May in Andaman.

The best time to visit the Andaman & Nicobar Islands is between mid-November and April.

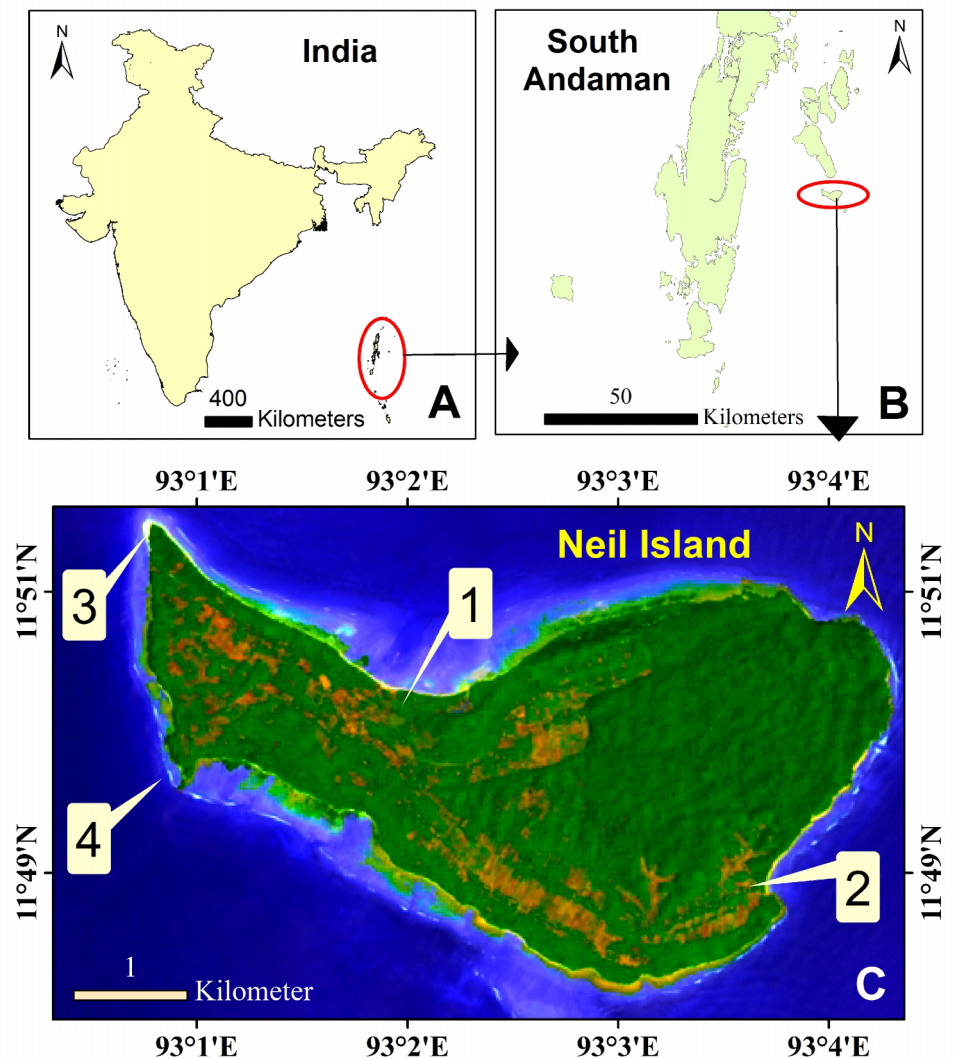
The eastern part of the Neil Island is covered by rainforest. Connected by speedboat from Port Blair daily, it provides ideal holiday destination for eco-friendly tourists in natural settings. The sea encircling the island is shallow and full of colorful corals. Both Havelock and Neil Islands of Richie’s archipelago are grouped in the ‘Rani Jhansi Marine National Park’ and are potential eco-tourism paradises. Most of the domestic and foreign tourists visit Neil Island because of the availability of various coastal resources like forests, corals, mangroves, white sandy beaches, creeks and mudflats. Neil Island is also known as the ‘vegetable bowl’ of Andaman as it is here the local vegetables are cultivated and supplied to other islands. The settlers named the beaches after the mythical characters of the epic Ramayana like Bharatpur, Laxmanpur, Sitapur, Ramnagar etc. The

beaches are popular for their hammocks under shady trees. Four main beaches of Neil Island namely Bharatpur beach, Sitapur beach, Sunset point beach and Natural arch beach of Lakshmanpur have been selected for this study (Figure 1).

3. Methodology

The general formula of Carrying capacity assessment for protected areas was first proposed by Cifuentes (1992), and further applied in different fields by many other authors (Amador et al. 1996; Ceballos-Lascurain, 1996; Cifuentes et al. 1999; Munar, 2002; Nghi et al. 2007; Segrado et al. 2008; Zacarias et al. 2011). In the present context the method has been applied with some modifications. Tourism carrying capacity is divided into the following levels:

Fig. 1 Location map of the study area showing the locations of the four beaches in Neil Island



- 1) Bharatpur Beach 2) Sitapur Beach
- 3) Sunset Point Beach 4) Natural Arch Beach

3.1. Physical Carrying Capacity (PCC)

Definition: PCC is the maximum number of tourists that can physically fit into or onto a specific area, over a particular time.

$$\text{Formula: } PCC = A/A_u \times Rf$$

Where: PCC = Physical carrying capacity; A = Available area for tourist use; A_u = Area required per tourist; Rf = Rotation factor (number of visits per day)

Total area (A) of four beaches of Neil Island, was measured during the field (Table 1). Considering the area of four beaches, an optimum area required per tourist (A_u) is 5 m² and rotation factor (Rf) is determined by:

$$\begin{aligned} Rf &= \text{Daily open period / average time of visit} \\ Rf &= 12 \text{ hours / 3 hours} \\ Rf &= 4 \end{aligned}$$

3.2. Real Carrying Capacity (RCC)

Definition: The maximum permissible number of tourists to the specific site, once the Correction factors (CF) derived from the particular characteristics of the site have been applied to the PCC.

$$\text{Formula: } RCC = PCC \times (Cf_1 \times Cf_2 \times Cf_3 \times Cf_4 \times \dots \times Cf_n)$$

Where: RCC = Real Carrying Capacity; PCC = Physical carrying capacity; Cf = Correction factors

Correction factors are calculated using the following formula.

$$Cf_x = 1 - Lm_x/Tm_x$$

Where: Cf_x = Correction factors of variable x; Lm_x = Limiting magnitude of variable x; Tm_x = Total magnitude of variable x.

Correction factors are so important for estimating the Real Carrying capacity. The correction factors are obtained by considering the biophysical, environmental, ecological, social and management variables. Tourism is dependent on nature, so some variables are considered as correction factors for this study. Rainfall, excessive sunshine, cyclone and beach quality are the correction factors which can limit the tourism activities and decrease tourists' satisfaction at certain place. Therefore, correction factors are also known as limiting factors of tourism. Calculation of correction factors for different limiting variables are described below.

Rainfall (Cf_1)

ANIs is situated in the equatorial belt and experiences warm and the moist tropical climate. These Islands are exposed to both the monsoons, viz. Southwest monsoon from May to September and northeast monsoon from October to December. Heavy Rainfall occurs during June to September with the southwest monsoon and northeast monsoon commences with very little amount of rainfall towards December. Therefore, the four months of heavy rainfall are considered as the months of restricted access. The limiting magnitude for this parameter was determined as 122 days. The total magnitude is the total number of days available in a year (365 days). The correction factor for rainfall was determined by:

$$\begin{aligned} Cf_1 &= 1 - Lm_x/Tm_x \\ &= 1 - 122 \text{ days / 365 days} \\ &= 1 - 0.3342 \\ &= 0.6658 \end{aligned}$$

Excessive sunshine (Cf_2)

Sunshine is the most important factor for beach tourism. In Andaman and Nicobar Islands from the month March to May are considered as summer season. During the dry summer period ANI has recorded the highest temperature. At noon mainly from 11 am to 3 pm very few tourists want to go to the beach for recreational purpose. So, excessive sunshine in the summer season can be considered as a limiting factor for the study area. The limiting magnitude for this parameter was determined as 92 days × 4 hours = 368 hours of excessive sunshine per year. The total magnitude was determined as the total day of the year i.e. 365days × 12 hours = 4380 hours. Therefore, the correction factor for excessive sunshine was determined as:

$$\begin{aligned} Cf_2 &= 1 - Lm_x/Tm_x \\ &= 1 - 368 \text{ hours / 4380 hours} \\ &= 1 - 0.0840 \\ &= 0.916 \end{aligned}$$

Cyclone (Cf_3)

In ANI under normal condition, the wind speed is fairly constant (5 knots / hour) but during cyclonic events it may go as high as 120 to 130 knots / hour. Generally in ANIs cyclone being one of the important limiting factors of tourism occurs during the months of May and November. Island to island ferry services and various tourism activities are affected by cyclonic storm during these two months. The limiting magnitude for this parameter was determined as 61 days, the total magnitude was 365 days and the correction factor for cyclone was calculated by:

$$\begin{aligned} Cf_3 &= 1 - Lm_x/Tm_x \\ &= 1 - 61 \text{ days / 365 days} \\ &= 1 - 0.1671 \\ &= 0.8328 \end{aligned}$$

Beach quality (Cf_4)

Beach tourism, snorkeling and sightseeing are the main tourism activities in Neil Island. Beach quality is one of the most important parameters which may put direct impact on the quality of beach tourism. Beach quality has negative impact on the tourist's mind and may reduce the satisfactory level of tourists. Beach quality assessment was done based on the indicators as proposed by [Nghi et al. \(2007\)](#). The results of beach quality assessment and Correction factor for beach quality were determined separately for four beaches of Neil Island and the results are shown in Table 2.

3.3. Effective Carrying Capacity (ECC)

Definition: The maximum number of tourists that a site can sustain, given the management capacity (MC) available.

$$\text{Formula: } ECC = RCC \times Mc$$

Where: ECC = Effective Carrying Capacity; RCC = Real Carrying Capacity; Mc = Management capacity

Management capacity (Mc) defined as the sum of conditions that the beach tourism management requires if it is to carry out its functions and objectives. It is so difficult to measure the Mc. Determination of the Mc was based on the available infrastructures, facilities, amenities, legislation, equipment, staff capacity and budget. Mc was assessed through perception study of beach user and evaluating the study during the field work. All datasets were collected from several literature studies, direct field surveys, questionnaire survey and from the perception based study of the beach users and tourists during the field visits in Neil Island in 2012 and 2013. As per the assessment the overall management capacity of Neil Island is 5 %.

4. Results and discussion

In order to investigate the physical carrying capacity in the study area based on applied approach, it is needed to calculate and assess required data, including a suitable area for tourism, area available per user, visit duration, etc. Suitable area for tourism was determined differently by the extent of recreation zones (Table 1). Table 2 shows the matrix of beach quality assessment along with the corresponding correction factors of four beaches of Neil Island. The result of the field shows that Sunset point beach covers 47500 m² (950 m long and 50 m wide), with highest tourist potentiality. Considering all required data, physical carrying capacity was estimated for four beaches of Neil Island and the results are shown in Table 3 and Figure 2.

SL. No.	Beach	Length of beach (m)	Width of beach (m)	Total area (m ²)
1	Bharatpur	1200	20	24000
2	Sitapur	1150	30	34500
3	Sunset point	950	50	47500
4	Natural arch	600	70	42000

Table 1. Areal coverage of beaches of Neil Island

PCC includes the maximum number tourist that can physically present at a certain time and place and should never exceed this range. Rotation factor is considered as an important indicator for the development of management strategies for beach tourism, as it influences the tourism capacity of a certain place. The numbers of the PCC are only theoretical and RCC was calculated to check the extreme value of PCC considering some correction factors. Correction factors that have been considered for this study includes: Rainfall, excessive sunshine, cyclone and beach quality. Excluding beach quality all correction factors considering for RCC are same on all over the Neil Island. The total RCC of Neil is 42687visitors/day which is in other words are the frequency of the maximum permissible number of people that should be allowed at Neil Island. Snorkeling, Scuba diving, Game fishing, trekking. Cycling, Sun bathing, swimming and bird watching are the main tourist activities in the Island. Good beach quality offers maximum tourist activities because, it has direct control on the satisfactory levels of tourist. Beach quality is assessed by selecting some parameters through a matrix table for Neil Island. In Neil Island each beach is popular with the tourists for different recreational activities depending on its quality (Table 2). The

Beach	Material Sand/ rock	Slope	Tide	Beach length	Litter	Beach colour	Quality of water	Beach quality	Correction factor (C _f)
Bharatpur	+	+	+	+	-	+	+	1/7	0.858
Sitapur	+	+	-	+	+	-	-	3/7	0.571
Sunset point	+	+	+	+	-	+	+	1/7	0.858
Natural arch	-	+	-	-	+	+	+	3/7	0.571

Notation: “+” Good or suitable quality; “-”Low or unsuitable quality

Table 2. Beach quality assessment matrix of Neil Island

available accommodation status (Government as well as private) in Neil Island are summarized in Table 4.

Study site	Physical Carrying Capacity (visitors/day)	Real Carrying Capacity (visitors/day)	Effective Carrying Capacity (visitors/day)
Bharatpur beach	19200	8371	419
Sitapur beach	27600	8004	400
Sunset point beach	38000	16568	828
Natural arch beach	33600	9744	487
Total	118400	42687	2134

Table 3. Tourism carrying capacity of four beaches of Neil Island

Sitapur beach is exposed to the open sea and thus prone to higher tides. It is located 5 km southeast from the jetty ghat. Sitapur beach is best suited to watch Sunrise in the backdrop of natural vegetation & limestone formations. Raised coral patch on the southern part of the beach is another attraction for the tourists at Sitapur. The journey from the Jetty to Sitapur beach itself is refreshing with green fields and a variety of crops. Half a kilometer from the jetty, Bharatpur is one of the best beaches known for swimming & coral watching. This beach is ideally recommended for youngsters because of activity options. One can avail from here glass bottom boats for coral viewing. The Sea around the Jetty area is full of corals with schools of fishes swimming around. The vegetation along the beach is simply soothing. Sunset point beach of Lakshmanpur, lies 2 km northwest of the jetty ghat. The beach is a broad spur of white shell sand with shallow water offering good snorkeling. Sun basking & swimming are the other choiceable options. One can view spectacular sunset from this beach. Natural arch beach is the only one rocky beach in the island. This beach is about two kilometers from the jetty with lots of coral formation, ornamental fishes, sea urchins, sea anemones, sea cucumbers and star fishes etc. are best suited for people with some kind of scientific temper. The ideal time to visit this beach is during the low tide time as the beach is inundated during the high tide. The rocky surface gets slippery and needs to be on guard. The main attraction of this beach is the Natural arch/rock formation.

The result indicates that each level constitutes a corrected capacity level of the preceding level. From this assessment it is clear to us that PCC is always greater than the RCC and RCC is greater than the ECC. ECC is more acceptable than two other types of carrying capacity. It is also useful for development of policy for beach tourism management, as it indicates the optimum number of tourists that should be allowed on the beach with existing condition and management capacity. Effective Carrying Capacity for Neil Island is 2134visitors/day. But the available tourist accommodation at Neil Island is well below the ECC of the region and needs to be increased but with due consideration to the environmental quality. Considering the total ECC as well as the yearly tourist flow in the Andaman Islands (1.5 lakhs approx.), it can be concluded that the tourism carrying capacity of Neil Island is well preserved to accommodate a higher level of yearly tourist infiltration with better services and management facilities in future.

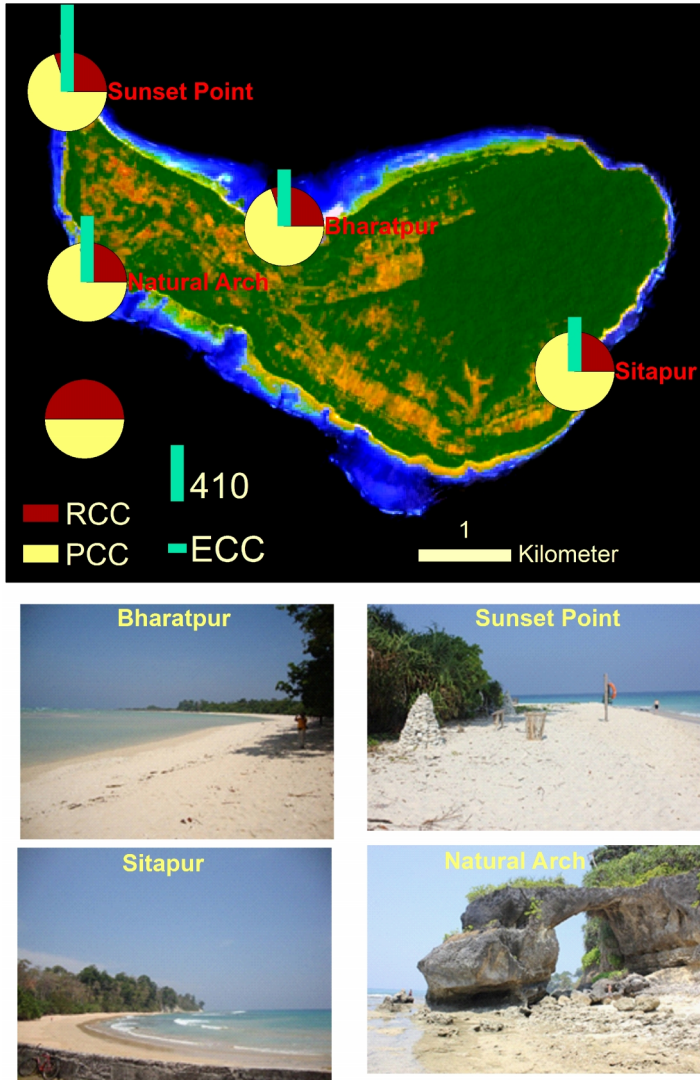


Fig. 2. Cartographic representation of PCC, RCC and ECC for the four beaches of Neil Island

Previous study shows that there are quite a number of very good reasons which hinders the growth of tourism in the island territory as lack of information, poor tourist transportation, communication facilities, inadequate hotels and tourists accommodation facilities and other infrastructural deficiencies. Two boats (and three on some days a week) leave make the round trip from Port Blair to Neil Island every day with one of them going via Havelock Island. From Rangat, there is also a ferry which leaves at 6:15am, goes to Havelock and then comes to Neil. Public transport is by means of autos, motorbikes, cycles and Omni vans. There is no bus service. The Andaman and Nicobar Administration, in association with the Pawan Hans Helicopter Limited operate weekly Helicopter services from Port Blair to Neil subject to availability of passengers. It flies a 10-seater Dauphin 365 N Helicopter on Mondays to Neil Island. There is no broadband or internet connectivity available in the island. No ATMs or scheduled banks are available as means of the tertiary economic activity. Among the other mobile services only BSNL has its own mobile tower in Neil Island. Power generation is done by Diesel Generating sets. There is one Primary Health Centre and also a sub-center functioning in this island with the service of three doctors.

Two Govt. guest houses (Hawabill Nest Guest House of the Directorate of Tourism and A.P.W.D Inspection Bungalow) and few private hotels which provide accommodation at reasonable rates in Neil Island (Table 4).

1. Govt. Accommodation:			
SL. No.	Name of the resort	No. of Rooms	Total No. of Beds
1	Hawabill Nest, Dept. of Tourism, Neil Island	07	18
2	A.P.W.D Inspection Bungalow, Neil Island.	02	04
2. Private Accommodation:			
1	Hotel Pearl Park, Lakshmanpur, Neil Island	26	52
2	Tango Beach Resort, Lakshmanpur, Neil Island	20	40
3	Hotel Kingfisher, Neil Kendra, Neil Island.	11	22
4	Cocon Hut Resort, Laxmanpur, Neil Island	14	18
5	Resort Bharatpur, Neil Island	8	16

Table 4. Accommodation facilities available in Neil Island

Reddy, (2007) have pointed out that any attempt to develop tourism on a large scale in the island would have harmful effects on the island ecology. It is argued that the opening up of the islands to tourists may cause an indiscriminate destruction of many unique and valuable species of flora and fauna some of which as alleged have already become extinct. Most serious concern in the islands is scarcity of fresh water during the time of havoc tourist inflow. The construction of the accommodation units must be encouraged which are environment friendly and must be concentrated on a particular site in order to easily manage solid and liquid waste generated from accommodation sectors. There are other problems with the expansion of tourism in these islands as mentioned earlier by Reddy, (2007). Basic consumables like rice, wheat, vegetables, fruits, milk etc. are expensive than the mainland as it has to be transported from the mainland. The cost of transportation hikes the prices of simple consumable items. One can imagine what would be the state in case of more number of people coming in as tourist and to meet their demands of food, water and shelter. Waste disposable will be a challenge especially when the islands are cut of miles away from the mainland. There are currently no measures either at the panchayat level or municipal level to dispose the garbage and this will be the serious concern in the coming days. The need of the hour is to make the islands self-sufficient in terms of production, with the introduction of sustainable practices which need a holistic action plan. For the revival and promotion of tourism, a list of demands for developmental assistance have been taken up with the Government of India, through the planning Department of the Andaman and Nicobar Administration. These are:

1. Promotion of quality resorts, hotels and restaurants, preferably by the private sectors.
2. Promotion of roads and wayside tourist amenities like changing rooms, toilets, eating joint and rest rooms.

3. Introduction of hovercrafts, catamarans, luxury boats for faster transportation of tourists from Port Blair and as well as other islands of Andaman.
4. Introduction and promotion of quality water sporting activities, including adventure water sports in Neil Island.
5. Promotion of qualified manpower, security guards and life guards for all the beaches of Neil Island.
6. Installation of more numbers of rainwater ponds and dug wells to manage the acute water scarcity as faced by the island.

According to Jovicic et al. (2008) for the proper understanding and use of the concept of carrying capacity in an attempt to sustainable tourism in ANIs some important prerequisites should be followed by the planners, managers, policy makers and administrators. These are:

1. Carrying capacities change over time along with changes in goals and technical processes affecting tourism, while the type and scope of tourist traffic have a critical influence on the variability of carrying capacity.
2. It is necessary that an agreement on desired/acceptable ecological, social, and economic conditions and the effects of tourism development be reached, including indicators for their monitoring and evaluation.
3. In order for the concept of carrying capacity to be used as a valid means of destination management, it is necessary to accurately identify the relation between the scope and type of tourist traffic in a given area, as well as the effect arising from them.

It is necessary to postulate a political, legislative, and financial framework within which the managerial bodies and planning sectors can set the limits of tourist usage of space.

5. Conclusions

The concept of carrying capacity is particularly important in the coastal zone which is undergoing rapid change as a result of increasing anthropogenic pressure in certain natural environments. In its broadest sense, carrying capacity refers to the ability of a system to support an activity or feature at a given level. From very small to large types of systems are found in the coastal zone and these systems also support different types of activities. Tourism is a most practiced activity in the coastal zone and it may vary from one location to another. Over tourism has environmental, social, cultural and economic impacts. In the present situation for coastal resource management and planning among different approaches, tourism carrying capacity assessment remains one of the most useful and applied tool. The concepts of carrying capacities are related by the idea that each system has certain limits or thresholds and is not necessarily fixed in time. They are dependent on technology, preferences, and the structure of production and consumption. They are also varying with the changing nature of interaction between the physical and biotic environment. From the present study in Neil Island, it is found that, the present status of tourism activity is in lower level with its carrying capacity. Implementation of good infrastructure and management facility will help the Neil Island to reach to its actual tourism carrying capacity (TCC) in the near future.

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