ACTION HISTORY OF RTI REQUEST No.WLIOI/R/E/21/00053

Applicant Name Nimisha Agarwal

An assessment of the environmental sensitiveness of sea turtle **Text of Application**

nesting beaches of the Great Nicobar Island.WII.30pp

Reply of Application Information provided in Annexure

SN.	Action Taken	Date of Action	Action Taken By	Remarks
1	RTI REQUEST RECEIVED	29/07/2021	Nodal Officer	
2	REQUEST FORWARDED TO CPIO	02/08/2021	Nodal Officer	Forwarded to CPIO(s) : (1) Monali Sen
3	REQUEST DISPOSED OF	23/08/2021	Monali Sen-(CPIO)	
			Print	

1 of 1 24-08-2021, 10:02 am





No. WII/RTI/CPIO/2021-22 (Qtr-II)/32

Date: 19 August, 2021

To.

Ms. Nimisha Agarwal 303 Villa Maria Apartment, 24 Wheeler Road, Thomas Town, Bengaluru, Pin:560084 Email: nimisha@jhatkaa.org

Sub.: Information under RTI Act, 2005-reg.

Ref.: Your Online RTI No. WLIOI/R/E/21/00053 dated 29/07/2021

Madam.

Please refer to your application cited above under RTI Act, 2005. In this context, point-wise response to your queries is given below:

Information Sought under RTI	Reply				
An assessment of the Environmental Sensitiveness of Sea Turtle Nesting Beaches of the Great Nicobar Island.WII.30pp	Please see the attached Annexure –I.				

If you are not satisfied with the aforesaid reply, you may appeal to the Appellate Authority i.e. "Director, Wildlife Institute of India, Post Box 18, Chandrabani, Dehradun – 248 001, Ph. 0135-2640910".

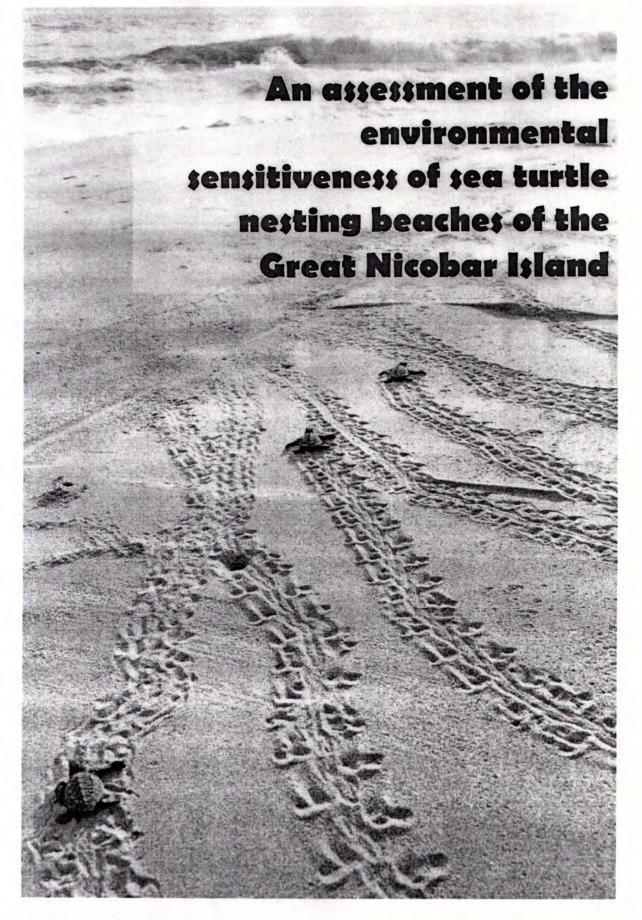
Thanking you,

Encl.: as above.

Yours faithfully,

NO & CPIO (RTI)

ई-मेल/E-mail : wii@wii.gov.in, वेब/Website : www.wii.gov.in



Page 1 of 30



An assessment of the environmental sensitiveness of sea turtle nesting beaches of the Great Nicobar Island

Disclaimer

The secondary information presented in the document are sourced from published literatures, WII, ZSI and A &N Forest Department. WII acknowledges all concerned for the same.

© Director, WII

Principle Investigator

K. SIVAKUMAR Wildlife Institute of India

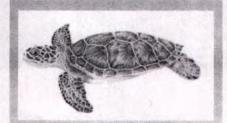
Research Fellow

SAGAR RAJPURKAR Wildlife Institute of India

Advisor

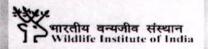
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Director
Wildlife Institute of India

t.
NFORWATION PROVEDEN



WILDLIFE INSTITUTE OF INDIA





Acknowledgment

I would like to acknowledge Shri Jitendra Narain, Chief Secretary of Andaman and Nicobar Islands, Shri Kulanand Joshi, Managing Director, Ms. Anjali Sehrawat, Executive Director, Shri Mohd Pervaiz, General Manager, Shri Saji Samuel, Senior Manager of ANIIDCO, Deputy Commissioner of Nicobar District, Assistant Commissioner of Nancowry, Block Development Officer of Campbell Bay for their supports during this study.

My sincere thanks to Dr Dhananjai Mohan, Director, Wildlife Institute of India for his ineffable guidance, encouragement and support to complete this task on time.

I am grateful to all officials from the Forest Department especially Shri S.K. Bhandari PCCF (CRZ&FC), Shri P. Subramaniyam, APCCF (A&V), Shri Thomas Verghese, DFO (Campbell Bay) and other staff of the Forest Department for their help during the survey. Special thanks to Thiru P. Subramaniyam, APCCF who accompanied me in the field, walked all beaches and nearby forests, and also helped me to collect field data.

I am thankful to the Coast Guard Commandant and his team at Campbell Bay for their help to conduct this survey in the difficult inclement weather condition and saving our life from the big waves, and providing two speed boats with smaller boats to approach beaches. I am also thankful to the Captain and crew members of 'MV Long Island' for helping us in the survey.

I am thankful to the National Helicopter Carrier India – Pawan Hans for helping us to conduct the reconnaissance survey with help of a helicopter.

Last but not the least, I thank Mr Sagar Rajpurkar, Research Fellow, Wildlife Institute of India for helping me in the survey and meticulously assisting me to collect all required field data.

- K. Sivakumar



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INFORMATION F. C. T.

INFORMATION PROVIDED

Introduction

The Andaman and Nicobar Islands in the Bay of Bengal arch from Arakan Yoma in Mayanmar in the north to Sumatra in Indonesia in the south. The Andaman group has more than 325 islands (21 inhabited) covering 6,408 sq km, and the Nicobar group has over 23 islands (12 inhabited) with an area of 1,841 sq. km. Nicobars are one of the four biodiversity hotspots of India. The Nicobar Islands can be subdivided into three distinct subgroups; the south lies the Great Nicobar group consisting of two islands over 100 km² in area, nine islets less than five km2 in area, and a few rocks. Great Nicobar, Little Nicobar, Kondul and Pilo Milo are inhabited. Meroe, Treis, Trax, Menchal, Megapod, Cabra and Pigeon are uninhabited islets. The shore line of Nicobar Islands are endowed with varied landscapes such as rocky shore, sandy beaches, backwaters, bays, lagoons, mangrove forests and coral reefs. To the interior most of the islands have undulating terrain with the main ridges running north-south, falling steeply and irregularly on both sides to the floor of the Bay of Bengal and the Andaman sea. The Great Nicobar groups is significantly more hilly than the Nancowry group, with the hight peak, Mt. Thullier at 670 MSL.

The soil shows considerable variability from heavy clay, loams, gravelly loams, sandy loam and sand. The depth of soil depends on the slope, with deep alluvial deposits often found along the lower reaches of the creeks. The soil lacks humus due to continuous leaching by heavy rainfall.

Four Islands in the Nicobar group have areas protected as wildlife preserves, and all islands are tribal reserves. Tillanchong and Batti Malv islands are Wildlife Sanctuaries. Great Nicobar has two National Parks (536 km²) and is also a Biosphere Reserve (885 km²), whose core areas are the National Parks.

The vegetation and the floristic composition of the Car Nicobar group, Nancowry and Great Nicobar groups of islands differ from one another. In general the vegetation of the Nicobar Islands can be classified into six groups: Marine vegetation, beach vegetation, tidal mangrove forest, inland evergreen forests, patches of deciduous forest and grass land and open vegetation. The beach forests or the dune forests are restricted to the beaches of fine calcareous sand which stretch along the shores. Creepers that mark the beginning of beach vegetation are *Ipomoea percaprae*, Vigna retusa, Ischaemum muticum, Phyla nodiflora and herbs like Acalypha indica etc. Scaevola frutescens is the immediate successor to these plants. Tournefortia argentina is a large shrub with silvery pubescent leaves and is very common in Great Nicobar Island.

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Pandanus leram, Pandanus tectorius and Pandanus furcatus grow luxuriantly in this coastal forest.

Mangrove forests are found in patches of varying sizes in most islands. The dominant species present in this mangrove forests are *Rhizophora mucronata*, *Bruguiera gymnorrhiza*, *Excoecaria agallocha*, *Carallia brachiata*, *Sonneratia acida*, *Timonius jambosella* and *Nipa fruticans*.

The Great Nicobar Island, which is located between 6045' N - 7015' N, and 93°38' E - 93°55' E. The total area of the island is 973 km² with five perennial rivers and five hill ranges. The highest point is Mt Thullier (670 MSL). South Bay or Galathea Bay is located near to the Indira Point, which is the southernmost point of India.

The island is exposed to both south-west and north-east monsoons, with an average rainfall of 200 cm. The bulk of the rainfall comes during the southwest monsoon, and the wettest months are August to November, while the driest months are February and March when less than 5 cm of rainfall is received. The climate is humid, tropical-coastal due to its proximity to the equator. The average temperature varies from 25.5°C and 34.4°C. The average relative humidity is 80.8% and seldom goes below 70%. The islands get northeast wind from November to January and southwest from May to October. Cyclones sometimes bring huge devastation, endangering life.

Two groups of indigenous communities inhabit Great Nicobar. The Shompen, who now number less than 150, are a semi-nomadic tribe who inhabit the forests of the central uplands. It is probable that they were pushed into inaccessible areas by the Nicobarese who have several settlements along the coast. The Nicobarese constitute the largest tribal group in the islands.

The Government's vision for holistic development of Great Nicobar Island, which inter alia envisages the sustainable development of Great Nicobar Island, including setting up of Transhipment Port, Airport and a Township. The project is of strategic importance and also significant from the points of view of National Security.



Sea turtles and their habitats in Nicobars

Five of the seven species of marine turtles found worldwide are reported to occur in Indian coastal waters, of these, four species such as Leatherback, Green sea, Olive Ridley and Hawksbill, nests along the coastline of Andaman and Nicobar islands (Sivakumar, 2002; Namboothri el al. 2012). Andaman and Nicobar Islands have some of the best nesting beaches and foraging grounds for marine turtles in India. A proportion of world's Leatherback turtle population migrates every winter to the off coast of Little Andaman, Little Nicobar and Great Nicobar islands. Most importantly on the beaches of Galathea, Dagmar (Casuarina Bay) and Alexandria in Great Nicobar Island as well as on the beaches of Little Nicobar and Little Andaman. The Leatherback turtle nesting population in Andaman and Nicobar islands forms one of the four large colonies in Indo-Pacific region. Leatherback turtles that nest on the beaches of Andaman Nicobar Islands migrate up to Australia and Africa on either side.

Increased egg predation by wild pigs, domestic and feral dogs, hunting and incidental capture of turtles and fishery related mortality have been widely reported in the islands. Therefore, the Forest Department has already identified all-important sea turtles nesting beaches of islands and continuously monitoring these beaches with a Special Sea Turtle Monitoring and Protection Force (STPF). Andaman administration has also banned sand mining in all turtle nesting beaches in the region. Feral dogs, which pose a great risk to the survival of turtles, were also monitored and regulated. Artificial hatcheries have been established at several nesting sites to protect nests from predation. Further, the department is successful in getting supports of communities and other stakeholders in conservation of sea turtles and their habitats in islands.

In Nicobar district, both Little and Great Nicobar Islands are historically well known for the nesting of leatherbacks. In the Great Nicobar Island, there are nine important turtle nesting beaches, of these, Galathea Bay is one of the three important nesting sites of Leatherback turtles, other two being Casuarina Bay and Alexandria Bay (Sivakumar, 2002). Other beaches are used by multiple species of turtles. Sporadic nesting of leatherback was also reported from Anderson Bay and Shashtri Nagar (ANIFD). About 150 to 500 Leatherback turtles nest at Galathea Bay every year. The 2004 tsunami has adversely affected this species and its nesting areas. But after few years, the species could bounce back that indicates that this species has a good resilience and adaptability for the changes, provided their habitats are protected.



Objective and Background

The Government's vision for holistic development of Great Nicobar Island, which inter alia envisages the sustainable development of Great Nicobar Island, including setting up of Transhipment Port, Airport and a Township. The project is of strategic importance and also significant from the points of view of National Security.

In this context, ANIIDCO after having a meeting with Additional Secretary MHA. vide (UT). its letter No.1-1552/ANIIDCO/Projects/2020-21/1275, dated 9th April, 2021, and with reference to 260th Meeting of EAC of MoEF&CC, had requested WII to undertake a study to assess the environmental sensitivity of the project to suggest most suitable location for the Port. In this context, WII has agreed making a recee inspection visit to the area to study the critical wildlife habitat at Galathea Bay and other parts of Great Nicobar to understand the area and the issues and set the future course of action subject to minutes of the 260th Meeting of EAC, MoEF&CC that was held on 5-6 April, 2021.

In this context, WII has carried out a **rapid assessment** study to understand the biological or ecological significance of five sites identified by ANIIDCO for the port. This study was conducted with aim of assessing the current status of important turtle nesting beaches with special focus on sea turtles especially leatherback. Study was also aimed to assess the status of megapodes and dugong habitats along these beaches.



Methodology

- 1. In the Andaman and Nicobar islands, the main nesting season for sea turtles is from November to March, therefore, this survey was largely based on sign surveys especially surveying the number of old tracks and nests laid in the season, and also secondary data collected by the Forest Department and other agencies and literature. This survey was carried out from 14th to 19th April, 2021 to understand the current status of beaches with respect to sea turtles nesting in the Great Nicobar Island. Aerial surveys were also carried out using a helicopter for reconnaissance and then all selected beaches visited by foot with six persons and a drone for the detailed survey.
- 2. Aerial survey. The entire coasts of Great Nicobar Island was surveyed using a helicopter on 15th April, 2021 to select the important beaches for detailed surveys by foot. Helicopter flew at the slower speed at the altitude of 500 m. Based on this survey, Anderson Bay (Joingdar Nagar), Vijay Nagar, Laxmi Nagar, Gandhi Nagar, Shashtri Nagar, Galathea Bay, Pemayya Bay, Alexandria Bay and Casuarina Bay were chosen for further detailed survey. These beaches were chosen largely due to its length and width, and historical reporting of sea turtles nests in these beaches that was based on literature and Forest Department's records. There were also several smaller but potential beaches that are conducive for turtle nesting were seen between Pemayya Bay and Alexandria along the west coast, and between Campbell Bay and Laful along east coast of the Great Nicobar Island.
- 3. Drone survey: A drone with a special application was used to study the beach profile, geomorphology of the bay, inter-tidal profile and locating old nests. Land-cover of surroundings of the beaches was also studied using the drone. Minimum two flights were made at over each beach at the height of 100 m. Further, one more flight was exclusively used for locating old nests at the height of 50 m. Geo-coded images of drone was later analysed for calculating the beach length, width, inter-tidal width, slope of the beach from the low-tide line. Drone was also used to check the presence of seagrass beds (and dugongs) and coral reefs in the bay areas. Drone also helped us to locate a leatherback nesting at the night on 15th April, 2021 at the Galathea

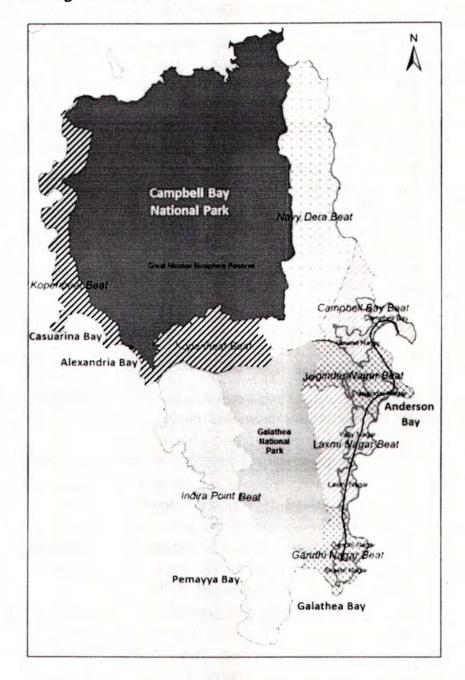




Bay and subsequently, we could observe the entire nesting behaviour of that turtle for about two hours.

- Foot survey: All selected beaches were surveyed by foot with help of a six members team. Entire beach was walked for locating the old nests of sea turtles and recorded. Old tracks of turtles were identified at species level whenever it could possible. Presence of predators based on indirect evidences were also collected. Soil samples were collected while doing surveys. Beach width and inter-tidal width were measured manually at selected points to reconfirm the drone data. Nearby, coastal forest was surveyed for the presence of megapode mounds. Assessment of abundance of seagrass beds in the bay area using drone was also done. All the beaches were approached from sea with help of the Coast Guard boats and their team members.
- Night survey: On 15th and 16th April, 2021, the entire Galathea Bay beach was surveyed for sea turtle nestings. Only one leatherback turtle laid eggs on 15th April, 2021 at 11.05 PM. Wild pigs were seen during the night hours on the beaches.
- Soil grain-size analysis: Soil samples were collected from all nesting beaches to understand the relationship between soil texture profile and species that used for nesting. At each sampling point, soils weighing about 100 grams were collected at high tide line, turtle nesting area and in-between these two points. Multiple sampling points at each beach were fixed at equal distances. Collected samples were air-dried and analysed at the Wildlife Institute of India. weighed sample of soil material was separated through a series of sieves with progressively smaller openings ((0.13mm, 0.25mm, 0.5mm, 1mm, 2mm). Particle size distribution was determined by weighing the material retained on each of the sieves and dividing these weights by the total weight of the sample. A correction was made for the moisture content of the sample and all calculations were based on INFORMATION FROWING dry weight.

Map 1. Important Sea Turtle Nesting Areas of Great Nicobar Island. Casuarina Bay, Alexandria Bay and Galathea Bay are largely used by the Leatherback. Pemayya Bay and Anderson Bay used by multiple species including Leatherback.





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Results and Discussion

- 1. A total of nine beaches viz. Anderson Bay, Vijay Nagar, Laxmi Nagar, Gandhi Nagar, Shashtri Nagar, Galathea Bay, Pemayya Bay, Alexandria Bay and Casuarina Bay (Dagmar) were chosen based on aerial survey for the detailed assessment on the ground. It was found that all these beaches had signs of turtle nesting. Of these, Galathea Bay, Anderson Bay, Pemayya Bay, Alexandria Bay and Casuarina Bay were used by the Leatherback turtles. But, high intensity of turtle nests of leatherback found in Alexandria, Casuarina and Galathea bays (Table 1 & 2). Sporadic nesting of leatherbacks on the Pemayya and Anderson bays was also recorded during this survey. However, both Pemayya and Anderson bays were also observed with nesting other species of turtles in high numbers especially the green sea and hawksbill.
- In 1991-92, more numbers of leatherback turtle nests laid in Alexandria Bay (N=343 nests) than Dagmar Bay (N=171 nests) and the Galathea Bay (N=158 but in 1993-94, leatherback nests reported only from the Galathea Bay (N=237) (Namboothri, et al., 2012) (Table 2). Further, the Forest Department could establish the turtle monitoring hut just after the tsunami but there was no reporting of Leatherback from 2005 to 2010 at Galathea. The first reporting of leatherback turtle nesting in the Galathea Bay was in 2011, when 146 nests reported (Namboothri, et al., 2011) but Jadeja et al. (2016) claimed the first reporting of leatherback nests after tsunami that was in 2015 (Jadeja, et al., 2016). Since 2004, beaches along west coast of the Great Nicobar were not monitored for turtle nests till February, 2016. Therefore, it would be difficult to confirm whether the leatherback used other beaches of Great Nicobar for nesting during this 6 years period, when they were not laid eggs at the Galathea Bay. In 2016, more number of leatherback laid in the Galathea Bay than Dagmar and Alexandria. Variations in the nests laid by the leatherback between years could variations in the environmental settings or conduciveness of the beaches for nesting as leatherback known to be having the poor nest site fidelity. It may change the nesting site



temporarily if the environmental settings of the beach is not favourable for nesting (Kelly et al., 2014).

- 3. Leatherbacks are known to distribute nests up to 460 km apart within a nesting season in Florida, USA (Kelly et al., 2014). Therefore, the Leatherbacks appears to have adopted a regional rather than a local optimum for nesting, possibly due to their poor nesting beach fidelity and the frequent erosion and degradation of their nesting beaches (Kamel and Mrosovsky, 2004; Kelly et al., 2014). Indian Institute of Science, Dakshin Foundation and ANET have earlier tagged 10 leatherbacks using satellite transmitters from the Little Andaman and monitored for their movements from 2011 to 2014. Of these, one turtle that laid eggs at Little Andaman was observed laying eggs in February, 2021 on the beach of the Galathea Bay, Great Nicobar by ZSI Team (pers: C. Sivaperuman, ZSI) that reiterate the weak nesting site fidelity of Leatherback as well as it reveals that the leatherback may distribute nests in different places between years.
- 4. Increased egg predation by wild pigs, domestic and feral dogs, hunting and incidental capture of turtles and fishery related mortality have been reported in the islands. Therefore, the Forest Department has already identified all-important sea turtles nesting beaches of islands and continuously monitoring some of these beaches with a Special Sea Turtle Monitoring and Protection Force (STPF). Andaman administration has also banned sand mining in all turtle nesting beaches in the region. Feral dogs, which pose a great risk to the survival of turtles, were also monitored and regulated. Artificial hatcheries have been established at several nesting sites (Galathea Bay, Gandhinagar, Vijay nagar and Anderson Bay) to protect turtle eggs predation to enhance nesting success. Further, the department is successful in getting support of communities and other stakeholders in conservation of sea turtles and their habitats in island especially at Anderson Bay, Shashtri Nagar, Gandhi Nagar and Vijay Nagar.
- Beaches of Galathea Bay is one of the three important nesting sites of Leatherback turtles in Great Nicobar Island, others being at Casuarina Bay and Alexandria Bay (Sivakumar, K. 2002). About 150





to 480 Leatherback turtles nest at Galathea Bay every year (ANIFD). The 2004 tsunami has adversely affected this species and its nesting areas. But after few years, the species could bounce back, which indicates that this species has a good resilience and adaptability for the changes, provided their habitats are protected. The information on the post Tsunami use of the other two beaches i.e. Casuarina Bay and Alexandria Bay was not available perhaps owing to lack of monitoring,

- 6. Soil analysis has revealed that all nine beaches are conducive for sea turtles to nest (Mortimer, 1990; Kamel and Mrosovsky, 2004; Behera et al., 2013; Kelly et al., 2014). However, Casuarina, Alexandria and Galathea beaches had more fine sands than other beaches. These three beaches had more similarities with respect to soil texture, inter-tidal flats, slope and connectivity with perennial rivers and these environmental settings are largely preferred by leatherback to nest in larger numbers (Table 3). Pemayya bay, Anderson Bay, Gandhi Nagar and Shahstri nagar bays had moderate slope with moderate inter-tidal flats that are seems to be more conducive environmental settings for other turtle species to nests.
- 7. Status of threat especially the nest predation was assessed at high level in all beaches that was concurrence with the similar observations made earlier by Swaminathan et al, (2017). Wild pigs were the main predators on the beaches of Casuarina, Alexandria, Pemayya and Galathea but domestic and feral dogs were major predators observed on the other beaches (Table 3). More than 85% of nests laid by the leatherback were predated that brought down the success rate of leatherback's nests about 15%, which is a very serious issue that needs to be addressed immediately.
- 8. Megapode nest mounds were found along the beaches of Casuarina (N=4), Alexandria (N=2), Pemayya (N=2), Galathea (N=1) and Anderson(N=1) (Map 2 and Table 1).
- 9. This short term survey could not find the presence of seagrass beds in the bay areas of these nine beaches. Therefore, the occurrences of dugong in these bays was doubtful.



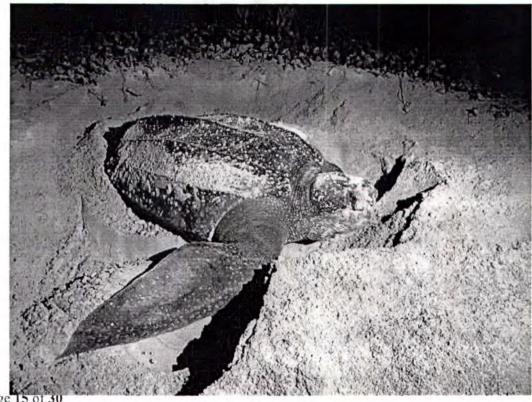


10. Except the Galathea Bay, coral reefs were found near the all nesting beaches (Map 2 and Table 1). But, composition and qualities of these reefs were not studied during this survey owing lack of expertise and to shortage of time.

Table 1. Distribution of sea turtles nests, megapode and dugong at the important beaches/bays of the Great Nicobar.

	Anderson Bay	Vijay Nagar	Laxmi Nagar	Gandhi Nagar	Shashtri Nagar	Galathea Bay	Pemayya Bay	Alexandra Bay	Casuarina Bay
Leatherback	V	V	V	V	V	V	1	V	V
Green Sea	1	V	V	V	V	V	V	V	V
Olive Ridley	1	V	V	V	V	V	V	V	V
Hawksbill	V	V	V	V	V	V	1	V	V
Megapode	V	X	X	X	X	V	V	V	V
Dugong	X	X	X	X	X	X	X	X	X
Coral reefs	V	1	V	1	V	X	V	V	V

Photo: A leatherback turtle covering her nest after laying eggs on 15th April, 2021 in the Galathea Bay, Great Nicobar Island (Photo by K. Sivakumar)



INFORMATION PROVIDED UNDER RTI

Map 2. Critical wildlife habitats along coastal areas of the Great Nicobar Island (Source: WII, ZSI & Forest Department)

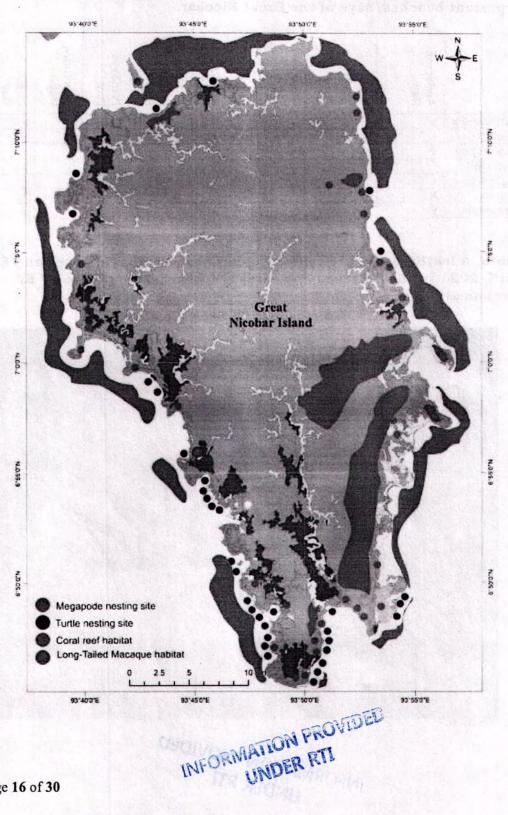


Table 2. Status of Leatherback turtle nests at the important beaches/bays of the Great Nicobar.

Year	Anderson Bay	Vijay Nagar	Laxmi Nagar	Gandhi Nagar	Shashtri Nagar	Galathea Bay	Pemayya Bay	Alexandri a Bay	Casuarina Bay
1991-92*	-	-	-	-	-	158	-	343	171
2000-01**	-	-	-	_	-	524	-	866	362
2015-16#	-	-	1	-	-	412	-	66	166
2016-17**	4	-	0	-	4	90	-	-	-
2017-18##	4	-	0	-	0	182	-	-	-
2018-19##	4	-	1	-	0	203	-		-
2019-20**	11	-	0	-	0	483	-	-	-
2020-21##	4	-	0	1	0	484	-	-	-

^{*}Namboothri, N., A. Swaminathan & K. Shanker. 2012. A compilation of data from Satish Bhaskar's sea turtle surveys of the Andaman and Nicobar islands. Indian Ocean Turtle Newsletter 16: 4-13.

Not monitored/surveyed either by Forest Department or by any other experts or organization, but signs of turtle nesting were recorded during this study. Attempt was not made to calculate the total number of nests laid for this season based on existing tracks/nests signs.



^{**}Andrews, H.V., S. Krishnan & P. Biswas. 2006. Distribution and status of marine turtles in the Andaman and Nicobar Islands. In: Marine Turtles of the Indian Subcontinent (eds. Shanker, K. & B.C. Choudhury), pp. 33-57. Universities Press, Hyderabad. India.

^{*}Swaminathan, A., S. Thesorow, S. Watha, M. Manoharakrishnan, N. Namboothri and M. Chandi. 2017. Current status and distribution of threatened leatherback turtles and their nesting beaches in the Nicobar group of islands. Indian Ocean Turtle Newsletter 25:12-18

^{**} Forest Department, Andaman and Nicobar Islands

Table 3. Profile of important sea turtle nesting beaches of the Great Nicobar on 14th – 19th April, 2021. Galathea Bay, Casuarina Bay and Alexandria Bay had more fine sands than other beaches.

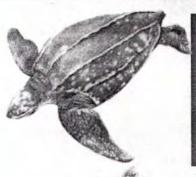
	Gradual 370 m 0.09% 1.14% 3.47% Yes High	mual nu	Anderson Bay Vijay Nagar Nagar Nagar Nagar	Jonath 3.5 km 2.8 km 2.4 km 2.5 km 1.2 km	Beach 16 m 15 m 12 m 15 m	Beach Slope Moderate Steep Steep Moderate Moderate	120 m 40 m	Sand grain 0.21% 0.26% 0.28% 0.17% 0.29% size [2.0 mm] 0.21% 0.26% 0.28% 0.17% 0.29%	Sand grain 0.18% 0.18% 0.17% 0.18% 0.16% size (1.0 mm) 0.18% 0.18% 0.16%	Sand grain 0.21% 0.14% 0.11% 0.18% 0.18% size (0.5 mm)	Sand grain 0.26% 0.21% 0.31% 0.21% 0.22% size (0.25 mm)	Sand grain 0.45% 0.15% 0.25% 0.25% 0.36% size (0.13 mm)	Perennial Freshwater	Liah High (Feral
	Galathea 4.5 km 23 m Gradual 370 m 0.09% 1.14% 3.16% 3.47% Yes Figh	munial nu		1.2 km	15 m		120 m	0.29%	0.16%	0.18%	0.22%	0.36%	ı	eral High (Feral
ate ate	Alexandra 3.2 km 20 m 360 m 0.11% 1.14% 4.11% 3.48% Yes Yes		Casuarina Bay	4.2 km	24 m	Gradua	375 m	%60.0	1.12%	3.18%	3.45%	1.09%	Yes	High (Wild

* high tide line to vegetation line on 14-19 April, 2021

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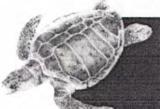
Galathea Bay





Leatherback:

- A total of 484 nests recorded in 2020-21
- One of the three important nesting sites of Leatherback turtles in Great Nicobar Island.
- Old signs of five nests of leatherback observed western side of Galathea and one nest on the eastern side of the Galathea river mouth on 15-16 April, 2021. Nesting of one turtle observed on 15th April, 2021.



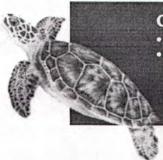
Olive Ridley:

- This species reported to be nesting in the Galathea Bay but there
 was no record of number of nests laid in the recent past.
- A total of 1182 nests recorded in 9 monitoring years, during 199.
 92, 1998-2005 and 2012-13



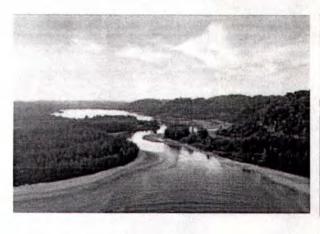
Hawksbill:

- A total of 17 nests recorded in 2000-2001.
- There was no record of number of nests laid in the recent past.



Green Sea:

- Three nests recorded in 1998-99.
- There was no record of number of nests laid in the recent past.

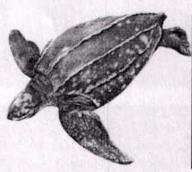




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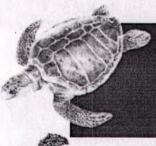
INFORMATION PROVIDED

Casuarina Bay



Leatherback:

- Maximum number of nests laid in 2000-01 (N=362) but this beach was not regularly monitored.
- There was no monitoring of this beach for last five years.
- One of the three important nesting sites of Leatherback turtles in Great Nicobar Island.
- Old signs of seven nests of leatherback observed on 18th April, 2021.



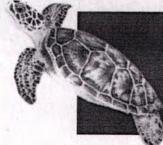
Olive Ridley:

- This species reported to be nesting in this each but there was no record of number of nests laid in the recent past.
- A total of 57 nests recorded in 2000-01
- Old signs of one nest observed probably of Olive Ridley.



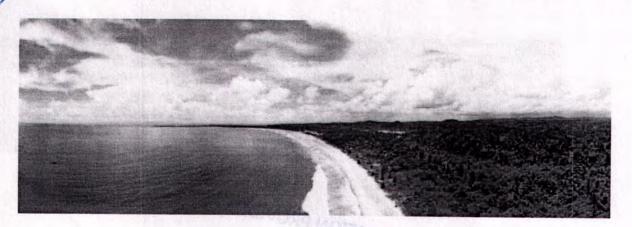
Hawksbill:

- There was no record of number of nests laid in the recent past.



Green Sea:

- There was no record of number of nests laid in the recent past.
- Old signs two nests observed on 18th April, 2021



Alexandria Bay



Leatherback:

- Maximum number of nests laid in 2000-01 (N=866), which
 was the highest number of nests reported from any beaches
 of Andaman and Nicobar islands for leatherbacks but this
 beach was not regularly monitored.
- There was no monitoring of this beach for last five years.
- One of the three important nesting sites of Leatherback turtles in Great Nicobar Island.



Olive Ridley:

- This species reported to be nesting in this beach but there was no record of number of nests laid.
- A total of 163 nests were recorded in 2000-01.
- Old signs of two nests observed during this survey



Hawksbill:

- There was no monitoring of nesting of this species in the past.
- But, it was reported that this species use this beach for nesting



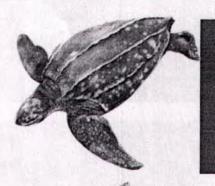
Green Sea:

- · Three nests recorded in 1998-99.
- There was no record of number of nests laid in the recent past.
- .





Pemayya Bay



Leatherback:

- This beach became more conducive for sea turtles to nest just after tsunami.
- This beach was never monitored in the past.
- Old signs of six nests of leatherback observed on 18th April, 2021.



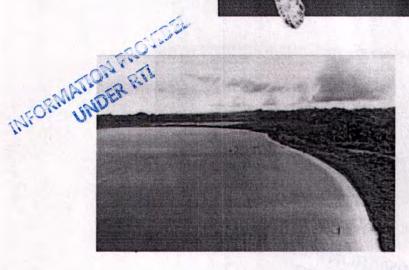
- Old signs of seven nests observed probably of Olive Ridley.
- This beach was never monitored for sea turtles nests in the past as it has became more condusive for turtles after tsunami

Hawksbill:

- · There was no record of number of nests laid in the recent past.
- Old signs of two nests probably of this species observed during this survey.

Green Sea:

- Old signs 11 nests observed on 18th April, 2021
- Highest number of nests of Green sea turtles reported from this beach during this survey.







Leatherback:

- Maximum number of nests laid in 2019-20 (N=11), but average of four nests reported every year in the recent past.
- There was no old signs of turtles seen during this survey but two nests were protected inside the artificial hatchery that was managed by the Forest Department.

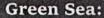


Olive Ridley:

• About 20 to 70 turtles laid nests every year from 2017 to 2021. Maximum of 71 nests reported in 2017. Forest Department collect the eggs and protect inside the artificial hatchery.



 There was no record of number of nests laid in the recent past But, local people confirmed the sporadic nesting of this species in larger number after tsunami. Further, fishermen confirmed that this species feeds in the adjoining coral reefs



Green sea turtles were also reported from this beach Old signs of two nests observed during this survey.





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INFORMATION FROVIDED



Conclusion & Recommendations

- 1. In the Great Nicobar Island, a total of nine beaches have been identified as important turtle nesting beaches, of these, five beaches such as Galathea Bay, Casuarina Bay, Alexandria Bay, Pemayya Bay and Anderson Bay were assessed as the most important beaches for sea turtles (Table 2 & Map 1). Galathea Bay, Casuarina Bay and Alexandria Bay are important for Leatherback turtles and other two beaches i.e. Anderson Bay and Pemayya Bay were assessed as good for nesting of multiple species especially green sea, hawksbill and olive ridley turtles.
- Megapode mounds were found along the beaches of Casuarina, Alexandria, Pemayya, Galathea and Anderson bays (Table 1 & Map 2).
- 3. This short term study could not find any dugongs and their seagrass habitats in these five bays during the survey.
- Except the Galathea Bay, nearby areas of all other important turtle nesting beaches have coral reefs (Table 1 & Map 2).
- 5. Therefore, this rapid assessment study may conclude that all five sites are ecologically or biologically significant sites especially for sea turtles, and may be equally environmentally sensitive for any changes due to development. Coral reefs were not found nearby areas of Galathea bay but it was found in nearby areas of all other bays.
- 6. Intensity of Leatherback turtle nesting varied between beaches located at Galathea Bay, Casuarina Bay and Alexandria Bay, and it was also varied between years. More number of leatherback turtles laid nests in Alexandria Bay than in Casuarina and Galathea Bay in 1991 and 2001. But in 2015, the Galathea Bay was estimated with higher number of leatherbacks nests (Table 2). There was no reporting of nests from the Galathea Bay between 2004 and 2011.



Just after tsunami, beaches of Galathea Bay were not conducive for turtle to lay eggs as it was inundated and swampy (Sivakumar, 2010a & 2010c).

- 7. There was no monitoring of sea turtles along the west coast including the beaches of Casuarina and Alexandria bays, therefore, it would be difficult to confirm whether leatherback turtles used these beaches for nesting from 2005 to 2011, when they have avoided the Galathea Bay. But, higher numbers of leatherback turtle tracks were seen on the beaches of Casuarina, Alexandria and Pemayya bays during this rapid assessment.
- 8. Leatherbacks are known to change the nesting sites depending upon the conduciveness and safety of the beaches. A leatherback turtle that laid eggs in the Little Andaman before 2014 was observed laying eggs in the Galathea Bay in February, 2021 that might be due to poor nest site fidelity of this species (Kamel and Mrosovsky, 2004; Kelly et al., 2014). Therefore, it is equally important to monitor, protect and conserve beaches of Casuarina and Alexandria beaches for the long term conservation of leatherback in Andaman and Nicobar Islands.
- 9. Further, three beaches such as Casuarina, Alexandria and Galathea were observed having more finer soils, and with gentle slope of intertidal flat that might probably be helping the gigantic leatherback to reach shore and lay eggs here conveniently. More similarities were also seen in the soil texture of these three beaches with smaller granules. But, other beaches comparatively had larger soil-granules.
- 10. In overall, more than 85% of leatherback turtle nests were known to be predated in the Great Nicobar (Swaminathan et al, 2017) possibly by wild predators such as wild pigs and water monitor lizard especially in Casuarina Bay, Alexandria Bay, Pemayya Bay and Galathea Bay, and domestic and feral dogs in other beaches (Sivakumar, 2010b). Therefore, the success rate of leatherback



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turtle nests in the Great Nicobar was less than 15% (Swaminathan et al, 2017) that needs to be addressed immediately. There is a lot of scope to enhance the success rate of nests up to 90% with a turtle conservation planning.

- 11. Pemayya Bay, Anderson Bay, Shastri Nagar, Laxi Nagar, Gandhi Nagar and Vijay Nagar bays and nearby areas were observed with coral reefs and mangroves. These beaches were used by multiple species of sea turtles largely by Green sea, Olive Ridley, Hawksbill and fewer leatherbacks. Of these, except Pemayya Bay that is located at west coast, all other beaches are with revenue or private parties, therefore, the beaches located along east coast between Shashtri Nagar and Campbell need to be managed with participation of local communities.
- 12. Now, the Government's has a vision for holistic development of Great Nicobar Island, which inter alia envisages the sustainable development of Great Nicobar Island, including development of an International Transhipment Terminal. In this context, Government of Andaman and Nicobar Islands and the Government of India has identified the South Bay (Galathea Bay) as most conducive location for the International Transhipment Terminal as it is of national importance owing to strategic and security reasons.
- 13. In this context, WII strongly urge the concerned authorities to develop and implement a mitigation plan to facilitate leatherback and other turtles to continuously nest in the Great Nicobar Islands including in the beaches of Galathea Bay for which the connectivity between the Galathea River and the Bay should be ensured.
- 14. Further, beach between Indira Point and Galathea Bay was also observed with sporadic nesting of leatherback two decades ago (Sivakumar, 2002), is now observed with more nests that also needs to be secured and conserved as part of the mitigation measures.

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- 15. Mitigation Plan should also facilitate the establishment of a research centre for marine biodiversity of islands with more focus on sea turtle conservation.
- 16. WII urge the authorities to establish the camps at Kopenheat, Alexandria and Casuarina bays to monitor and protect the nests of leatherback turtles from predators, which is the most critical conservation action required immediately.
- 17. Further, the mitigation plan should facilitate the long term conservation of sea turtles in Andaman and Nicobar Islands especially in the Great Nicobar and Little Nicobar islands. The long-term conservation plan is required to monitor, protect and conserve sea turtles and their habitats without disturbing the livelihoods of people especially the indigenous communities of the islands, but that needs to be prepared after a detailed EIA study as envisaged by the EAC of MoEF&CC in its 260th Meeting. In addition, we suggest that that EIA study should also include the satellite tracking of few leatherback turtles from Galathea, Casuarina and Alexandria beaches to understand their movements and nest site fidelity that are critical for the development of mitigation measures.
- 18. WII has very limited expertise to conduct EIA study covering all aspects of ToR provided by EAC of MoEF&CC in its 260th Meeting as they are very vast and include areas where WII has no expertise., Therefore, this study may be assigned to the Zoological Survey of India as they have a Regional Centre at Port Blair with required expertise and logistics. Further, ZSI has already assessing the status of biodiversity in connection with this project for considerable time. WII would be willing to provide the technical inputs to ZSI to conduct EIA study, if required.





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