

CHAPTER - 1

MOUNT HARRIET NATIONAL PARK: GENERAL INFORMATION & BACKGROUND

1.1 Name, Location and Constitution

The Andaman & Nicobar group of Islands are the largest archipelago system in the Bay of Bengal, consisting of 836 islands, rocks and rocky outcrops, and are situated between 6° 45' N to 13° 41' N latitude and 92° 12' E to 93° 57' E longitude. Total geographical area of these Islands is 8,249 Sqkm. of which 7171 Sqkm. area is covered with recorded legal forest. The total coastline of these Islands is 1,962 km. The Andaman and Nicobar Islands are well connected with main mass of India by air and sea.

Established in the year 1996, the Mount Harriet National Park, spread over an area of 46.62 square km, is located in South Andaman Island, about 40 km away from Port Blair city and is adjoining to the Ferrargunj Tehsil of South Andaman District.

The entire National Park is a part of a major chunk of hill ranges in the eastern part of South Andaman Island and lies between the following geo-coordinates:

Latitude: 11°42'05" and 11°51'45"N

Longitude: 92°43'41" 92° 48'13"E

The hills are steeper on the east than on the west. The five prominent peaks are Mt. Koyob (459 m), Mt. Hext (425 m), Mt. Warden (365 m), Mt. Goodridge (376 m) and Mt. Carpenter (346 m). The Mount Harriet range contains some of the highest peaks in the Andaman and Nicobar Group of Islands and is covered with dense evergreen and semi-evergreen forests of outstanding natural beauty. These forests

are in pristine condition and have remained largely untouched and thereby retain their ecological significance. They harbour a rich diversity of floral and faunal life.

This National Park is under the administrative jurisdiction of the Deputy Conservator of Forests (Wildlife) with headquarters at Port Blair. The Range Mount Harriet is entrusted with the entire management of the National Park area.

1.2 Access and Approach

The Mount Harriet National Park, which is located on the South-East of the main South Andaman Island, is connected to Port Blair with road network, as well as through waterway. One way goes over land following the Andaman Trunk Road and is around 50 Km from Port Blair, while the other, which is shorter, passes through Chatham to Bambooflat by ferry, is about 15 Km.

A winding bituminous road connects the Park to the outside world. Inside the Park area, dirt paths criss cross the Park area that are utilized for patrolling and inspection primarily and also by visitors on certain identified designated routes.

1.3 Statement of Significance

The Mount Harriet National Park is studded with dense tropical evergreen forest at hill tops and slopes, semi evergreen forest at eastern plain and littoral forest at shore line. The forest of the Park attracts researchers particularly taxonomist as it harbours many unique, rare and undiscovered species.

The western side of the Mount Harriet Hill Range is thickly populated and the villagers of the area are indirectly benefitted by these hills ranges as these hill ranges act as watershed and feed all the seasonal and perennial streams flowing towards western side, thereby of supreme importance and local significance to the existence of habitation at the foothills of the Western side. The Mount Harriet Hill Range act as barrier for the strong winds that flows landward from the Andaman sea, thus it not only protects the property of people living in the villages situated on the western part of Mount Harriet hill range from the strong wind but also safe guard their crops from the salt laden high winds. The Mt Harriet forms a natural

barrier against all the cyclones and high storms originating from the Andaman Sea and impacting these islands.

This Park has got the distinction of being one of the most important habitats of herpatofauna. Many species of herpatofauna might be yet to be discovered. Few species of large terrestrial mammalian fauna are found here due to long geographical isolation but birds, reptiles, fishes and other lower animals, many of which are endemic, are well represented in the park. Few creeks are available at broken shoreline touching the eastern boundary of the park provides habitat for Salt Water Crocodile. Sea turtles like Olive Ridley and Green Sea nest at the beach of Madhuban and Mirchi Dera. Since visitation of sea turtles are little in number, in-situ conservation by protecting individual nest from predators is done instead of ex-situ.

The National Park is a good birding area for the bird enthusiasts as this park is home to many endemic birds species of Andaman and Nicobar Islands. The Birdlife International designated the Mount Harriet National Park as a global network of IBAs (Important Bird Areas) for conservation of world's bird and associate fauna. It is also home to many rare, endangered, threatened (RET) and endemic plants. Some of the rare species reported from the National Park requiring special conservation measures are the following.

1. ***Pinanga andamanensis*** Becc. (Family: Arecaceae)

This is an endemic, rare palm of Andaman Islands. The largest populations of this species have been reported from Mt. Harriet hill ranges including the National Park area. It is a small palm resembling Arecanut palm in general appearance. The species has been listed as Critically Endangered.

2. ***Ceropegia andamanica*** Sreek. & al. (Family: Asclepiadaceae)

This is a rare, endemic plant of Andaman Islands first described from Mt. Harriet NP. It is a weak climber with membranous leaves belonging to the group of fly trap flowers. Its reported native range is only South Andaman Island.

3. *Amomum andamanicum* V.P. Thomas & al. (Family: Zingiberaceae)

This is a rare, endemic plant of Andaman Islands first described from Mt. Harriet NP. It is a rhizomatous perennial plant belonging to the group of wild ginger plants. Its reported native range is only South Andaman Island (Mt. Harriet Hill ranges) and North Andaman (Saddle Peak hill ranges).

4. *Nageia wallichiana*(Presl.) Kuntze (Family: Podocarpaceae)
(Syn.*Podocarpus wallichianus* Presl.)

It is the only broad leaved South Indian conifer. In India, this Gymnosperm coniferous tree is found only in Kerala, Tamil Nadu (Southern Western Ghats) and A & N Islands. In A & N Islands it has been recorded from Mt. Harriet hill ranges and Great Nicobar Island only. The species has been listed as threatened.

5. *Magnolia andamanica* (King) Raju et Nayar (Family: Magnoliaceae)
(Syn. *Taluma andamanica* King)

It is a rare tree reported from India and Myanmar. In India it has been reported from North Eastern states and Andaman Islands only. The tree has been reported from South Andaman and North Andaman Islands.

6. *Begonia andamensis* Parish ex C.B. Clarke (Family: Begoniaceae)

It is a rare, narrow endemic species restricted to Southern Myanmar and Andaman Islands. In Andaman & Nicobar Islands, this endangered plant has been reported from a few locations like Saddle Peak NP, Rani Jhansi Marine NP, Mahatma Gandhi Marine National Park and Mt. Harriet National Park besides a few locations in South Andaman Island. It is a tuberous herb mostly confined to precipitous rocky and shady humid areas.

7. *Wendlandia andamanica* Cowen (Family: Rubiaceae)

It is a critically endangered endemic species restricted to Andaman Islands. A shrub or small tree reported from few locations in South Andaman Island including Mt. Harriet National Park.

8. *Cyrtandroemia nicobarica* Balkr. (Family: Scrophulariaceae)

This is a rare, endemic plant of Andaman & Nicobar Islands first described from Great Nicobar Island. It is an under shrub reported from a few locations in South Andaman Island (including Mt. Harriet NP) and Great Nicobar Island.

9. *Myristica andamanica* Hook. f. (Family: Myristicaceae)

This is a rare, endemic tree of Andaman & Nicobar Islands belonging to the group of wild nutmeg trees. It has been reported from many locations in Andaman and Nicobar islands.

10. *Habenaria andamanica* Hook f. (Family: Orchidaceae)

It is a rare and endemic terrestrial orchid of Andaman Islands reported from a few locations of South Andaman Island including Mt. Harriet National Park.

11. *Malleola andamanica* N.P.Balacr. & N. Bhargava (Family: Orchidaceae)

A rare and endemic epiphytic orchid from Andaman Islands. Reported from a few locations in South Andaman Island including Mt. Harriet National Park.

12. *Grosourdyia muriculatum* (Rchb.f.) R.Rice (Family: Orchidaceae)
(Syn. *Pteroceras muriculatum* (Rchb.f.)(P.F.Hunt)

This is a rare and endemic epiphytic orchid of Andaman Island. Reported from a few locations in Middle Andaman, North Andaman, Little Andaman and South Andaman Island

Including Mt. Harriet National Park. The species has been categorized as threatened.

13. *Zeuxine rolfeana* King et Pantl. (Family: Orchidaceae)

A critically endangered endemic terrestrial orchid of Andaman Island. Reported from a few locations in South Andaman Island including Mt. Harriet National Park.

14. *Bosenbergia siphonantha* (King ex Baker) M.Sabu, Prasanthk. & Škorníček
(Family: Zingiberaceae)

A rare and endemic herbaceous plant, belonging to the group of wild gingers. Reported from a few locations in Middle Andaman, North Andaman and South Andaman Island including Mt. Harriet National Park

15. *Amorphophallus longistylus* Kurz ex Hook.f. (Family: Araceae)

A rare and endemic plant of Andaman Islands, belonging to the group of wild elephant foot yams. Reported from a few locations in Middle Andaman, North Andaman and South Andaman Island including Mt. Harriet National Park.

In addition to its rich biodiversity value lending it regional and global significance, the National Park provides ample opportunities which may have significant impact on the socio-economy of the people living in the vicinity of the National Park.

- a) The existence of very dense forest, covering almost entire area of the National Park, provides a variety of tangible and intangible benefits to the people.
- b) The unique biodiversity that harbours many endemic flora and fauna is a source of attraction to the local, national as well as tourists from abroad.
- c) The unexplored flora and fauna attracts scientists, researchers, environmentalists, nature enthusiasts from not just India but also from around the world.
- d) Coupled with the rich pristine forest ecology, forming a source of education and creating awareness among masses, remains of residence of the then Chief Commissioner, artillery gun and barracks at Mount Harriet makes the Park a highly potential place for eco-tourism which will be of immense significance for the economic upliftment of the communities living around.

CHAPTER - 2

BACKGROUND INFORMATION AND ATTRIBUTES

2.1 History

The Mount Harriet Hill is named in commemoration of Mrs. Harriet C. Tytler, the second wife of Robert Christopher Tytler, a British army officer, an administrator, naturalist and photographer, who was appointed Superintendent of the Convict Settlement at Port Blair in the Andamans from April 1862 to February 1864. Robert Christopher Tytler is known for setting up of Andamanese Homes. Together with his wife Harriet, they documented with photographs the Indian Mutiny of 1857. They are also known for documenting the monuments of Delhi. Harriet Christina Earle (3 October 1828 - 24 November 1907), was the daughter of an officer in the 3rd Bengal Native Infantry. She had an interest in photography, which she learnt from Dr John Murray and Felice Beato. Today, Tytler and his wife are remembered mostly for their extensive photographic documentation works. Together they produced about 300 photographs, some of which formed large panoramas. Harriet wrote several memoirs when she was between 75 and 77 years old (1903-1906). These include *An Englishwoman in India*; the *Memoirs of Harriet Tytler (1828-1858)* first was published in *Chambers Journal* in 1931 and a more detailed version was published in 1986 by Oxford University Press (source :<https://www.britishempire.co.uk/maproom/Andaman/Roberttytler.htm>)

For the settlements nearby Mount Harriet Range, Kiran Dhingra in '*the Andaman and Nicobar Islands in the Twentieth Century- A Gazetteer*' (page 161) notes that between 1921-26, a population of 1885 Moplahs were allotted land in the west of the Mt Harriet Range. They were encouraged to bring in their families, and amenities like schools, local establishments were provided. With a climate similar to their native place and a community to fall back they adapted better than the other communities by developing community-based solidity.

A series of correspondence of the period August 1887- June 1888 between the Military Department and the Superintendent of ANIs throws up interesting facts about Mt Harriet. It is learnt that Mt Harriet had an establishment of wooden

barracks for 200 men and 4 officers. The barracks had shingle roofs and were slightly raised from the ground. It had an excellent spring about 100 feet below the summit and one well about 300 feet below the barracks. The spring was said to dry up in February, while the well always had water as it was fed by a spring. Interestingly, the well still exists and can be approached by a stone step and it still has water. The spring however has ceased to exist on ground. Further, it says that there were good roads from Hopetown jetty 1 3/4 miles long and 12 feet wide and which were metalled. There were 4 other bridle paths.

2.2 Extent of Area

The Mount Harriet National Park is spread over an area of 46.62 Sqkm, situated on the South-east of South Andaman Island. The eastern boundary of the Park coincides with the high tide line where as the western boundary follows the topmost ridge of Mount Harriet Range. The southern and northern boundary runs along the ridge of Mount Harriet. Towards east it extends till it touches the high tide line.

2.3 Legal Status

The entire area of the National Park is part of Reserve Forest constituted vide Notification No. 59/G/635 of 1962 dated 17th April, 1963 (*Appendix I*). The intention to notify the area into National Park was made on 13th November, 1979, vide Notification No. Silva/G/88 and the final notification was issued on 28th November 1996, vide Notification No. 97(D)/96-F. No. CWLW/WL/31/1219 (*Appendix II*).

2.4 Boundary Description

North : Starting in clock-wise direction from a peak known as Mount Warden, at an altitude of 365.76 m (1200') situated at grid reference North Latitude 11° 52' 52" and East Longitude 92° 46' 12", the northern boundary runs in north eastern direction along an artificial line at a bearing of 53° 15' 00" for a distance of about 302 metres up to the source of an unnamed tributary/stream at grid reference North

Latitude 11° 52' 58" and East Longitude 92° 46' 19", thence downstream along the left bank of this stream in east direction till it meets the Andaman Sea.

East :Thence, the boundary runs along the eastern coast in a southern direction up to the mouth of an unnamed Nallah at grid reference North Latitude 11° 44' 25" and East Longitude 92° 46' 04".

South and South-west : Thence the boundary moves in a North Western direction along the right bank of this Nallah up to its source at grid reference North Latitude 11° 44' 43" and East Longitude 92° 45' 35" and along an artificial line at a bearing of 256° 30' 00" for a distance of about 191 metres up to top of an unnamed mount at an elevation of 309.67 metres (1016') at grid reference North Latitude 11° 44' 41" and East Longitude 92° 45' 29", thence along the ridge in the North West direction upto Mount Carpenter at an altitude of 346.25 metres (1136') at grid reference North Latitude 11° 45' 38" and East Longitude 92° 44' 23" thence the boundary move in a North western direction along the ridge till it meets an unnamed mount at an altitude of 313.94 metres (1030') at grid reference North Latitude 11° 46' 12" and East Longitude 92° 44' 17".

West : The boundary thence follows the ridge in northern direction and crosses a saddle and join Mount Goodridge at altitude of 376.22 metres (1235') at grid reference North Latitude 11° 46' 56" and East Longitude 92° 44' 23", thence along the ridge and crossing a saddle it meets an unnamed mount at an altitude of 305.10 metres (1001') at grid reference North Latitude 11° 47' 00' and East Longitude 92° 44' 48", thence the boundary moves along the ridge and crosses a saddle and joins an unnamed mount at an altitude of 346.55 metres (1137') at grid reference North Latitude 11° 48' 33" and East Longitude 93° 45' 00", thence this boundary run along the ridge and crosses a saddle and it meets Mount Koyob at an altitude of 459.94 metres (1509') at grid reference North Latitude 11° 49' 00" and East Longitude 92° 45' 21", thereafter, it moves in North eastern direction along the ridge and crosses a saddle just before it meets Mount Hext at an altitude of 426.72 metres (1400') at grid reference North Latitude 11° 51' 54" and East Longitude 92° 46' 05", thence the boundary moves in the same direction along the ridge till it meets the starting point i.e., Mount Warden.

The Park has no inter-state or inter-district boundary. Being carved out of Reserved Forest, the area is contiguous with a larger chunk of reserved forest areas. It shares

its northern, western and southern boundary with the Reserved Forests boundary of the South Andaman Territorial Forest Division.

2.5 Eco-Sensitive Zone to the National Park

The Central Govt. has notified an area to an extent ranging from 0 kilometer on East and upto 1 kilometer on South, West and North direction around the boundary of Mount Harriet National Park as Eco-sensitive Zone from ecological, environmental and biodiversity point of view and primarily to prohibit harmful industrial and related activities and processes in the said Eco-sensitive Zone vide Notification No. S.O. 652 (E) dated 1st February, 2019. The Eco-sensitive Zone was declared with sole aim to protect and conserve the unique terrestrial, mountain and coastal ecosystem that is represented by the National Park and can be attained only through rigorous conservation (*Appendix III*).

Boundary description of Mount Harriet National Park Eco-sensitive Zone is as follows:

North : Eco-sensitive Zone boundary of Mount Harriet National Park starts from a point A at a grid reference of North Latitude $11^{\circ} 52' 12.191''$ and East Longitude $92^{\circ} 45' 8.243''$ which is 1 Km from the peak of Mount Warden at a bearing of $322^{\circ} 30'$ and proceeds Eastwards a 1 km distance from the boundary of the National Park and passes through the point B at a grid reference of North Latitude $11^{\circ} 52' 21.303''$ and East Longitude $92^{\circ} 46' 10.985''$ and reached a point C and the seashore at a grid reference of North Latitude $11^{\circ} 52' 32.412''$ and East Longitude $92^{\circ} 47' 7.984''$.

East : The Eastern boundary starts from point C at a grid reference of North Latitude $11^{\circ} 52' 32.412''$ and East Longitude $92^{\circ} 47' 7.984''$ and proceeds along the east coast and reached a point D at a grid reference of North Latitude $11^{\circ} 51' 57.699''$ and East Longitude $92^{\circ} 47' 9.572''$. Thereafter the boundary of Eco-sensitive Zone of Mount Harriet National Park will follow the boundary of the Mount Harriet National Park and meet at a point E at a grid reference of North

Latitude $11^{\circ} 44' 35.975''$ and East Longitude $92^{\circ} 45' 39.675''$. Thereafter the boundary will follow the coastal boundary and proceeds further to appoint F at a grid reference of North Latitude $11^{\circ} 44' 3.295''$ and East Longitude $92^{\circ} 45' 30.586''$.

South : The Southern boundary starts from a point F at grid reference of North Latitude $11^{\circ} 44' 3.295''$ and East Longitude $11^{\circ} 52' 12.191''$ and moves westwards keeping 1Km distance from the boundary of the National Park and passes through the point G at grid reference of North Latitude $11^{\circ} 44' 12.721''$ and East Longitude $92^{\circ} 44' 44.172''$, point H at grid reference of North latitude $11^{\circ} 44' 18.39''$ and East longitude $92^{\circ} 43' 54.956''$ and reaches a point I at grid reference of North latitude $11^{\circ} 44' 41.407''$ and East longitude $92^{\circ} 43' 31.354''$.

West : The Western boundary starts from a point I at a grid reference of North Latitude $11^{\circ} 44' 41.407''$ and East Longitude $92^{\circ} 43' 31.354''$ and moves towards north keeping a distance of 1 Km from the boundary of the National Park through the point J at a grid reference of North Latitude $11^{\circ} 45' 17.109''$ and East Longitude $92^{\circ} 43' 10.515''$, point K at a grid reference of North Latitude $11^{\circ} 46' 34.491''$ and East Longitude $92^{\circ} 43' 11.532''$, point L at a grid reference of North Latitude $11^{\circ} 47' 38.759''$ and East Longitude $92^{\circ} 43' 23.193''$, point M at a grid reference of North Latitude $11^{\circ} 48' 44.725''$ and East Longitude $92^{\circ} 43' 58.825''$, point N at a grid reference of North Latitude $11^{\circ} 49' 59.949''$ and East Longitude $92^{\circ} 44' 10.337''$ and reaches a point O at a grid reference of North Latitude $11^{\circ} 50' 53.017''$ and East Longitude $92^{\circ} 44' 36.901''$. Thereafter the boundary ends at point A at grid reference of North Latitude $11^{\circ} 52' 12.191''$ and East Longitude $92^{\circ} 45' 8.243''$.

2.6 Geomorphology

Topographically, the area is very compact and ranges from sea level on the Eastern side to 460 metres at Mount Koyob. The topography varies from steep precipitous slopes to gentle undulating terrain; ridge and troughs as one traverse across the slope and a good number of perennial & seasonal streams. The Park becomes inaccessible during monsoon months. On the western side is the ridgeline,

demarcating its boundary with hill ranges starting from Mount Carpenter to Mount Koyob.

2.6.1 Topography

The Andaman and Nicobar Islands are the summits of northern part of a prominent submarine mountain range, probably co-related with the Indonesian arc, lying on the great tectonic suture zone extending from the eastern Himalayas along the Myanmar border to Arakan and finally Sumatra and lesser Sundas, with southern continuation of the longitudinal ranges extending through the Bay of Bengal from Myanmar towards the south and southeast. The northern most part of these islands is isolated from Cape Negrais in southern Myanmar by the north Preparis Channel and the southern most part is separated from the Acheen Head of western Sumatra by Great Channel. There are two more channels, (i) the Ten-degree Channel which separates Andaman Islands from Nicobar Islands and (ii) the Sombero Channel which isolates Great Nicobar from Car Nicobar & Nancowrie group.

Geologically these islands belong to a geosynclinal basin. The rocks of these islands are highly folded due to frequent tectonic movements in the past. The geological formations represent a period of sedimentation from Cretaceous to Sub-recent period. The rocks are of two main types; (i) the Serpentine Series and (ii) the Sedimentary Series. The general stratigraphic sequences of Andaman Islands are given in the table below:

Table No. 2.1 STRATIGRAPHIC SUCCESSION OF ANDAMAN ISLANDS

Group	Lithology	Tentative age
Recent to Sub-recent Group	Coral reefs, mangrove clay etc.	Recent to Pleistocene
Archipelago Group	Upper limestone, Diatomaceous earth Chalk, White clay stone, limestone, Sand stone and Basal conglomerate	Pleistocene to Miocene
Andaman Flysch Group	Alternation of sandstone and Silt stone with Basal grit and conglomerate	Oligocene to Upper Eocene

Mithakhari Group	Sandstone grit & conglomerate locally inter bedded arenaceous shale grit containing thin seam of coal	Middle Eocene to Palaeocene
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Source: Working Plan of South Andaman for 2016-17 to 2025-26

Most of the portion of this National Park drains directly into the Andaman Sea. The general slope is from west to east. The elevation of the tract varies from sea level to 460 metres. Most of the area of this National Park lies on the eastern slopes. The topography varies from steep precipitous slopes at the top to gentle undulating terrain towards the base. These hill ranges are the southern continuation of the longitudinal mountain ranges of Western Burma and occur as peaks of the Northern area extending through the Bay of Bengal from the mainland of Burma towards the south and southeast.

2.6.2 Rocks & Soil

The rocks of this National Park comprise of Serpentine Series of rocks, which includes altered basic and ultra basic intrusions of plutonic type and occasionally of dolerite dykes. The associated rocks consist of red and green jaspers, purple-porocellanitic limestone, and hard gray and yellow quartzites together with occasional outcrops of calcareous gneiss. Such Ferro- magnesium rocks on weathering gives rise to fine textured soils with abundance in macro and micronutrients like calcium, magnesium, phosphorus etc. The siliceous portions yield soil of less nutrient value and less exchange capacity. Some parts of this National Park are comprised of Sedimentary Series of rocks, which are characterized by conglomerates with inter-bedded sand stones. Conglomerates generally occur in the vicinity of the older Cretaceous rocks. Foraminifer limestone, sands and marls are also reported.

The geological formations of these Islands are mainly responsible for the soil types and there-by become the deciding factor for the forest types of the area. Climate, ground water conditions, aspect and steepness also influence the soil types of this area. On decomposition, these serpentine series of rocks give rise to a thick

covering of soil fertile in the lower strata with a good internal drainage. The topsoil over such series however has a high base status of less nutrient value and low exchange capacity. These soil support the dense evergreen forests of Gurjan and its associates with a dense undergrowth of canes, bamboos etc. On decomposition, the Sedimentary series of rocks give rise to stony & unfertile soil except those with calcareous cement which gives rise to reasonably fertile soil. These areas are also wooded with mostly deciduous nature of forests predominant with Padauk. The change from one area where serpentine rocks prevail to another where the porous sedimentary are predominant is very striking. Where the impervious clay occurs among the sedimentary strata and where the water table is high with consequent water logging, the forests are very dense and resemble those covering Serpentine areas. Due to high humidity & rainfall in most part of the years, the decomposition rate of leaf litter becomes low leading to acidity of the soil and this is exactly the prerequisite requirement of Gurjan & its associates of the evergreen species.

2.6.3 Water Availability

Although rainfall is high and spread over 145 to 195 days of the year, fresh water supply is comparatively scarce and peculiarly localized. Water supply varies with soil conditions and configurations. In the areas where under lying rocks are of the Serpentine series, the soil has good internal drainage and is covered by a luxuriant growth of evergreen forests. Such areas are often the source of perennial fresh water, often in the form of streams. In the areas with sedimentary rocks, where the soils are often interbedded with clays, the result is that the runoff is too heavy. Deciduous forests cover these areas. Here there is shortage of fresh water especially during the dry season. No wetland is found in this Park. The smaller patches of swamps are found along the coastal areas which support luxuriant growth of Mangrove forests serves as a good habitat for crabs and smaller fishes. No river is found within the Park but few perennial streams and a good number of seasonal streams are available. Due to the presence of innumerable seasonal and many perennial streams, the scarcity of water for wildlife has never been felt in the Park, hence no artificial water holes have been created in the park area.

2.7 Climate

No portion of this National Park experiences extremes of climate and there are no reports of any damage to the wildlife due to extremes of climate. The climate is of wet tropical type. It is warm and humid for most of the year. However, in the past couple of years, dryness is felt in the forest in the peak summer time of March till April in the fringe areas towards the ridge line. The seasons can be divided into dry and rainy season. Extreme winters and summers are practically unknown but there is a general nip in the air during the months of December, January and February particularly in the interiors of forests. Mist hangs over the forest and particularly over openings in the forests during these months. The months of March, April May and October can be uncomfortable on account of above average humidity although the temperatures are not very high. There is no separate climatic data available for the Park, hence the climatic data of Port Blair town for 2008 to 2019 is analyzed below.

2.7.1 Temperature

The temperature data recorded for the period from 2008 to 2019 at Port Blair (*Appendix VIII*) has been taken into consideration. Though the forest tract of this National Park enjoys little more dip in the temperature, but at the same time the temperature is more equable than Port Blair and as well as the nearest Hopetown and Panighat areas. Summers are hotter in the moist deciduous forests, than in the evergreen/ semi-evergreen forest, the vegetated hill tops, gorges and the perennial nallahs experience less temperature. Being on high altitude and completely wooded, the Park area experiences somewhat more prominent winters than Port Blair area. The mean annual temperature is 27.7°C, and the mean daily maximum temperature varies from 24°C to 32°C during August to February. Hottest months are March till mid May when the temperature hovers around 30°C. The Mean daily minimum temperature varies from 21°C to 24°C during June to September, the coldest months being December and January. From the highest and lowest temperatures recorded during the periods from 2008 to 2019 it is inferred that the range of both the highest maximum and lowest minimum temperatures are small indicating the uniformity in recurrence of such temperatures year after year. As

the highest maximum temperature never exceeds the critical limit of 28.9°C so it is not a limiting factor. Again the lowest minimum temperature also does not act as a limiting factor due to the fact that it never goes down the critical limit of 5.6°C (it is well above 20°C). The less variation in temperature (minimum and maximum) throughout the year adds to the growth factor of the Tropical Rain Forests. Annual temperature data for the period from 2008 to 2019 is tabulated below.

Table No. 2.2 ANNUAL TEMPERATURE IN °C FROM 2008 TO 2019

Year	Mean Max.	Mean Min.	Mean Average
2008	30.20	24.00	27.10
2009	30.70	24.50	27.60
2010	31.30	24.60	27.95
2011	30.80	24.40	27.60
2012	31.00	24.10	27.55
2013	31.00	24.50	27.75
2014	31.00	24.83	27.92
2015	31.00	24.70	27.85
2016	31.20	24.80	28.00
2017	30.90	24.90	27.90
2018	30.50	24.70	27.60
2019	30.87	24.50	27.69

Source: Meteorological Department, Shadipur, Port Blair

2.7.2 Humidity

The mean relative humidity during the year 2008 to 2019 as recorded at Port Blair is given in table mentioned below. The relative humidity varies from 72% to 95% being the greatest during the months from May to November i.e. during the South-west and beginning of the North-east monsoon. The relative humidity is normally greater in the evening than in the morning. Detailed month wise humidity data are given in *Appendix IX*

Table No. 2.3 ANNUAL AVERAGE HUMIDITY IN % FROM 2008 TO 2019

Year	Average Humidity (in %)	
	AT 0830 hrs	AT 1730 hrs
2008	80.00	82.00
2009	78.00	81.00
2010	80.00	83.00

2011	82.00	85.00
2012	81.00	84.00
2013	80.00	83.00
2014	77.00	80.00
2015	78.00	81.00
2016	78.00	81.00
2017	79.00	83.00
2018	79.00	83.00
2019	77.25	80.83

Source: Meteorological Department, Shadipur, Port Blair

2.7.3 Precipitation

Month wise rainfall data for the period from 2008 to 2019 data recorded at Port Blair has been taken into consideration (*Appendix X*). However this is an accepted fact that the total rainfall as well as the periodicity of the rainfall is higher than, what is experienced and recorded at Port Blair. The rainy season is from May to October, the heaviest rainy months being June, July and August. The Park gets more rain than the Port Blair city in having more rainy days. The Park witnesses prominent monsoons during both the South-west monsoon and the retreating North-East Monsoons. The South West monsoons bring most of the rains & spreads over May through October. The North-east monsoon starts from November and spreads over December. January to April is the calmest and driest months of the year. The months of March, April and first fortnight of May are usually hot and dry. They constitute the main drought period and in these months only scarcity of water is faced in western foothills. However, there is no dearth of water reported from the Mt Harriet National Park, owing to its several streams and nullahs, which tend to retain water even during the peak summer months. Infact, the natural water stored in the artificial reservoir made by the Forest Department has been utilized for catering to the water demands of the locals during the scarcity period faced in the year 2019 and 2020. Annual rainfall data for the period from 2008 to 2019 is tabulate below.

Table No. 2.4 ANNUAL RAINFALL FROM 2008 TO 2019

Year	Rainfall (in mm)	Number of Rainy Days
2008	3254.80	158
2009	2531.60	151

2010	3126.60	159
2011	3771.60	166
2012	3428.50	157
2013	3405.40	158
2014	2877.00	120
2015	2887.90	136
2016	2833.19	119
2017	2866.60	142
2018	2959.80	143
2019	2954.43	131

Source: Meteorological Department, Shadipur, Port Blair

2.7.4 Winds

Mean wind speed recorded at meteorological station, Port Blair for the period from 2008 to 2019 is given in **Appendix XI**. The maximum average wind velocity is recorded during South-west monsoon season from June to August and minimum during April. The average wind velocity during North-east monsoon from November to January goes upto 11 Km/hrs. Being heavily vegetated with storied canopy, the impact of high winds is negligible in the Park area. The Eastern foothills might get some winds in case of disturbances in the Andaman Sea.

Table No. 2.5 ANNUAL MEAN WIND SPEED IN Km/hrs FROM 2008 TO 2019

Year	Mean Wind Speed in Km/hr
2008	09.80
2009	08.40
2010	06.70
2011	10.71
2012	10.30
2013	10.00
2014	10.00
2015	09.00
2016	08.08
2017	07.50
2018	07.46
2019	06.88

Source: Meteorological Department, Shadipur, Port Blair

The Bay of Bengal is the seat of origination of most of the cyclones in the eastern part of our country, which subsequently hits the coastal areas of the mainland, but

it seldom affects these Islands. These, however, do affect the weather conditions in the islands. These Islands are mostly impacted by the cyclones that travel west from the Andaman Sea or the South East. During 1782, 1844, 1864, 1891, 1941, 1962, 1976 and 1989 cyclones passed over certain parts of the islands causing damage to the growing stocks. A cyclonic storm named ‘Phailin’ passed near to Mayabunder in the Andaman Islands during October, 2013. A very severe cyclonic storm ‘Lehar’ in November, 2013 primarily affected the Andaman and Nicobar Islands. Lehar was the second most intense tropical cyclone of the 2013 after cyclone ‘Phailin’. A strong tropical cyclone named ‘Hud Hud’ hit the Long Island and North Middle Andaman during second week of October, 2014. Mild effects of these tropical cyclones, which often lead to the breaking of crowns and uprooting of trees, are often noticed. A list of high winds, depressions and cyclones that had an impact on the Islands is tabulated below:

Table No. 2.6 MAJOR STORMS IN PAST 15 YEARS

Name	Period of Occurrence	Peak Classification	Intensity/Sustained speed (approx.)
Mala	April 24-30, 2006	Extremely Severe Cyclonic Storm	185 km/h
Durian	December 5- 7, 2006	Depression	35 km/h
Nargis	April 27- May 3, 2008	Extremely Severe Cyclonic Storm	165 km/h
Phailin	October 8-14, 2013	Extremely Severe Cyclonic Storm	215 km/h
Leher	November 23-28, 2013	Very Severe Cyclonic Storm	140 km/h
BOB 02	May 21-23, 2014	Depression	45 km/h
Hudhud	October 7-14, 2014	Deep Depression (while in ANIs.)	55 km/h
Kyant	October 21-27, 2016	Cyclonic Storm	75 km/h
Vardah	December 6-18, 2016	Very Severe Cyclonic Storm	150 km/h
Maarutha	April 15-17, 2017	Cyclonic Storm	75 km/h
Mora	May 28–31, 2017	Severe Cyclonic Storm	110 km/h
BOB 8	December 5-9,	Deep Depression	55 km/h

	2017		
Gaja	November 10-18, 2018	Severe Cyclonic Storm	110 km/h
Pabuk	January 5-8, 2019	Depression (while in ANIs.)	45 km/h

Source: Websites of IMD, Joint Typhoon Warning Centre, Wikipedia

2.8 Demography

2.8.1 Habitation

There is no habitation inside the National Park. There are four revenue villages in the vicinity of the National Park viz. Shoal Bay, Kalatang, Hope Town, and North Bay having population of 1373, 116, 1258 and 1603 respectively as per population census 2011.

2.8.2 Rights and Concessions

The entire National Park was constituted out of Reserve Forest. Therefore, there exists no rights and concessions; all such claims are extinguished in the National Park.

2.9 Range of Wildlife, Status, Distribution and Habitat

Tropical warm, humid and wet conditions, arising due to closeness to the equator and the impact of South-west and North-east monsoon, have given rise to dense to varied and luxuriant multistoried vegetation cover to these islands. This in turn has become haven for very high biological diversity both in terms of flora and fauna. Islands are generally known for high level of endemism of flora and fauna. At the same time, island species are often more susceptible to natural and human induced threats. Introduced species pose one of the greatest threats to unique flora and fauna of the islands. Andaman & Nicobar Islands are no exception. About 20% of faunal species occurring here are endemic. Here many species of flora and fauna are introduced, which are finding their way to pristine areas and causing great harm to native species. Dogs, Cats, Spotted Deer, snails etc. are some examples of

such species. Mount Harriet Park area has some of these species like Spotted Deer, Common Myna, Sparrow etc.

The park is very diverse in faunal components, and most of the species occur in good abundance, which can be witnessed during a short visit to the park. Various individuals and agencies like ZSI, BSI etc. have documented various components of wildlife of the park. Still many of the species of flora and fauna of the park are yet to be discovered.

2.9.1 Flora

The flora of Andaman and Nicobar has elements from the Indo-Chinese and Indo-Malayan region and 3552 plant species have so far been reported (Hajra et al., 1999; Sreekumar, 2002; Padalia, et al., 2004). 110 orchids are reported from these islands of which 25 species are endemic. Out of 630 higher plants in Red data Book, 46 species occurs in A & N Islands (Sinha, 1999).

The vegetation occurring in these islands can be broadly classified into Inland, Littoral and Tidal Swamp forests. The inland forests comprises of Evergreen forests, Wet and Moist Deciduous forests, Bamboo Brakes, Grassy Blanks and fresh water aquatic vegetation, while the Littoral forests occurs along the narrow coastal belt and tidal swamp forests comprises of mangroves and salt marshes.

The biological richness map indicates that tropical evergreen and the mangrove forests are falling under high to highest biological richness. The biological richness analysis for South Andaman shows that 21.6% of the area is under high to highest biological richness and 69.4% area is under moderately rich category. Most of the high richness area is dominated by evergreen and semi evergreen forests.

The luxuriant Evergreen forests exist in the entire land mass of South Andaman Island excluding a few patches where area has been cleared for revenue settlement. In the dense forests also occurs tangled mass of climbers, lianas, canes, bamboos etc. Vegetation becomes more evergreen in low level areas when we proceed from north to south, with increase in rainfall. The mangrove forests from the boarder in low-lying banks of creeks and sheltered belt of coastal line, subject to tidal action. They occur in belts of varying depth of a few metres to several metres on saline alluvial soil. The vegetation is comparatively stunted in growth on the higher hilltops that are usually exposed to high winds.

Tropical warm, humid and wet conditions, arising due to closeness to the equator and the impact of South-west and North-east monsoon, have given rise to dense to varied vegetation covers to these islands. The vegetation occurring in these islands can be broadly classified into Inland, Littoral and Tidal Swamp forests. The inland forests comprises of Evergreen forest, Wet and Moist Deciduous forests, Bamboo Brakes, Grassy Blanks and fresh water aquatic vegetation, while the Littoral forests occurs along the narrow coastal belt and tidal swamp forests comprises of mangroves and salt marshes (**Map showing Forest types is annexed as Annexure-XXVIII**).

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The Andaman and Nicobar Islands is one among the bio-diversity hot spot in the world. The nature has endowed these islands with a unique and varied animal lives both on land as well as in sea. Fauna of Indo-Chinese and Indo-Malayan regions influences faunal distribution in these islands. Geographical isolations of these islands have caused high degree of endemism. Large mammals are absent in these islands. Though biological investigations are not completed. 5100 animals (100 fresh water, 2100 terrestrial, 2900 marine animals) have been described. Endemism is particularly prominent in these islands and this is more so with the avian fauna where 40% of the 300 species and sub species recorded are endemic. Out of the approximately 5357 species of major groups of fauna, 487(9%) species are endemic. The vertebrates also show high degree of endemism, 50% of the 64 species of mammals, 30% of the 84 species of reptiles and 20% of 10 species of

amphibians recorded are endemic. The Andaman & Nicobar Island is one of the 221-priority areas concerning conservation of global biological diversity.

Mt. Harriet National Park is home for many rare and endemic plants. Long term conservation of these plants is very important and needs special attention. Some of the rare species reported from the National Park requiring special conservation are, viz., *Pinanga andamanensis* Becc. (Family: Arecaceae), *Ceropegia andamanica* Sreek.& al. (Family: Asclepiadaceae), *Amomum andamanicum* V.P. Thomas & al. (Family: Zingiberaceae), *Nageia wallichiana* (Presl.) Kuntze (Family: Podocarpaceae) (Syn. *Podocarpus wallichianus* Presl.), *Magnolia andamanica* (King) Raju et Nayar (Family: Magnoliaceae), (Syn. *Taluma andamanica* King), *Begonia andamensis* Parish ex C.B. Clarke (Family: Begoniaceae), *Wendlandia andamanica* Cowen (Family: Rubiaceae), *Cyrtandroemia nicobarica* Balkr. (Family: Scrophulariaceae), *Myristica andamanica* Hook. (Family: Myristicaceae), *Habenaria andamanica* Hook f. (Family: Orchidaceae), *Malleola andamanica* N.P.Balakr. & N. Bhargava (Family: Orchidaceae), *Grosourdia muriculatum* (Rchb.f.) R.Rice (Family: Orchidaceae) (Syn. *Pteroceras muriculatum* (Rchb.f.)(P.F.Hunt), *Zeuxine rolfeana* King et Pantl. (Family: Orchidaceae), *Bosenbergia siphonantha* (King ex Baker) M.Sabu, Prasanthk.& Škorničk (Family: Zingiberaceae), *Amorphophallus longistylus* Kurz ex Hook.f. (Family: Araceae). **Appendix-XVII** enumerates the floral biodiversity of MHNP.

The vegetation of Andaman forests mainly influenced by climatic and edaphic factors. Andaman Islands are having more or less uniform climate but there is much variation in soil structure. Since variation in elevation is not much, the aspect has little influence over vegetation in such a low altitudes. Therefore, the vegetation of these islands is mainly the function of the climatic or edaphic factors.

As per the classifications of Champion and Seth, the Forest vegetation of these islands has been classified into twelve different types depending upon the nature of soil, tidal influence, moisture retainability and floristic composition.

The Mount Harriet National Park supports the following forest types:

2.9.1 a₁A/C₁- Giant Evergreen Forests

This is the most luxuriant type of forest met with and is the climatic climax where the site conditions are optimum for tree growth. The top canopy is occupied by giant trees and is almost entirely evergreen.

Distribution

This type is present in small areas in the National Park near the banks of the larger streams, where soil is deep alluvium.

Locality Factors

These forests occur in the areas with rainfall of over 3000 mm, well distributed, and a sufficiently retentive soil, if the ground is sloping.

Floristic

The Giant Evergreen forests are so intimately mixed with the semi evergreen forests that delineation from each other is difficult. The vegetation includes the following species.

Dipterocarpus alatus, the loftiest tree in the Andamans. *Artocarpus chaplasha*, *Artocarpus gomeziana*, *Dipterocarpus gracilis*, *Calophyllum soulattri*, *Sideroxylon longipetiolatum*, etc. form the top canopy; of which *Dipterocarpus* species (Gurjan) forms the greater percentage. Other species present near the top canopy are *Amoora wallichii*, *Pterocymbium tinctorium* etc. In the lower storey *Pometia pinnata*, *Mesua ferrea*, etc. are found. The Climbers present are –*Dinochloa andamanica*, *Gnetum scandens* and a variety of canes.

2.9.1 b₁A/C₂ Andaman Tropical Evergreen Forests

They are not as luxuriant as the Giant Evergreen Forests particularly in height, density and size of the giant top storey, which is very irregular and incomplete, but otherwise, very similar in composition. There are fewer species in the top canopy, deciduous species being rather more frequent.

Distribution

It is distributed mostly on the hilltops.

Locality factors

A well distributed rainfall of over 3000mm and a sufficiently retentive deep soil with good internal drainage.

Floristic

- I. *Dipterocarpus grandiflorus*, *Dipterocarpus pilosus*, *Artocarpus chaplasha*, *Artocarpus gomeziana*, *Calophyllum soulattri*, *Planchonia andamanica*, *Hopea odorata*, *Endospermum chinense*, *Sideroxylon longetiolum*.
- II. *Xanthochymus andamanicum*, *Myristica andamanica*, *Myristica glaucescens*, *Baccurea sapida*, *Croton argyratus*, *Pterospermum aceroides*, *Caryota mitis*, *Crypto spp.*, *Memecylon spp.*, *Euphorbia epiphyllodes*, *Pseudovaria prainii*, *Actephila excelsa*, *Oxytenanthera nigrociliata*.
- III. *Anaxaqorea luzoniensis*, *Mussaenda macrophylla*, *Leea sp.*, *Evodia glabra*, *Licuola peltata*, *Pandanus sp.*
- IV. *Dinochloa andamanica*, *Calamus palustris*, *Gnetum scandens*, *Ancistrocladus extensus*.

The *Dipterocarpus spp.* forms a more or less pure stand in the top storey but is also present in all layers. This type covers the hills though the valley forests have a different composition and include *Musa. spp.* and tree ferns as well as the extensive climbing bamboo *Dinochloa*, *Dipterocarpus* is absent.

Note : *Dipterocarpus grandiflorus* is a conspicuous member of evergreen forests occurring in moist clayey hill slopes, which are best viewed as examples of Type c_1A/C_2 . Similarly, the *Dipterocarpus kerrii* attains a moderate height, and occurs in a few restricted localities in South Andaman.

2.9.1 c_1A/C_3 Southern Hill Top Tropical Evergreen Forest

This type is more or less inferior edition of the typical wet evergreen, not more than 10 meters high in extreme cases.

Distribution

They are found on the exposed upper slopes and tops of hills and sometimes on steep slopes towards lower side.

Locality Factor

Exposure to wind and generally less favourable conditions of soil and climate than the main climax form. Annual rainfall is usually high above over 3500 mm, and humidity is high during the period of low rainfall.

Floristic

I. *Dipterocapus costatus*, *Mesua ferrea*, *Canarium manii*, *Harpullai cupanioides*, *Hopea andamanica*, *Cratoxylon formosum*, *Euphorbia trigona*, *Euphorbia epiphylloides*.

II. *Memecylon caeruleum*, *Cryptocarya ferrarsi*, and some small bamboos and *Phoenix species*.

2.9.1 d₁A/E₁ Cane Brakes

An impenetrable thorny thicket, sometimes with a few tall trees standing over it and sometimes without. The stems are typically trailing and may be 60 m or more in length, but some species are more or less erect.

Distribution

Occur throughout the evergreen and semi-evergreen climax forest, and locally in moist deciduous forests.

Locality Factors

Occurs in wet hollows extending outwards to various distances, becoming more conspicuous with heavier and better-distributed rainfall, i.e. in the wet tropical evergreen. The soil is permanently wet and usually fine clay, very rich in humus.

Floristic

Calamum spp. and sometimes creeping bamboo (*Dinochloa andamanica*). A few palms such as *Licuola peltata* and *Zelacca spp.* The species vary with locality permitting differentiation of a number of forms.

Note: Once the creeping canes are in possession of a site, they make it almost impossible for trees to push through but they require constant and abundant water supply for optimum development.

2.9.1. e₁A/E₂ Bamboo Brakes

Description

The brakes are often very dense, even if the bamboo grows in clumps. The bamboo tends to be of the smaller type rather than the big clumped species.

Distribution

Throughout the Tropical Evergreen tracts.

Locality Factors

Wet bamboo brakes are usually found along streams or on badly drained hollows, more or less displacing the tree forests, whilst Cane Brakes replace them in the wettest sites.

Floristic

Dendrocalamas brandisis, *Oxytenanthera nigrociliata*, *Bambusa chizostachyoides* etc.

2.9.1. f₂A/C₁ Andaman Semi-Evergreen Forests

The type is economically the most important of the Andamans, and owing to its accessibility, it has been steadily cleared or worked over.

Description

A luxuriant type of forests with many giant trees, which include both deciduous and evergreen species often intimately, mixed but frequently in groups, particularly the evergreens. Bamboos may or may not be present. Chengappa describes it as the densest forest in the Andamans and terms it “Low Evergreen Forest.”

Distribution

Found in the main valleys.

Locality Factors

The chief characteristic is the immature alluvial soil sufficiently old and rose above flood level to be able to progress to the climatic climax, but with a good subsoil water supply and well-drained soil.

Floristic (Chengappa)

- I. *Dipterocarpus alatus*, *Dipetrocapus pilosus*, *Pterygota alata*, *Pterocymbium tinctorium*, *Terminalia bialata*, *Terminalia procera*, *Albizia chinensis*, *Albizia lebbek*, *Calophyllum soulattri*, *Salmalia insignis*, *Artocarpus lakoocha*, *Artocarpus chaplasha*, *Pterocarpus dalbergioides*.
- II. *Lagerstroemia hypoleuca*. *Dellenia pentagyna*, *Dracontomelum mangiferum*, *Pometia pinnata*, *Myristica irya*, *Pisonia excelsa*, *Litsea panamonja*, *Xanthophyllum andamanicum*, *Fagraea morindaefolia*, *Talauma andamanica*, *Garcinia andamanica*, *Aporosa villosula*, *Licuola peltata*, *Caryota mitis*, *Areca triandra*.
- III. *Saprosma ternatum*, *Musa andamanica*, *Micromelum pubescens*, *Clerodendron viscosum*, *Leea indica*, *Clinogyne grandis*.
- IV. *Dinochloa andamanica*, *Thunbergia laurifolia*, *Buettneria andamanensis*, *Combretum extensum*, *Daemonorops calamus*.

2.9.1. g₃A/C₁ Andaman Moist Deciduous Forests

Description

There is typically, a somewhat irregular top storey of predominantly deciduous trees about 40 metres or more in height, many of the trees being of very large girth and heavily buttressed. Beneath these trees is rather a definite second storey of numerous species including some evergreens, though most are deciduous and there is fairly complete shrubby evergreen undergrowth, including patches of bamboos. Climbers are heavy and often include canes.

Distribution

Found throughout the Andaman Islands, covering nearly half of the total area but not much in Nicobar group of islands.

Locality Factors

The underlying rock is chiefly hard, coarse grained sandstone with bands of shale and conglomerate and the soil, which is often shallow, is a sandy or clayey loam of light yellowish colour. This type is confined to the hilly ground and does not extend much above 100 metres where it is displaced by Tropical Evergreen nor does it occur on the flat alluvial ground which is covered with the Low Evergreen Forest.

Floristic

- I. *Pterocarpus dalbergioides*, *Terminalia bialata*, *Terminalia manii*, *Terminalia procera*, *Canarium euphyllum*, *Pterocymbium tinctorium*, *Salmaalina insignis*, *Lagerstroemia hypoleuca*, *Tetrameles nudiflora*, *Chukrassia tabularis*, *Albizia lebbek*.
- II. *Lannea coromandelica*, *Adenanthera pavonina*, *Dillenia pentagyna*, *Diospyros marmorata*, *Saccopetalum tectonic*, *Sageraea elliptica*, *Crotoxylon formosum*, *Semecarpus kurzii*, *Cinnamomum spp.*, *Pterospermum aceroides*.
- III. *Oxytenanthera nigrociliata*, *Bambusa schizostachyoides*, *Plecosperrum alatum*, *Ganthium gracilipes*, *Ixora grandifolia*, *Rinorea bengalensis*, *Mallotus acuminatus*, *Glycosmis pentaphylla*, *Licuala peltata*.
- IV. *Ventilago spp.*, *Ventilago madraspatana*, *Delima sarmentosa*, *Buettneria andamanensis*, *Acacia pennata*, *Entada phaseolides*, *Calamus spp.*

Note: This type is unquestionably a stable pre-climax to the Tropical Evergreen Forests determined by the soil, which dries out considerably in the month of January to April when there is scanty rain fall. Although the forests have not until recently suffered in the hands of man, the planned management to which they are being subjected to be unquestionably altering their character. The regenerated stands being more predominantly deciduous in character. It is possible that this forest might in part be classified with the Semi – Evergreen Forest.

2.9.1. h₄A/L₁ Littoral Forests

Nomenclature: The terms beach and dune forests are in general use.

Description

The most characteristic species is the tall evergreen *Manilkara littoralis*, which often forms an almost pure fringe on sandy beaches and dunes along the sea face. Scattered smaller evergreen trees occur with fewer deciduous trees and these form the dominant canopy. There are numerous shrubs, and where the undergrowth is light, maritime grasses and surface creepers are conspicuous, binding the sand. In the depressions, which are swampy usually with saline water, the tidal species are poorly developed with dense undergrowth. If the water is less saline, tall grasses (*Phragmites*) occur.

Distribution

All round the coast wherever a fair width of sandy beach occurs.

Locality Factors

The habitat is an exposed one with pronounced characteristics. The soil is sea-sand often blown and accumulated in low dunes, having adequate lime from shell fragments but poor in nitrogen and mineral nutrients. It is very coarse, porous and dry at the surface but the water table is usually only a few feet down. The water is less saline than expected, but often brackish. Strong winds, often salt-laden, act as desiccating agents with strong insulation and radiation from the bare sand rendering conditions profoundly xerophytic. The temperature is moderated by the proximity of the sea and by sea breezes. Rainfall varies with locality, its influence is mainly seen in the rate at which the formation progresses towards the climatic climax.

Floristics

Manilkara littoralis, *Pongamia pinnata*, *Morinda citrifolia*, *Erythrina variegata*, *Calophyllum innophyllum*, *Terminalia catappa*, *Barringtonia asiatica*, *Cordia subcordata*, *Thespesia populnea*, *Hibiscus tiliaceus*, *Pandanus tectorius*, *Ipomea pescaprae*, *Crinum asiaticum*, *Vigna retusa*, *Scaevola frutescens*, *Mucuna gigantea*, *Colubrina asiatica*, *Caesalpinia bonducella*.

Lining the top of the beach is *Scaevola frutescens* or a fringe of *Hibiscus tiliaceus* with *Colubrina asiatica*, *Synthea calpiearpa*, *Crinum asiaticum*, *Caesalpinia bonducella*, *Desmodium umbellatum*, *Mucuna gigantea*, *Clerodendron inerme* and

less frequently *Dalbergia tamarindifolia*, again there may be only *Pandanus tectorius* thickets. Above the beaches, the twining *Ipomoea pescaprae*, *Vigna retusa*, *Clitoria ternatea* may occur. Behind the shrubs, in addition to species noted in the description, *Guettarda speciosa*, *Ixora brunnescens*, *Cycas rumphii*, *Hernandia peltata*, *Heritiera littoralis* and *Gyrocarpus jacquinii* may also occur.

2.9.2 Fauna

The Andaman and Nicobar Islands is one among the bio-diversity hot spot in the world. The nature has endowed these islands with a unique and varied animal lives both on land as well as in sea. Fauna of Indo-Chinese and Indo-Malayan regions influences faunal distribution in these islands. Geographical isolations of these islands have caused high degree of endemism. Large mammals are absent in these islands. Though biological investigations are not completed. 5100 animals (100 fresh water, 2100 terrestrial, 2900 marine animals) have been described. Endemism is particularly prominent in these islands and this is more so with the avian fauna where 40% of the 300 species and sub species recorded are endemic. Out of the approximately 5357 species of major groups of fauna, 487(9%) species are endemic. The vertebrates also show high degree of endemism, 50% of the 64 species of mammals, 30% of the 84 species of reptiles and 20% of 10 species of amphibians recorded are endemic. The Andaman & Nicobar Island is one of the 221-priority areas concerning conservation of global biological diversity.

Below mentioned table show new discovery/reporting of species from the park during the last 10 years.

Table No. 2.7 NEW DISCOVERIES/REPORTING OF SPECIES DURING LAST 10 YEARS

Common name of species	Scientific name	Discovered/ Reported by	Year of discovery/ reporting	Remarks
Short-crested Bay Island Lizard	<i>Coryphophylax brevicaudus</i>	Harikrishna S. and S. R. Chandramouli	2012	New discovery
Andaman Bush Toad	<i>Blythophryne beryet</i>	Harikrishna S. and S.R.Chandraamouli	2016	New discovery
Charles	<i>Ingerana</i>	S. R.	2016	Rediscover

Darwin's Frog	<i>charlesdarwini</i>	Chandramouli		ry. First recorded in 1998
Indo-Pacific Slender Gecko	<i>Hemiphyllodactylus typus</i>	Harikrishna S. and S. R. Chandramouli	2012	New record

Mammals

There are 64 mammals are reported in these islands so far, of which 32 species are endemic. However, the number of mammals recorded in this National Park is not very appreciable. The largest and endemic wild mammal found in this park is Andaman Wild Pig (*Sus scrofa andamanensis*). Other important species found in this park are, White toothed Shrew (critically endangered), Andaman Masked Palm Civet, Spotted Deer etc. So far 14 species of mammals have been recorded in the Park of which 10 are endemic. The mammals of the park are listed in **Appendix XIII**.

Avian Fauna

The National Park is very rich in bird species. So far 122 species of birds have been recorded from the Park area. Out of 30 endemic species occurring in Andamans, 19 species are found in the Park. The bird species in the Park is listed in the **Appendix XIV**.

Reptiles

Total 98 species of reptiles have been reported (out of 86 are terrestrial, 12 are marine reptiles) in Andaman and Nicobar Islands, and of these 24 species are endemic. Out of this 98 species, 27 species of reptiles are found in the Park, and of which 16 are endemic which show a high degree of endemism. Among reptiles, the Andaman Water Monitor Lizard (*Varanus salvator andamanensis*) is quite common in this park and are found dwelling in the forest particularly near shores. Marine turtles namely Olive Ridley (*Lepidochelys olivacea*), Green Sea Turtle (*Chelonia mydas*) and Hawksbill Turtle (*Eretmochelys imbricate*) are reported to be visiting the beaches of Mirchi Dera and Madhuban for egg laying.

Among snakes apart from King Cobra, other venomous snakes such as Andaman Cobra, Pit Viper, and Kraits are also found in this park along with non-poisonous snakes like Rat Snake, Water Snake etc.

List of reptiles found in the park is listed at *Appendix XIV*.

Amphibians

Seven species of amphibians are reported from Mount Harriet National Park and out of which four species are endemic. One of the most important endemic species i.e. Charles Darwin Frog (*Ingerana charlesdarwini*) is critically endangered. The list of amphibians is given in *Appendix XV*.

Insects

The National Park houses good population of insects like butterflies and beetles. By and large, the Phylum Arthropoda is very well represented here and consists of a large number of butterflies belonging to the order Lepidoptera which accounts for a high degree of endemism. The Zoological Survey of India, Port Blair has made extensive study on the insects and documented the species which is listed in *Appendix XVI*.

CHAPTER - 3

HISTORY OF MANAGEMENT IN MT HARRIET NATIONAL PARK

3.1 General

Due to its highly undulating land configuration, steep slopes and deep valleys, the area within the Mount Harriet National Park remained almost untouched by human interventions. In the erstwhile notified Reserved Forest status within the South Andaman Forest Division, the Park area was kept under Protection/Conservation Working Circle of different Working Plan periods owing to its typically unworkable hilly terrain.

3.2 History of Forest Management in Mount Harriet Hill Range

The first colonial settlement was established in these islands in 1857. Until then, the population consisted of the tribes who met their requirements of food and shelter from the forest. Early settlers cleared land for the road, buildings and agricultural cultivation under the guidance of Royal Engineers, Public Works Department and then Commissionerate Department. The Forest Department came into existence in 1883 under Lt. Col. M.L. Ferrar, who explored the forests of South Andaman and submitted his report in 1886. A stupendous documentation amongst others by Ferrar has been '*The Butterflies of the Andamans and Nicobars*' published in the Journal of the Bombay Natural History Society which still accounts for one amongst the most comprehensive accounts on butterflies. The work was done by him between the years 1923-1931 when he was the Chief Commissioner of the Islands, however, published at a much later date.

The first valuation report on the Forests of these Islands was by M.L. Ferrar in 1886, which celebrated the availability of the commercially exploitable tree, *Padauk*. In the initial years, forestry operations were irregular felling in the accessible areas.

His report was preceded by a 1839 report of a Russian Scientist, Dr. Helfer, who unfortunately lost his life at the hands of the tribes. S. Kurz in 1870 made a botanical exploration to collect materials for his book "A flora of Andaman

Islands”. The period spent by him was too short to collect materials for flora, but he published his works as “Report on Vegetation of Andaman Islands” accompanied by a report on the Forest. The next report was of Inspector General of Forests, H.C. Hill in 1891 who suggested for forestry operation in an accessible area of 31,080 ha by drawing a Working Plan. This was followed by quick successions of plans by C. G. Roger (1903-04), Todd (1906), and Bonington (1914). Till 1925, they all suggested for rotation periods and regeneration for better stock of exploitable commercial species, both indigenous and exotics. Mostly clear felling was done with little or no attention to regeneration of an area after lumbering operations.

However B. S. Chengappa in 1931 introduced “Andaman Canopy Lifting Shelter Wood System” which was simple, inexpensive and successful. This method found space in Dean’s Working Plan in 1936. In this Plan from 1936 to 1966, the prescription of yield was low and the assessment of areas extracted was not correct.

From 1942 the islands remained under Japanese occupation, during which period the forestry operations were confined to the needs of defense and no system was followed. After reoccupation of the islands from Japanese in 1945, forest working remained irregular and selective.

In 1948, Chengappa was appointed as Conservator of Forests (Working Plan) and prepared new Working Plan for the period from 1952 to 1968. However due to start of the rehabilitation schemes of refugees from the East Pakistan from 1952, the Plan prescriptions could not be followed. In this Plan, the Andaman Islands were divided into three territorial divisions namely North, Middle and South Andaman and a separate Working Plan for each division was prepared.

Because of steep undulating nature of terrain and inaccessibility, the park area was never preferred for timber operation during early days. In later part, the area was considered as important catchment area, hence placed under protection/conservation working circle. However timber operation was carried out in the adjacent reserve forest. Large track of forest in Revenue land was cleared at North Bay adjacent to the southern boundary of Park for raising coconut plantation. A considerable area of Reserve Forest adjacent to the western boundary was cleared and allotted to Agriculture Department for raising coffee

plantation somewhere near 1960s. Dhingra in the Gazetteer (2005) at page 258 comments that, “ *Coffee saw a short moment of glory when it was recommended by an expert team in 1956-57 and then taken up for trials under the Accelerated Development Programme; but it could not withstand the vagaries of taste and pricing of the international market, and faded out after hopes of commercial viability were abandoned.*” The area now is being managed on a shoestring budget and a skeletal staff strength. Many other commercial crops like coconut, spices and lesser known fruits were later added. Presently it is being kept as a mother stock of spices and without any substantial economic gains.

The next working Plan for Andaman Forests was written by J. C. Varmah, the then Conservator of Forests but due to some administrative reasons, the Working Plan was not sanctioned. With change in situation and land use pattern, A. C. D’Cruz took up preparation of separate Working Plan in 1966 but GoI returned the Working Plan suggesting certain changes.

The D’ Cruz Working Plan was modified and revised by Pandey B. P. Sinha for the period from 1970 to 1980. Revision of Working Plan of Sinha, was taken up by B. K. Basu and GoI approved the Plan for the period from 1990 to 2000.

Considering the ecological importance and biodiversity, the Mount Harriet Hill Range was placed under Protection/Conservation Working Circle in almost every Working Plan. Moreover, being inaccessible, no extraction was possible.

M. P. Singh had prepared the Working Plan for the period from 2003 to 2013 of South Andaman Division. In this Working Plan, the park area was brought under Eco-Tourism Overlapping Working Circle.

The current Working Plan for South Andaman was prepared by C. R. Mallick for the period from 2016 to 2026. The adjoining area (the Eco-sensitive Zone) of Mount Harriet National Park is kept under Eco-Tourism Overlapping Working Circle with objectives to showcase the rich biodiversity and natural beauty by promoting bird watching, trekking, nature trail, turtle watching etc.

The first Management Plan of the Mount Harriet National Park was written for the period from 1998 to 2002 by Pratap Singh. In this Management Plan main emphasis was given on habitat improvement and protection of natural resources of the park.

The second Management Plan for the park for the period from 2008 to 2018 was prepared by Pratap Singh and Alok Saxena. In the absence of a revision, the prescriptions of the last MP were continued with for the next two years. The prescriptions of the plan are briefly discussed:

a. Protection Plan

Protecting park resources against the threat of poaching and illegal removal as well as stopping potential encroachments by establishing a network of nature trails, protection camps and check points equipped with modern communication equipments and rapid transport facilities was envisaged in the Management Plan.

b. Habitat Improvement Plan

Removal of grazing pressure and controlling invasion of exotics in the Park were the two very important activities prescribed for improving the Park habitat. Removal of exotics like *Eupatorium*, *Michenia* etc. and stopping spread of weeds through the materials carried by visitors, forest workers and others entering into the Park were few steps suggested to improve habitat for overall well being of faunal elements of the Park.

c. Research and Monitoring Plan

Under Research and Monitoring Plan emphasis was given to carryout research work in collaboration with various institute and organization. Stress was given on long term monitoring programme by conducting baseline survey of important and prominent group of flora and fauna. For population management and monitoring, it was suggested to conduct bi-annual census of wild pig and spotted deer for proper monitoring of population. The plan also emphasized on impact of introduction of exotics and biotic pressure on the floral and faunal wealth of the Park.

d. Nature Education, eco-tourism and Eco-development

The plan emphasized on involvement of people including students, youth, tourist, local population etc. in conservation efforts of the Department. It was prescribed to print publicity materials like brochures, booklets, poster etc., and organizing nature camp for students, college students to create awareness and love towards nature, forest and wildlife. Developing nature trails for trekking and camping facilities to promote eco-tourism were given due importance under eco-tourism head. Using of local materials for creating eco-tourism infrastructure and involving local people to the extent possible as desirable to boost economy of people residing near the Park was also a part of eco-tourism plan.

e. Infrastructure Development and Capacity Building Plan

The plan envisages development of basic infrastructure including improved mobility, better communication and availability of sufficient arms and ammunitions with the protection staff. Similarly, organizing appropriate capacity building programmes for the protection and research oriented staff were also suggested under this Plan.

f. Boundary Rationalization and Consolidation Plan

The park has a wide belt of reserve forest which acts as buffer against various biotic pressures, so the plan stressed upon delineating the RF boundary from National Park boundary by fixing permanent boundary pillars all along the park boundary in the north, west and south.

g. Organizational Structure Improvement Plan

Improvement in the existing organizational structure of the National Park was prescribed for proper management, protection and conservation.

3.3 Attainments of the Previous Management Plan

a. Protection Plan

- i. Two permanent protection camps one each at New Madhuban and Mirchi Dera were established during the plan period. The camps were electrified by providing solar powered energy. Patrolling staff are present 24X 7 on a rotation basis of 15 days. They carry out foot-patrols on the Eastern side of the slope.
- ii. These protection camps were provided with all modern communication equipments like VHF and GPS for effective patrolling and protection works.
- iii. Regular patrolling through engine fitted dinghy boats are being carried out on eastern boundaries of the park to check illegal entry of unauthorized persons inside the park.
- iv. Through effective protection activities, the park managers were able to curb poaching, illicit felling, illegal entry and encroachment inside the park area to a great extent.

b. Habitat improvement Plan

- i. No grazing of domestic animals is allowed inside the park area through regular foot patrolling along the western boundary of the park.
- ii. No exotic flora and fauna were allowed to introduce inside the park area.
- iii. Beach cleaning are carried out to clean the garbage being deposited by wave action.

c. Research and Monitoring Plan

Fauna: Research and scientific study of fauna have been carried out during the plan period by different scientific institutions and individual researchers. The Zoological Survey of India, Port Blair has carried out extensive faunal survey and discovered some of the critically endangered species like Andaman White-toothed Shrew, Jenkins Andaman Spiny Shrew, Charles Darwin's Frog.

Flora: The Botanical Survey of India has also made floristic surveys at Mount Harriet National Park during the Plan period and discovered some rare and endangered species like *Aporosa villosa*, *Canthium glabrum*, *Cratoxylum formosum*, *Grewia serrulata* etc.

Census: Wildlife census for Spotted Deer, Wild Pig and Bird was conducted on 18th December, 2010 by the Wildlife Division in collaboration with Zoological Survey of India, Forest Training Institute and South Andaman Forest Division. The census was carried out along the transects laid for census from Kalatang, Mount Harriet and Mannarghat upto the eastern sea shore of the park.

d. Nature Education, eco-tourism and eco-development Plan

- i. Awareness programme on biodiversity of park during important days i.e. Wildlife Week, World Wetland Day, National Forestry Day etc. have been conducted involving school and college students.
- ii. Awareness programmes on marine wealth, crocodile, menace of plastics etc. for local fishermen and people were also conducted.
- iii. One Nature trail from Mount Harriet to North Bay through Mount Carpenter had been created and opened for the tourist. Facilities such as resting benches, signages etc. were provided along the trek path for the nature enthusiasts.
- iv. A good number of tourists both national and foreign origin have visited during the plan period. Road signages and informative boards are installed along road side from Range Office, MHNP to Mount Harriet FRH. Apart from this, eco-friendly structures like resting benches were constructed for promoting eco-tourism on the nature-trails from Mount Harriet to Kalapather and Mt Harriet to North Bay via Mt Carpenter.
- v. An eco-friendly hut has been built at the entry gate for streamlining the entry of tourists into the National Park. This eco-hut is also used for resting by the visiting tourists.

e. Infrastructure Development and Capacity Building Plan

- i. Permanent protection camps are established at Mirchi Dera and New Madhuban. These camps were provided with latest communication and patrolling gadgets.
- ii. Mechanized boat and one motor cycle was provided for transportation of men and materials and patrolling along the sea front boundary of the park.
- iii. The Executive staffs have been deputed for capacity building training programmes and refresher courses as and when such training programmes were conducted at Forest Training Institute, Wimberlygunj. In-house trainings on Law and Animal Handling too have been imparted by the Division to the frontline staff.

f. Organizational Structure Improvement Plan

- i. The far flung Protection Camps i.e. Mirchi Dera and New Madhuban are manned by the Executive staff of designation Deputy Ranger/Forester/Forest Guard on 15 days rotational duty. The Protection Camp In-charge are made responsible for maintaining the plants and equipments of the camp and entrusted to mobilize the protection staff under him for effective protection duty.
- ii. For proper management, the entry gate to the park is manned by Executive Staff who issue permits to the visitors entering inside the park after realizing a prescribed entry fee.

CHAPTER - 4

MOUNT HARRIET NATIONAL PARK: PRESENT SCENARIO

4.1 Issues and Problems

4.1.1. Encroachment

There were four post-1978 encroachers at Mirchi Dera and they had encroached 4 hectares of park land. These encroachers were evicted during December, 2002 by removing their illegal establishments and reclaiming the area by replanting with forestry species.

There was one post-1978 encroachment near to Mirchi Dera on the Eastern coast. Locally the area is named as Santosh Dera after the name of the encroacher. Santosh Katchap had encroached two hectares of land by clearing forest. This encroachment was removed and area reclaimed during February, 2003.

Presently the National Park area is free of encroachments. Having being carved out of a Reserved Forest Area lends it the advantage of being without any boundary disputes. However, with the increasing population and mobility, outlaws too have diversified their approach towards creating nuisance. Therefore, intensive protection measures require to be always present to subvert any such attempt of encroachment.

4.1.2. Poaching

Due to geographical isolation, these islands lack diversity in large mammals. Hence the British introduced various species of Deer between 1905 to 1930 AD, of which Spotted Deer (Chital) and Barking Deer have established well mostly due to absence of natural predator. The Hog deer that had also established and was found in abundance in Andaman earlier is now not reported in South Andaman. Being protected under the Wildlife

(Protection) Act, 1972, killing of deer is a crime. The population of deer species reduced considerable due to demographic pressure and hunting. Wire traps are periodically recovered from Mt Harriet NP, particularly along the higher ridges, where entry points are accessible by roads. The traps are laid for hunting wild pig and spotted deer. Regular patrolling have resulted in reduction in the incidences, however, a complete stoppage of this illegal activity is yet to be achieved.

Feral dogs are also becoming serious threat to the Andaman Wild Pig and nesting ground birds.

Though the park area is secured from high hills on three sides and sea from one side and also has advantage of broken hills and deep valleys, illegal hunting of Andaman Wild Pig, Spotted Deer and Water Monitor Lizard, birds take place. Animals moving out from the park area into the fringe areas are mostly vulnerable. Use of lure, particularly for birds species, is seen during fruiting seasons.

Large scale organized poaching having national and international ramification in respect of terrestrial animals does not exist in Andaman and Nicobar Islands as of now. The terrestrial fauna of the park is almost secured from organized poaching.

However collection of marine wealth such as sea cucumber by locals having nexus with people dealing with such articles at national or international level cannot be ruled out. Till now no poaching of marine wealth has been reported from sea adjacent to the eastern boundary of park.

As stated earlier, care requires to be taken with the changing times, advent of advanced technologies, diversification of communications and greater outreach. New sought after items, erstwhile unknown to the settled population here are being added to the list of items being smuggled out. Snake venom, butterflies, moths and beetles are such articles which the Protection unit requires to be wary about.

4.1.3. Illegal Felling of Trees

Ornamental wood like Padauk, Chooi, Marble Wood and other superior hard wood such as Black Chuglum, Pyinma, Toungpeine etc. are illegally felled from forest area for local and commercial consumption. Large scale organized illegal felling is however, not reported in these islands. The areas approachable from the Mannarghat, Wright Myo and Shoalbay ends from towards the ridge are the most vulnerable points. The establishment of camps at the Eastern boundary has controlled the illegal entries from the eastern end to a great extent, however, the northern, western and southern areas still remain vulnerable.

4.1.4. Feral Cattle

Livestock, mostly the unproductive females and male cattle, left off by their owners, easily enter the Park areas for grazing and browsing. Problem of feral cattle destroying the vegetation is as of now unassessed. The damage is seen mostly towards the western and southern fringe areas. In the coming times, close co-ordination is required with the Animal Husbandry department and the general public to find a practical solution to it.

4.1.5. Wildfires

There are no reports of wild fire within the jurisdiction of the Mount Harriet National Park till date.

4.1.6. Insect attacks and Pathological problems

The forest of the park remains untouched with no major human interventions. The forest is virgin and healthy and no attack of insect has been recorded. The terrestrial wildlife are also not reported to be infected by any pest or pathogen.

4.1.7. Exotics

Protection has lent a substantial relief to the deer population. However, on the other side, there has been an increase in population of spotted deer, an introduced faunal species, is likely to cause a significant damage to the

natural regeneration of ecologically important flora. Being a non-specific feeder, the deer species eat up the young shoots of any and every sapling and restrict the growth; they even debark pole crops which lead to their death. No concrete studies have been carried out to assess the impact, howsoever. Impact of exotic bird species like Common Mynah, House Sparrow etc. on forest ecosystem too have not been evaluated.

4.1.8. Sand Mining

Sand mining is a threat that looms large for such a big, inaccessible area. Even though, reports in the recent past have been negligible, the perils attached to it cannot be underestimated. Sand mining not only affects the mangrove and coastal ecosystem, but also encourages further soil erosion and sedimentation in the coastal and offshore areas. It results in erosion of coast and fall of coastal trees, mainly bullet wood (*Mimusops littoralis*). The Protection camps at New Madhuban and Mirchi Dera are instrumental in warding off any such threats to the environment and thus require further strengthening in terms of their infrastructure, particularly communication and transportation.

4.2 Activities and Programmes of the Department

Various activities and programmes of the Government have been carried out in the Mount Harriet Hill Range since the colonization of these Islands. In the initial British period, Mount Harriet was identified as the summer retreat for the British Superintendent, later which was renamed as Chief Commissioner. The ruin of the Chief Commissioner's bungalow nestled near the Mt Harriet peak speaks of the era bygone. Additionally, there were accommodation for 200 people in barrack formation. It was preferred destination for change in weather during the summers for the Britishers. Owing to the steep gradient, commercial forest workings were limited in this part of the Island. The areas were thus kept under the Conservation Circle and the Protection Circle of the subsequent Working Plans.

NTFP collection: Previously, while being notified as Reserved Forest Area, NTFPs like bamboos, selai patta and canes were issued to public of South Andaman Island on free royalty but was later stopped in compliance with the order of Apex Court issued on 07.05.2002 in W.P(C) No. 202/1995 . Presently, given the status of National Park and that all rights have ceased to exist and are thus extinguished, no collection of NTFP is allowed.

Lease: No area is permitted to be leased out from within the Mount Harriet National Park area.

Other Establishments: The Department had established one Elephant Training Camp with all facilities to train young untrained Departmental elephants at Old Madhuban. The untrained young elephants from all the Divisions had been brought to this camp and were imparted training on loading, dragging, pushing and all other commands by qualified trainer and subsequently were sent back to the field after completion of training. This Camp was wound up in 1996.

No establishments, other than that of the Forest Department are present within the National Park area. It is compact chunk of landmass under protection and conservation.

Specific programmes and activities had been taken up by the Department towards mainly preserving the unique and distinct nature of the highly vulnerable and fragile ecology of the National Park. For attaining the ends, tailor-made schemes of the Government- both State funded and Centrally funded, are implemented. These schemes are aimed at strengthening infrastructure and management of National Parks and Sanctuaries as decided in the Coimbatore Charter (2001). Under the current schemes, activities include infrastructure development such as construction of quarters and camps, procurement of watercraft and their maintenance, strengthening of protection network, observing important days like Wildlife Week with public participation, propagation of information and awareness creation on wildlife wealth and its conservation.

4.2.1 Forest Protection

The area park was brought under legal frame of wildlife conservation by declaring it as National Park under section 35 of Wildlife (Protection) Act, 1972. All wildlife related offences are thus addressed as per the provisions of W(P)A, 1972. Patrolling is undertaken inside the park as well as along the East coast. Protection Camps are functioning from New Madhuban and Mirchi Dera. Madhuban is accessible on foot from Mount Harriet, Mannarghat and North Bay and by boat from Panighat Jetty. Mirchi Dera camp is reached from Shoal Bay or Madhuban on foot. It can also be accessed by boat from Wright Myo or Shoal Bay. Both camps are well connected with Range Office, MHNP; Control Room, ROP and Central Control Room, Chatham through VHF communication network. Temporary barracks are available for staff to stay with water and solar electric facilities. Wells have been provided. Toilets are available. The camps are for 15 days and done on rotation basis. Staff, from the level of Forest Guard to Deputy Ranger are sent on camping duties alongwith a couple of mazdoors. Regular foot patrolling is carried out for which the park area is accessed from the ridges near Shoal Bay area. Patrolling paths are mainly narrow dirt paths, locally called '*bhaanjhi*'. These dirt paths get easily vegetated in a single monsoon period and again the next fair weather, require to be cleared. Protection of the Park and deterring any wildlife offence depends upon the intensity of patrolling being undertaken, particularly in the dry part of the year. In the Monsoons, given the steep elevation and slick substratum with high clay content, the Park is usually avoided by the miscreants. However, increasing the presence of staff on the ridge side will ensure total and un-denied protection of the Park.

4.2.2 Awareness Generation

Department conducts various programmes and activities in association with various premier institutions, NGOs etc. for the general public, school and college students for inculcating love and affection towards nature and its creation. The idea behind conducting such programme is to make people aware about the rich biodiversity of MHNP and its conservation through

people's participation. These programmes are mainly conducted during important days like Wildlife Week, International Biodiversity day, International Wetland days etc. Following are the programmes which are conducted by MHNP Range:

1. Nature camps for school and college students, women and PRIs.
2. Awareness programme on biodiversity.
3. Birth watching
4. Awareness programme for fishermen.
5. Cleanliness drive.

4.2.3 Eco-Tourism

Eco-tourism is a subject of nature tourism in which conservation and tourist interests work together on the principle of preserving environmental quality while tourism is naturally protected.

In Andaman & Nicobar Islands, apart from the provisions of the Wildlife (Protection) Act, 1972, the Apex court judgment dated 07.5.2002 in the matter of W.P. (C) 202 of 1995, forms the basic tenet for any form of tourism. As per Professor Shekhar Singh Committee Report, tourism in ANIs is to be seen within the realm of the following:

- i) The Islands offer a great potential for high value, low volume, specialized eco-tourism that can be done with minimal infrastructure and follows the principles of dispersion and flexibility. Special interest tourists, wanting to view the unique and rich biodiversity of the Islands can be accommodated in wilderness areas in small clusters of tents with low concentration at any one place. The location of these tents can be shifted every two or three years to ensure that no one site is inordinately impacted.
- ii) No concrete or permanent infrastructure for tourism should be built on any forest area in the Islands. Tourist activities in forest areas should be restricted to tented accommodation or temporary wooden/prefabricated structures that can be dismantled easily and moved to another site. These areas should remain under the control of the

forest department who should be responsible for ensuring that the quantum and type of tourism is such that it does not in any way degrade the forests or other ecosystems.

- iii) A proper eco-friendly tourism plan should be developed for the Islands within one year. Such a plan must be in conformity with the requirement for conserving the ecological and cultural integrity of the Islands and not pose a security threat to this ecologically important area.

MHNP is quite popular among the tourists coming to Andamans, both Indians as well as foreign. Increased spending power, leisure time and interest in adventurous forms of recreation have created an increasing use of forest areas as tourist destinations. Many small islands have few natural resources other than sunshine, sea and marine products, and thus tourism has been viewed as a major source of economic development in Andaman and Nicobar Islands. Statistical data clearly shows that the tourist flow to these islands is drastically increasing. While tourism is providing employment opportunities to the local people, the unbridled tourism activities can adversely impact the natural environment. The tourism is regulated by the Wildlife Division by issuing permits to the visiting tourists and the park is opened for visiting tourists from sunrise to sunset. Given the steep gradient and inaccessible topography, number of people visiting the forest area per se is not very high and thus is naturally regulated as on date. However, for the times to come, a regulatory mechanism should be in place.

MHNP is considered paradise for the nature lovers. A visitor can witness the untouched tropical evergreen forest, unique avian fauna and colourful butterflies in their natural lair. Visitors, who have interest on history, can see the remains of summer residence of commissioner, artillery cannon point and old well etc of the British era. For the benefit of the visitors to MHNP, display boards on biodiversity of MHNP are installed all along the road leading to the FRH. Staying facilities in the form of individual wooden huts and tents are available at Mt Harriet peak, which are cosy with basic facilities.

Small hikes are undertaken by tourists and visitors till Kalapatther, which is about 2 km from the Forest Rest House establishment. The path to it is undulating with gentle gradient and takes one through the typical evergreen and semi-evergreen forests. One, however, has to be careful of the vagaries of any natural evergreen forests of hill side. The path exposes visitors to leeches in the wet season and ticks in the dry season. Another trek path popular with the nature enthusiasts is from FRH via Kalapatther to North Bay via Mt Carpenter, for about 12 km and experience many hillocks and deep gorges. Once descended to North Bay, the trekkers can avail the boats at the jetty for the return journey to Port Blair.

Table No. 4.1 DETAILS TOURIST VISITED MNHP FROM 2008 to 2020

S.N	Year	Indian			Foreigner			Total		
		Adult	Child	Student	Adult	Child	Student	Adult	Child	Student
1	2008	18028	1234	574	120	0	11	18148	1234	585
2	2009	19690	1334	974	200	0	19	19890	1334	993
3	2010	21427	1242	1079	180	0	5	21607	1242	1084
4	2011	30999	2216	664	153	0	18	31152	2216	682
5	2012	35808	2267	631	151	14	0	35959	2418	631
6	2013	35808	2321	631	151	14	0	35959	2335	631
7	2014	30148	2191	677	201	10	0	30349	2201	677
8	2015	46891	2124	304	175	3	0	47066	2127	304
9	2016	38628	2009	410	178	4	0	38806	2013	410
10	2017	43731	1972	399	145	9	3	43876	1981	402
11	2018	45783	2893	99	147	2	0	45930	2895	101
12	2019	30668	3060	144	148	3	0	30816	3063	144
13	2020	10540	791	0	56	0	2	10596	791	2

Note: In 2020, visitation of tourists was less due to Covid-19 pandemic

4.2.4 Research & Monitoring

Research in the park mainly focuses on assessment of biodiversity especially terrestrial faunal and floral diversity.

Parkinson (1921) started systematic pioneer work on flora of Andaman and enumerated them in “The Forest Flora of Andamans”. His enumeration work includes the flora of Mount Harriet Region. Champion and Seth in

1968 described the forest types of Andaman and Nicobar Islands including the forest types of Mount Harriet region.

Further the Botanical Survey India, Andaman Region has also made extensive survey on flora of Mount Harriet Hill ranges.

The Zoological Survey of India has conducted survey and research on mammals, amphibians, reptiles and herpetofauna of Mount Harriet area.

Apart from the above two premier institutions of A & N Islands, scientific institutions from mainland also conduct extensive research on flora and fauna of Andaman and Nicobar Islands including the Mount Harriet region.

Table No. 4.2 : List of researchers conducted scientific research/studies at MHNP

SN	Name of the Researcher	Name of the Institute	Duration	Topic
1	V. B. Mathur	WII, Dehradun	April, 2010 to March, 2014	Survey on herpetofauna in Protected Area of ANI
2	Dr.JayshreeRatnam	Wildlife Biology and Conservation, National Center for Biological Science Bangalore	Dec., 2011 to Nov., 2018	Long term monitoring of Forest Tree Community Biomass and Vegetation dynamics in South Andaman
3	K.N. Ganeshaiyah	University of Agricultural Science, Bengaluru	Jan., 2013 to Dec., 2013	The DBT Project on Mapping Plant Resources of ANI
4	Ajith Kumar	NCBS, Bengaluru	Nov., 2013 to May, 2014	Study on gene flow of different species of Bats in ANI
5	C. Murugan	BSI, Port Blair	April, 2014 to March, 2015	Collection of Lichen sample for morphological, anatomical,

				chemical and molecular characterization and identification in the laboratory
6	Tasneem Khan	ANET, Wandoor	Sept., 2014 to Aug., 2015	The effect of Cheetal disturbance on the composition and functional traits of understory vegetation in the forest of ANI
7	C. Srinivasulu	Osmania University, Hyderabad	Oct., 2014 to March, 2016	Study and collection of specimen of bats.
8	Mr. Chandramouli S.R	Pondicherry University	Feb., 2015 to Nov, 2017	Study on Island biogeography of Anurans in A & N Archipelago.
9	Dr. Manchi Shirish S.	SACON, Coimbatore	March, 2015 to March, 2016	Conservation of the Andaman Serpent-eagle in Andaman Islands.
10	Lalji Singh	BSI, Port Blair	January, 2016 to March, 2016	Survey the RET plants and collect the representative sample in the reserve forest and Protected Area
11	The Director	National Centre for Sustainable Coastal Management, Chennai	April, 2017 to March, 2018	Blue Carbon offsetting carbon emission by conserving coastal vegetative ecosystem in Andaman Group of Islands.
12	Dr.JayshreeRatnam	Wildlife Biology and Conservation, National Center for Biological Science Bangalore	Oct, 2017 to May, 2018	Tropical Forest responses to historic logging and assisted regeneration in Andaman
13	Dr.ShwetaYadav	Dr. HS Gour Central University	August, 2018 to October, 2018	Study and collection of different species of earthworm
14	Dr. P. Laxminarasimha	BSI, Port Blair	January, 2019 to February,	Survey on genus <i>Luisia</i> species

			2019	(Orchid) and collection of representative sample from the Forest of ANI
15	Dr.SabyasachiMaiti	IIT, Khargpur	February, 2019 to Dec. 2021	Shoreline change Analysis along A&N Islands : Implication for Coral Conservation
16	Dr.RuchiBadola	WWI, Dehradun	February, 2020 to 2021	Mangrove response to sea level change along a gradient of tectonic subduction- A multi-disciplinary approach
17	Dr. Noorunisa Begum	FRLHT, Bangalore	February, 2020	Development of electronic data base on medicinal plants of A & N Islands.
18	Dr. Rajesh Desmukh	HBPCL, Mumbai	March, 2020	Establishment of Centre of Excellence for snake venom standardization and supply for manufacturing of various Anti-serum products
19	Dr. Jahnvi Joshi	CCMB, Hyderabad	June, 2020	Systematic and biogeography of centipedes in A & N Islands

Monitoring

Monitoring is basic component of control function. Day-to-day monitoring of park was conducted since its notification for its effective management.

4.2.5 Training & Capacity Building

At present, there is paucity of trained specialized staff on Wildlife in the Department. The foresters posted at the park are trained in basic forestry courses at Forest Training Institute, Wimberlygunj but they are not specialized in wildlife.

The foresters posted at the park undergo refresher and capacity building training programmes conducted by Forest Training Institute, Wimberlygunj time to time. Trainings have also been conducted in-house by the Division in the past 3-4 years in animal handling and law. Trainings have been rendered and teams of Animal Handlers, Dog Squad, Scuba Dive Unit have been established who attend to specific Wildlife Management Issues not just in and around Port Blair, but also the entire of Andaman and Nicobar Islands in times of exigencies. Inter-departmental co-ordinated mock-drills are undertaken for disaster management to keep the staff abreast with the requirement of the changing times.

The requirement of having dedicated units for handling wildlife related cases and regular monitoring of wildlife areas is highly felt in today's world as we strive to create awareness amongst not just the staff of our Department in general and the Wildlife Wing in particular, but also amongst the other stakeholders including other department of the Administration and the public to bring down the reaction time in attending to human- wildlife conflicts, which anyhow is on the rise all across the world. At present, the specialized training imparted to staff of the Department per se is very limited.

Table No. 4.3 IN-HOUSE TRAINING IMPARTED ON WILDLIFE MANAGEMENT

S.No.	Particular of training	Year	Number of participants
1	Training on snake capturing and handling	2016	24
2	Training on stress management	2016	48
3	Training on crocodile capturing and handling techniques	2017	47
4	Training on snake capturing and handling	2018	18
5	Training on crocodile capturing and handling technique	2018	67
6	Training on snake capturing and handling	2019	37
7	Training on crocodile capturing and handling techniques	2019	47
8	Training on Wildlife Laws for frontline staff.	2020	26

**Table No. 4.4 TRAINING PROGRAMME FOR FRONTLINE STAFF
IMPARTED BY OTHER AGENCIES**

S.No.	Particular of raining	Name of Agency	Year
1	Training on implementation of EDC	Periyar Tiger reserve, Kerala	2012
2	Training on wildlife crime and forensic science	Loknayak Jayprakash Narayan National Institute of Criminology and Forensic Science, Delhi.	2012
3	Training on Green India Mission and its implementation	IGNFA, Dehradun	2012
4	Legal implications in wildlife crime	Wildlife Crime Control Bureau, Chennai	2015
5	Stress management	Sixth Sense Resource Pvt., Bangalore	2016
6	Training on Web portal for online submission and monitoring of Forests, WL and Environment clearance to the user agency & departmental staff.	Forest Academy, Coimbatore	2018

Table No. 4.5 TRAINING ON OPEN WATER DIVING AND REEF MONITORING

Sl. No.	Name of the course	Number of courses	No. of staff attended training
1	Open Water Diving Course	02	13
2	Refresher Course on open Water Diving	02	13

**Table No. 4.6 TRAINING/PROGRAMMES IMPARTED FOR VARIOUS
STAKEHOLDERS**

Sl. No.	Particular	Stake holders	Year	Number of participants
1	Training programme on human-crocodile conflicts.	Local villagers and fishermen of Junglight	2017	
2	Training programme on conservation of marine resources in association with WCCB, Chennai	Fishermen of Junglight	2019	62
3	Training on management of snakes and crocodiles	PRI members, staff and staff of	2019	36

		Manglutan Range		
4	Training programme on schedule articles	Locals and fishermen of Junglightat	20196	40
5	Training programme on identification of marine resources and their conservation	Staff of Fisheries and Forest Department	2019	30
6	Training on identification of contraband wildlife articles	CISF unit of VSIA	2020	22

CHAPTER -5

THE INTERFACE BETWEEN THE PROTECTED AREA AND THE ZONE OF INFLUENCE

5.1 The existing situation in the Zone of Influence

The area on the western and south-western side of the park is inhabited by the communities of settled population and comprises of the Zone of Influence. There are four revenue villages in the vicinity of the park namely Hope Town, North Bay, Kalatang and Shoal Bay having a population of 4687.

Table No. 5.1 VILLAGE WISE HUMAN POPULATION (CENSUS – 2011) IN ZONE OF INFLUENCE

S.No.	Name of the Village	Number of House Hold	Population		Total Population
			Male	Female	
1	Hope Town	297	657	601	1258
2	North Bay	368	856	747	1603
3	Shoal Bay	302	715	658	1373
4	Kalatang	27	66	50	116
TOTAL		994	2294	2056	4350

Source: Directorate of Economics & Statistics, A&N Adm., Port Blair

5.2 Ethnic identities, traditions, customs, relationships between different groups

The people living in the vicinity of the park are mainly farmers and fishermen in occupation and have almost of homogeneous culture and belief. The major portions of population of Hope town and North Bay village are Telegu while Shoal Bay and Kalatang village have mainly Bengali and Ranchi community people. Major chunk of population of Hope Town and North village are mainly fishermen by occupation whereas people of Shoal Bay and Kalatang villages are primarily engaged in marginal agricultural activities. Small population depends on private work and few are Govt. employees.

5.3 Relationship with Park

The dependency of the villagers on the biological resources of MHNP is almost negligible. Large scale collection of forest produce by the villagers is not reported. Almost all houses have LPG connection so collection of fuel wood from forest is also negligible. Villagers of Shoal Bay rear cattle for domestic and agricultural purposes but collection of fodder for these cattle has never been reported from Park or adjacent area. However, the villagers have over the years developed a tendency to leave their unproductive cattle and male cattles into the jungles which turn them feral.

5.4 The state of people's economy

People residing in the vicinity of park belong to lower to middle class strata of the society. The major population of Hope Town and North Bay are fishermen and are engaged in fishing activities throughout the year and earn handsomely. Few others who do not have regular employment, are engaged in private enterprises like shops and similar service sector for their livelihood. The villagers of Shoal Bay and Kalatang are mainly engaged in agriculture and animal husbandry.

5.5 Land use pattern

Most of the people in the villages in the vicinity of park, practice marginal agriculture as their land holdings are very small. Rearing of cattle, buffaloes and goats is common among the villagers of Shoal Bay.

5.6 Park management practices and their implications for people

As the direct dependency of the people on the park is negligible, hence the implication of park management on the people is minimal.

5.7 Developmental programme and conservation issue

There are many developmental works that were carried out within the park jurisdiction during previous management plan period. No negative impact on people is reported by the developmental works carried out by the park managers. Other Departments also have their developmental activities going on in these

villages and these developmental activities are mutually exclusive to each other. The reason is attributed to the fact that none of the settled population actually depend upon the bio-resources directly for their sustenance.

CHAPTER-6

PROPOSED MANAGEMENT

The primary objective of this management plan of Mount Harriet National Park is the conservation of the natural and cultural heritage and their ecological relationship. The dynamics of ecological processes shall have to be kept going in the same way as they have been going on since time immemorial, devoid of human negative influence. This can only be achieved through strict protection without any disturbance and sustainable uses of all natural and cultural resources to ensure overall economic growth.

6.1 Scope of the Plan

This management Plan deals with the notified National Park area. The Plan area remains the same as was in the previous management Plan for the period 2008-2018. The management plan is prepared based on present scenario and practices permitted in the protected area and aspiration of local communities. The identified scopes for the plan are as follows:

- a. Protecting and conserving the unique biodiversity of the park.
- b. Habitat improvement for the endangered fauna of the park.
- c. Restoration of critical habitat for protection of endangered species to maintain the biological diversity.
- d. Promoting scientific study for understanding the fragile and rich forest ecosystem of the park.
- e. Restoration of degraded area through scientific intervention.
- f. Education and awareness among masses in order to get peoples participation in protecting and preserving the rich biodiversity of the park.
- g. Development of programmes and action plans for management and performance evaluation of park.
- h. Fostering the economic development which is ecologically and culturally sustainable through eco-development programmes.
- i. Ensuring public involvement in management processes and contributes to the attainment of system goals and objectives.
- j. Guiding management decision-making and future planning.
- k. Promoting Eco-friendly and Sustainable Eco-tourism in consonance with the Eco-tourism Policy Guidelines issued from time to time.

6.2 Plan Period

The present Management Plan is for a period of 10 years from 2021 to 2031. To make the Plan dynamic and adaptive to the field requirements and changing scenarios, the outcomes shall be subjected to reviews after five years.

The overall objective of the present management plan is to develop appropriate strategies and action plans to ensure preservation of the unique biodiversity and maintain the ecological balance in this National Park, protect them effectively from natural as well as anthropogenic pressures, develop appropriate eco-development plans to seek participation of local people, create awareness among masses and promote eco-tourism, research, survey and monitoring.

6.3 Objectives of Management

- i. To maintain the ecological functions and maintain the essential ecological processes.
- ii. To protect, conserve the biodiversity of the park
- iii. To help in restoration of critical habitat for protection of endangered and economically important RET species
- iv. To promote interventions based on sound scientific findings in maintaining the ecological balance
- v. To generate mass awareness amongst the public regarding the ecological values of the Park
- vi. To foster economic development which is ecologically and culturally sustainable through planned eco-development programmes in villages adjoining the Protected Area.
- vii. To provide high quality learning experience to the visitors and to promote nature conservation through low impact and sustainable eco-tourism.

6.4 Strategies

As discussed in initial chapters, the importance and values of Mount Harriet National Park are manifold. To maintain the landscape for its vast ecosystem services and having far reaching socio-politico and economical implications, a holistic approach is asked for. In the Management Plan of the period 2008-2018,

the strategies were based upon the Wildlife Sanctuary and the National Park areas, and involved various measures to ensure that the conservation practices are put in place with the direct and indirect involvement of the local communities. Once a system is in place, it is required to further fine tune the existing practices to conserve this beautiful landscape. Moreover, as the economics and social fibre of the communities inhabiting the Zone of Influence is changing rapidly with the change in times, it becomes pre-requisite to strengthen protection measures. For the major critical habitat areas, intensive protection strategies in lines with the previous management plan are to be continued with. For the adjoining areas, mostly in the Zone of Influence but outside the protected boundaries, conservation efforts have to be strengthened, allowing only well-defined and scientifically backed sustainable utilization of the resources. Newer avenues may be opened for furthering the eco-development and eco-tourism activities, however with utmost protection measures.

6.5 Plans

It is suggested to continue with the Plans as specified in the previous Plan period, albeit with certain changes where the ends have either been met with or changing times require adaptations. However, to showcase the unique biodiversity of the Park to the visitors, an Eco-tourism Plan is prescribed in addition to the Plans specified in previous Plan period.

The following specific Plans are prescribed:

- A. Protection Plan
- B. Habitat Improvement Plan
- C. Climate Change Mitigation Plan
- D. Research & Monitoring Plan
- E. Eco-Development Plan
- F. Eco-tourism Plan

A. Protection Plan

Protecting park resources against the threat of poaching and illegal removal of natural resources as well as stopping potential encroachments into the park can be best tackled by strengthening the protection strategies like intensive patrolling by opening more patrolling paths, intelligence, capacity building & trainings of the staff, introduction of advancements in telecommunication and related technological interventions, transportation & mobility, etc.

B. Habitat Improvement Plan

Heavy rain is one of the important aspects that leads to loss of soils along the banks of nallah during rainy season as the runoff water moves at very high velocity due to steep terrain. There are numerous nallahs and due to erosion, gullies are formed. A check on the introduction of exotics in park, garbage cleaning along the sea shore to facilitate turtle breeding, safeguarding RET species with other steps for improvement of habitat for animals, flushing out stray and feral domestic animals, etc. are some strategies to be followed.

C. Climate Change Mitigation Plan

Climate Change is undeniable. It becomes of immense importance for Islands. Small island developing states (SIDS) have long been recognised worldwide for specifically being vulnerable to the impacts of changing climate. Scientific studies point to the fact that that island states are particularly at risk, and face unique challenges in addressing impacts. Sea level rise, tropical cyclones, and marine heatwaves, changing seasonal regimes make the islands extremely vulnerable. Climate change intensifies these hazards, leading to higher levels of risk as global average temperatures increase.

D. Research & Monitoring Plan

There is unlimited scope for carrying out research work in biologically rich and diverse tropical ecosystems in Andaman & Nicobar Islands. However, financial constraints and urgent management needs do not allow taking up

all kinds of research works. There is strong need to prioritize research activities in order to make the best possible use of the limited financial resources available and also to address management needs. As Department can handle very limited research work, therefore, there is a need to seek collaboration with various institutes and organizations. Baseline Status surveys of important and prominent groups of flora and fauna are urgently required to develop a long term monitoring programme alongwith the impact assessment of various conservation interventions. Socio-economic survey will also be an integral part of the research and monitoring plan.

E. Eco-Development Plan

The park manager alone cannot conserve and protect the biodiversity of Mount Harriet National Park. Infact, one of the prime tenets of conservation is public participation. Therefore, people participation helps in streamlining conservation efforts. Nature awareness, incentivizing positive public participation, usufruct sharing goes long way to win support for the park and nature conservation.

F. Eco-tourism Plan

The Park being situated nearby the capital city of Port Blair and being a repository of unique flora / fauna with tremendous natural beauty can be easily showcased to the visiting tourists to provide them with a unique learning experience. Strategies like development of nature trails, raising of eco-friendly structures for providing amenities to the visitors etc. can be adopted for the purpose. However, the provisions of the policies / guidelines issued by MoEF&CC / Local Administration and the Provisions of Forest (Conservation) Act, 1980 are to be strictly followed in this regard.

CHAPTER - 7

PROTECTION PLAN

7.1 Objectives

This plan is to ensure that utmost protection is lent to the flora, fauna, and the geomorphological features within the Mount Harriet National Park, so that the future generations are not left bereft of the marvels of this unique area. The broad objectives are:

- i. To accord complete protection to the endangered species of flora and fauna.
- ii. To safeguard the fragile geo-morphological aspect of MHNP
- iii. To safeguard against the unscrupulous elements indulging in illegalities within the notified areas of MHNP through collection and/or destruction of flora and fauna, poaching of wild animals and breach of any applicable legal provisions in force in MHNP.
- iv. To eliminate all the destructive factors those threaten to impact the ecosystems within MHNP and its components

7.2 Strategies

- a) Consolidation of boundary of Park shall be the most important aspects of protection plan. The northern, western and southern boundary of park shall be consolidated with RCC boundary pillars at appropriate distance. The undergrowth in the Park boundary and inspection paths shall be cleared as and when required. All boundary pillars are to be maintained and replaced wherever necessary. Pillars shall have continuous numbering with bearings engraved on them. A register of pillars shall be maintained at the Range Office, with copies at HQs.
- b) Regular awareness generation through extensive outreach programmes shall be carried out, specifically across the Zone of Influence, regarding the defined wildlife crimes in general and activities that are prohibited within the National Park in particular.

- c) Maintenance and further strengthening of the existent camps at New Madhuban and Mirchi Dera, with the deployment and operationalization of the central unit at Range HQs shall be done. Free dry ration shall continue to be provided to all camping staff in addition to their allowances. Provision of a Secret Fund, in line with that of the Police Department, at the disposal of the Wildlife Warden, shall ensure payback in case of receipt of vital information leading to substantial protection of natural wealth.
- d) Identification of convenient landing sites and making rotational and temporary/seasonal camping in such areas shall be done. The western and south western boundaries are extremely vulnerable in regards to illegal entries, poaching and related illegal activities. Areas like the Old Madhuban Camp, entry point at Shoal Bay 12, Wright Myo, Shoal Bay 19 shall be explored for setting up new camps with all related paraphernalia to increase the Departmental presence.
- e) Care shall be taken to avoid multiple entry points for visitors/tourists. Multiple entry points shall be set up only with an increase in staff strength. Visitors shall always be accompanied by a Range staff.
- f) Increase in staff strength is a pre-requisite. Moreso, as we intend to intensify patrolling, protection campings and establish new campsites for increasing the presence. Capacity building of staff in usage of arms and ammunition, detection of wildlife and forest crimes and prosecution procedures, preparation of offence documents, tackling assault on staff, framing final complaints, filling court cases, recording evidences etc. For this purpose help of Police Officers, Advocates and experienced Forest Officers shall be sought to train field staff especially the executive staff.
- g) Protection works require a lot of commitment and dedication on the part of the staff. Highly motivated staff can render exemplary services whereas disinterested staff, even well equipped, can prove ineffective. Hence it is very vital that the staff is motivated to keep the morale high. The following steps will be useful in this regard:
 - i. Providing monetary incentives to the field staff, as per the provisions of Wildlife (P) Act-1972.

- ii. Maintaining records of performance of each staff and suitably rewarding selected number of staff annually for the highest number of cases booked, material seized etc.
 - iii. Conducting annual training courses for the field staff.
 - iv. Providing alternate accommodation to the family of protection staff close to places where basic education and other facilities are available.
- h) Augmentation of infrastructure- Presently the infrastructure is in nascent stage and an effective protection of the National Park can be brought about by augmentation of existent infrastructure by bringing in state of art equipments and all weather sea-worthy vessels and field vehicles for fast and safe movement of men and materials. Presently only one motor bike and two engine dinghies are available with the Range which is insufficient. The camps linked with road shall be provided with a few more motor bikes; Madhuban and Mirchi Dera camps shall be provided with one Fibre Speed Boat each. One pick up van at the level of Range shall also be provided for transportation of men and material for developmental works and patrolling. Telecommunication requires to be strengthened. Internet facility at Range is pre-requisite with the changing times. All Camps shall have VHF inter-connectivity necessarily. Subject to extant guidelines / policy, use of Drone for effective monitoring and interception along the eastern coast of the National Park shall be encouraged. Similarly, to ensure safety of the frontline staff, arms and ammunition shall be of utmost importance while dealing with sea-bandits and poachers. Constructions and maintenance of checkposts at strategic locations, camps, fair-weather roads and all such related paraphernalia are to be added as and when necessary with due approval of CWLW. Use of unmanned tower mounted Remote camera Surveillance system may be installed, e.g., edge of Shoal Bay 19. Sea-worthy vessels shall be inducted into the Range so that the length of the eastern coastline can be put on surveillance and vigilance on a regular basis and with better efficiency. As the eastern coast is opens up to the rough Andaman sea, travel by country made boats/dinghies becomes tedious. One four wheeled field vehicle and additional motor bikes will be provided to the Range for better mobility of the staff.
- i) Foot patrolling requires to be intensified along the existent paths. New paths may be found out and seasonal maintenance is to be carried out for

effective patrolling. Feasibility of laying a patrolling path shall be explored along the entire stretch of Eastern coast for facilitating the camps. The path so laid could be utilized for evacuating the camp-staff in case of emergencies and in inclement weather. Presently, each camp maintains a daily duty/ patrolling schedule. The same is to be continued with. The executive staff shall submit their fortnightly diary to the Head office through their Range Officer. Regular weekly checks are to be carried out by the Range Officer to ensure effective protection measures within MHNP. The Deputy Conservator of Forests and Assistant Conservator of Forests, Wildlife will conduct surprise checks and will closely monitor patrolling duties of the staff. He shall submit detail patrolling report to the DCF, Wildlife-I. The duties shall be as follows:

- i. Protection Camp In-charge: Every Protection Camp In-charge must carry out patrolling in his area regularly and submit report pertaining to all the damages detected in his jurisdiction.
- ii. Range Officer: The primary responsibility of the Range Officer is to verify whether the Protection Camp In-charges are carrying out proper patrolling in their respective jurisdiction. He will inspect a specific portion of each and every camp once in a month and submit the findings to the Deputy Conservator of Forests (WL). In case, the quantum of illicit activities is more, the Range Officer will take appropriate measures to inspect the entire camp area thoroughly.
- iii. Supervisory Officer: The Supervisory Officer such as ACF/DCF, while on tour will inspect the specific areas of illicit activities.

The offence cases shall be reviewed regularly irrespective of the nature of offence, quantum of offence, whether the case is compoundable or required to be prosecuted in court of law etc.

- j) Inter-departmental and intra-departmental liaison shall be strengthened and joint patrolling and regular combing operations with adjoining Divisions like South Andaman, Havelock and Baratang divisions, Coast Guard, Fisheries, etc. shall be done. A Dog Squad has been established in the Division in the year 2017. The dog squad should be effectively put to good use to deter wildlife offence and to apprehend offenders. SOP for upkeep of the Dog Squad is at **Annexure- XXIII**.
- k) Generation of intelligence at local and regional level is of utmost importance and capacity building is required at the field level. Creation of informer network by way of incentivising them through secret fund on case to case basis.
- l) Wildlife/Forest crime dossier of each person apprehended/accused/convicted to be instituted and maintained in both hard and soft copy version to refer, make history sheet and for surveillance purposes. This should be in addition to Offence Register which otherwise contains offence reports, details of court cases attended month-wise to facilitate follow-up of all detected crimes within the given jurisdiction and monitoring based on season and area. Such data will also periodically be uploaded in the crime database of Wildlife Crime Control Bureau, GOI.
- m) Capacity building of staff is pre-requisite with the pressures surmounting in the ever-changing scenarios. Training on identification of birds, reptiles, butterflies and amphibians found in the park; biology and ecology of important species, identification of trees, climbers, shrubs, herbs and grasses found in the park is immensely important. They should also be made aware of monitoring methods and population estimation methods. Staff should be well-versed with identification of common scheduled species, anti-poaching approaches, documentation of offence cases, conflict resolution mechanisms for dealing with local people etc. Weapon training shall be imparted to deal with miscreants.
- n) Establishment of a Flying Squad at the Division level with one Deputy Ranger, one forester, two forest guards and two mazdoors should be made. They shall function as a mobile unit, with communication and transportation facilities and their prime objective shall be to gather

information and conduct covert operations. They shall hand over the cases accordingly to the Range concerned after apprehending the offender/ seizing the wildlife articles. They shall also assist the Ranges in documentation process.

Format for Register of Offenders

Name & address of the offender	Previous record viz. Offence No./Seizure/Action taken	Modus- operandi	Photograph
1	2	3	4

For effective protection, following steps are to be followed:

- i. Review of offence cases camp-wise quarterly. Review of the offence cases of unknown offenders monthly and efforts shall be made to find out the offenders in each such case.
- ii. The data related to offence cases shall be analyzed judiciously.
- iii. Monitor the occurrence of all the offence cases daily through wireless and other communication system.
- iv. Identify and document all the established paths and means for transportation of illegal wildlife articles.
- v. Place effective patrolling at all important routes to prevent offences.
- vi. Place well-manned checkgates at all known entry points.
- vii. Emphasis shall be made to arrest and prosecute the offenders rather than seizing the material only.
- viii. Plan in such a way to have young, sincere and energetic staff in protection duty especially in the sensitive area.
- ix. History sheets of all the offenders along with their photographs and bio-data are maintained.
- x. Prepare list of offenders, showing the offence cases involved in by them.
- xi. Joint patrolling with the mobile squad, South Andaman along the periphery of northern, western and southern boundary of the park.
- xii. Every Protection Camp-Incharge shall maintain a register of stumps of illegally felled trees showing relevant details. Every stump is

registered with a serial number followed by year. The Supervisory Officers, during Camp inspection, verify the registered stumps and unregistered stumps. The Camp In-charge shall be held responsible for non-registering the illicit stumps.

- xiii. The Range Officer shall maintain the copies of the judgment of all forest/wildlife cases for the guidance and improvement purposes.
- xiv. All crime related data including history sheets etc. be uploaded in National Wildlife Crime Database maintained by Wildlife Crime Control Bureau, GOI (WCCB).
- xv. For investigation of wildlife crime cases, the help of Police and other expert agencies like WCCB can also be taken whenever required and where the offence has interstate or international ramifications.

CHAPTER - 8

HABITAT MANAGEMENT PLAN

8.1 Objectives

The Park harbours a large number of endemic faunal species and these species flourish only when the habitat in which they breed, feed and grow is managed in a proper scientific manner. The core zone of the park is studded with rich and undisturbed forest and requires only protection and conservation measure with minimum intervention. As such, a habitat improvement plan with well defined objective is prescribed.

The broad objectives are:

- i) To ensure that ecosystems within MHNP and adjoining areas retain their ecological integrity and functioning.
- ii) To ensure viability, sustenance and continuance of a healthy mix of flora and fauna within the National Park and adjoining areas.
- iii) To accord complete protection to RET species of flora and fauna.
- iv) To protect and conserve the present; rehabilitate and improve the degraded areas by making scientifically informed and time-tested interventions and thereby, transmit to future generations the outstanding universal values of MHNP.

8.1.1 Strategies

- i. Eco-profiling of the existing of eco-systems vis-a-vis historical studies and documentations require to be done. Based on the eco-profiling, restocking of RET plants at appropriate site shall be taken up.

- ii. Restocking of Rare, Endangered & Threatened species at appropriate places shall be taken up in consultation with BSI and similar agencies/institutions abreast with requisite knowledge. Planting of native fruit trees for enriching feed reserve for avifauna and frugivorous mammals.
- iii. Removal of exotic species like *Eupatorium*, *Mikania*, *Cuscuta* etc periodically which is occupying open space at the fringe areas and along the patrolling paths in the park.
- iv. Awareness creation of the public vis-a-vis inter-departmental co-ordination shall be taken up to address the upcoming issue of feral cattle being left out in the forest fringe areas. The issue shall be addressed before it takes up disproportionate size. Total surveys in fringe villages, tagging of each cattle with radio-chips, levying heavy fee on the defaulting owner, and neutering of all feral male cattle shall be instituted.
- v. Specific habitat improvement plans for species like Darwin's frog and White toothed shrew (which are endemic and critically endangered and listed under IUCN which are found in the park), shall be carried out in consultation with ZSI and similar institutes/agencies of repute and expertise.
- vi. Re-introduction programmes based on the historical studies and present documentations shall be carried out, e.g., Andaman wild pig re-stocking, coastal and littoral patch regeneration, mangrove re-planting etc shall be taken up based on ground assessment.
- vii. Fresh water is available in the innumerable seasonal streams. Augmentation of existing fresh water sources with suitable Soil Water Moisture Conservation structures will benefit terrestrial re-introduction programmes not just for the large bodied animals, but also for birds, reptiles and amphibians. A catchment treatment plan shall be drawn up based on feasibility and applicability of suitable treatment measures. Training of nallah by putting gabion structures or paving stone or

masonry so that the nallah does not change its course. Numerous gullies that are formed, need to be plugged by constructing loose boulder and brushwood check dam so that the velocity of runoff water is arrested. The gully head shall be protected by growing of live hedges. Creation of cane brakes and bamboo brakes at gully head is found very effective in controlling advancement of gully. Stream bank erosion shall be control by stabilizing the sides of perennial and seasonal nallahs by planting trees like *Myristica andamanica*, *Myristica glabra*, *Pisonia excels*, *Pajanelia rheedii*, *Anthocephalus cadamba*. To check the sheet erosion along the slope, live check dams/live hedges by planting grasses like *Sacharum arundinaceum*, *Phragmites karka* and *Thysanolaena agrositis* along the contour shall be created to check the runoff and arrest eroded soil.

- viii. The beach area particularly Madhuban and Mirchi Dera is a prominent habitat of sea turtle and coastal birds. Sand stabilisation on the beach and cleaning of garbage above the high tide line shall be done regularly during the breeding season. Regular monitoring is required to done during nesting period in order to find out the trend of visit of turtles in the beaches for nesting. In situ conservation measure shall be taken without disturbing the nest by putting wooden stakes closely all around the nest to secure the nest from the prey like monitor lizards etc. Regular patrolling in beaches should be done during nesting period. Proper record of nesting shall be done of each nesting site.
- ix. Area behind the Mirchi Dera Protection Camp is open and is being taken over by fast growing secondary and tertiary vegetation- mostly brushwood and shrubs. These vegetations are not serving much for the targeted wildlife of the Park. Hence as a part of habitat improvement, it is prescribed to cover this open space by planting indigenous fruit bearing trees like *Artocarpus chaplasha*, *Mangifera andamanica*, *Diospyros pyrrocarpa* , *Ficus*, etc. for the birds, frugivorous mammals, etc.

- x. The nullah draining behind the Mirchi Dera camp has a tendency to overflow and inundate the campsite. Therefore, the flow of water requires to be arrested and slowed down by making check dams from a higher reach and gradually getting downstream. Bunds be made along the flow on both sides and be planted with indigenous tree species of short height, that are capable to withstand high water regime. Planting shall be completed by first monsoon showers.
- xi. Regular cleaning activity shall be taken up at the beaches and forest areas frequented by visitors, to keep the pristine nature of the Park intact.
- xii. Stray dogs and cats tend to accompany the patrolling party and once these reach the camp areas, there is no going back. These stray cats and dogs then become nuisance to the breeding birds, small mammals, turtles etc., defeating our purpose of keeping the target wild flora and fauna intact. Therefore, care shall be taken that no pets are allowed into the Park area/campsites and further to flush out these stray dogs and cats, if any. Regular neutering measures for the cats and dogs of the fringe areas shall be undertaken in collaboration with the Animal Husbandry and Rural Development departments.
- xiii. A detailed SOP shall be prepared and implemented by the Park Manager regarding do's and don't's by the staff residing in camps to prevent habitat degradation.

Other measures

Following measures shall also be adopted apart from above habitat management plan:

- a. Ban on keeping cattle in the wildlife/forest camps within the forest area by forest and wildlife staff, and Mazdoors.
- b. Stopping the practice of keeping dogs, cats and poultry inside park area by staff and Mazdoors.
- c. Feeding of food articles to the animals- wildlife as well as stray, shall be strictly prohibited in the camps/Park.
- d. Disposal of garbage generated by the camping staff shall be closely monitored. Necessary liaison shall be made with PBMC/village panchayats for safe disposal.
- e. Placing garbage bins at suitable places along the nature trails and impose fine on the people throwing garbage anywhere else other than in the bins.

- f. Giving wide publicity, through local media and brochures, of the harmful effects of the introduced species to the native flora and fauna, and the environmental damage caused by non-biodegradable materials.

CHAPTER - 9

CLIMATE CHANGE MITIGATION PLAN

The forests and woodlands play important roles in climate change mitigation through emissions reductions, carbon sequestration, and carbon substitution. As such with the hard push in policy for development and infrastructure build-up, it is pre-requisite to have undisturbed chunks of tropical forests to ameliorate the ills of rampant diversions. FAO in its guidelines of 2013 has stated that forests play a significant role in climate change mitigation by acting as carbon “sinks”, absorbing carbon from the atmosphere and storing it in biomass and soils, but, when cleared or degraded, they are also significant sources of greenhouse gas emissions. Forests, therefore, are important components in strategies for adapting to climate change.

9.1 Objectives

- i. To ensure the resilience of the forested habitat
- ii. To ensure that the amelioration capacity of the forests do not deteriorate
- iii. To minimize the impact of climate variability and reduce the cost associated with the adaptation and mitigation.

9.2 Strategies

- i. Monitoring of the changes in the weather pattern in the Park area. Being located away from the Port Blair city, taking the parameters of weather recorded in Port Blair to define changes in climatic regime of the park forest makes the exercise a non-specific one. Therefore, site-specific recordings should be done. A weather observatory shall be installed for *in situ* monitoring of the changes in temporal realm. This could be done by the Department or in collaboration with INCOIS.
- ii. Mapping of catchment and run-off areas for catchment treatment interventions. This will help in arresting erosion in the event of change in precipitation regime of the place.

- iii. Care shall be taken to strictly ensure planting of species as per their zonation. The species change in the zones shall be monitored on long term basis to assess the change in composition and efforts shall be taken to mitigate the same, by artificially aiding regeneration.
- iv. Vulnerability mapping of the Forests and the coasts shall be undertaken in collaboration with institutes like National Remote Sensing Centre, Geological Survey of India and NIOT. BHUVAN portal shows erosion data and degradation due to anthropogenic pressures like mining and dumping. Modeling of vulnerability of the terrain owing to its soil characteristics and in the event of removal of vegetation can prove to be an important tool in the hands of managers for making decisions. Mapping of Geo-hazards based on geo-environmental studies will become of great importance in years to come and hence vulnerability mapping shall be undertaken in collaboration with established institutions of repute.

CHAPTER - 10

RESEARCH & MONITORING PLAN

Research and monitoring are imperative to attain the objectives and to help ensure scientific management of resources. Research and monitoring is necessary to provide the knowledge which is important to make decisions concerning the protection of the biological diversity and natural ecosystem processes of MHNP and its resources, to encourage and provide support for research and monitoring that lead to better understanding of important ecological processes and understand ecological change. The specific purpose of monitoring is to establish the baseline information on natural resources and other components of the ecosystems and to measure changes over time. As monitoring studies gather data, they have the potential to detect significant changes and the source/cause of such in natural resources. Monitoring can also measure whether a system has been impacted over a length of time- positively or negatively, and if it is recovering from damage. In MHNP monitoring protocols are necessary to get information on the critical habitats across the different forest types. It is also necessary to know the trend of important species of flora and fauna. The results of research and monitoring shall be used to evaluate management actions and improve them accordingly in upcoming management plans.

10.1 Objectives

- a) Prioritising the areas within the National Park for management interventions.
- b) To assess the biodiversity and the change in their composition in spatial and temporal realms.
- c) To improve the understanding of the interaction of the components of the terrestrial and marine ecological processes.
- d) To establish an information and knowledge base for MHNP and for its ecologically sustainable multiple use
- e) Sharing and accessing data and information and coordinating the research efforts amongst various stakeholders at local, regional, national and international levels.

- f) To address the developmental and socio-economic issues vis-a-vis the conservation requirement based on robust scientific information and analyses.
- g) To conduct baseline survey of floral and faunal resources of the protected area.

10.2 Strategies

- a) Capacity building and orientation of staff in research tools and methods to identify and generate basic data through close monitoring over a period of time.
- b) Advanced monitoring equipments like camera traps, drones, Radio Frequency Identification tags, acoustic devices, GPS, etc shall be used for intensive monitoring of wildlife populations, including rescued and released fauna. Infrastructure likewise requires to be augmented further for easy movement of the staff without having to share the resources with the other Ranges.
- c) Prioritising the research and monitoring requirements based on local requirements shall be done. Regular census is to be done to monitor the important populations that indicate health of the ecosystem like that of birds, wildpigs, butterflies, amphibians, reptiles, etc. Impact assessment of various socio-economic interventions at the fringe areas on the ecological processes and their health should be of topmost priority.
- d) Collaboration with research and monitoring agencies of repute at regional, national and international levels carrying out studies in national parks, like Zoological Survey of India, Centre for Advanced Studies in Marine Biology, Annamalai University, National Institute of Oceanography, Central Inland Agriculture Research Institute, Wildlife Institute of India, Forest Survey of India, Geological Survey of India, National Remote Sensing Agency, Indian Council for Forestry Research and Education, Salim Ali Centre for Ornithology

and Nature conservation, Botanical Survey of India, Central and Regional universities, etc.

- e) Vulnerability mapping of the Forests and the coasts shall be undertaken in collaboration with institutes like National Remote Sensing Centre, Geological Survey of India and NIOT. Modeling of vulnerability of the terrain owing to its soil characteristics and in the event of removal of vegetation is necessary and an important tool in the hands of managers for making decisions. Mapping of Geo-hazards based on geo-environmental studies will become of great importance in years to come and hence vulnerability mapping shall be undertaken in collaboration with established institutions of repute.
- f) The agency interested in taking up research activities within MHNP shall submit a detailed proposal including the background, the objectives, the methodology, the study area, literature on past research on the field, the time schedule, the source of funding and the collaborators, if any. The proposal should be submitted to the Chief Wildlife Warden for prior review and approval.
- g) Establishing a library of recent advancements in ecological processes, impact assessments, etc. alongwith storage, retrieval and dissemination of existing and newly acquired scientific information on MHNP.
- h) Monitoring for establishing baseline information should be got done and then periodically monitored for assessing the changes thereby,

viz., seasonal physiochemical and biological properties of the water in creeks, creek-mouth, soil surveys, eco-profiling of the topography, catchment areas and their profiles, trend in composition change of flora across different forest types, terrestrial animals, birds, etc. Seasonality is to be accounted for e.g. migratory birds are to be monitored intensively along the eastern coast during November till April.

- i) Monitoring the adaptive responses and the natural recovery and / or restoration of injured or degraded ecosystems, including the coastal region and information on the location of potentially harmful activities, generating baseline survey data for assessing catastrophic damage from natural or man-made events such as storms, diseases, vessel groundings, and toxic spills and which serves as an early warning system for identifying declines in the ecosystem.
- j) Assessment of various strategies mentioned under Habitat Management Plan to assess the efficacy of the measures taken, to fine-tune the management in near future.
- k) Designing of species based recovery programmes based on the assessment of the life histories and population dynamics, while monitoring and evaluating trends in their population parameters. E.g., amphibians, reptiles, birds, insects, etc.
- l) The research programme should have minimal impact on the physical environment and aesthetics of the area. While conducting research, monitoring or surveys, utmost care is to be taken to not violate any provision of the Wildlife (Protection) Act, 1972. No specimen shall be collected from the national park area, without the explicit permission obtained from the Competent Authority. It is also to be ensured that the research activities do not interfere with those of other users in the park or pose as potential danger to other living organisms.

CHAPTER - 11

ECO-DEVELOPMENT PLAN

No environmental conservation or management strategy is sound unless the needs, aspirations and livelihoods of people who depend on the ecosystem resources are recognised and fully integrated. The effective management of ecosystem requires consideration not only of the biological and ecological parameters of the system but also the social and economic factors that condition their utilization by human societies.

Involvement of local communities in the management of the MHNP through participatory approach is an important management intervention. Since MHNP has tremendous tourism potential, involvement of local people in this activity can lead to employment generation particularly for local youth. Eco-development programme should try to address issues in the interest of the park, surrounding villages and the visitors to the Park.

Since the notification of the park, the local support for the park has not been significant. This may be because of low appreciation of the ecological importance of the Park by the local people and the fact that they are not significantly dependent on the resources of the Park for their livelihood needs. The main challenge before the park manager is to put in place a system of providing some supplemental livelihood opportunity for the local community and link these benefits to the protection/management of the park. Simultaneously the other issue will be to provide a good visitor experience. To develop and nurture such arrangement, the process of eco-development will have to be spread over a reasonable time frame in which various concurrent actions may be required.

11.1 Objectives

- i. To build collaboration with the nearby village communities so as to garner their long term support for the Park, by generating supplemental livelihood opportunities through conservation and in protection related activities of the park.

- ii. To collaborate with various stakeholders in the management of park
- iii. To develop the park as model for community participation and nature education.

11.2 Strategies

- i. Awareness and Extension- The level of awareness about importance of the park among the stakeholders will be the foundation of eco-development plan. It is prescribed to initiate a system of conservation awareness programme for different target groups. The prominent stakeholders which need to be covered will be the local communities, school children, line agencies, PRI etc. Printing of publicity materials like brochures, booklets, posters etc., organizing nature camps for school children, college students, PRIs, organizing seminars and workshops involving Scientific Institutions, Educational Institutions, NGOs etc., organizing various competitions, quiz and other events related to conservation of wildlife, organizing film shows on wildlife conservation in schools, colleges, village panchayats etc shall be done annually.
- ii. Documentation of flora and fauna- The flora and fauna of the parks will be documented by involving scientific institution like BSI, central/state universities, etc. In the process of documentation local people will be involved. This will help in documenting their Indigenous Technical Knowledge (ITK) and the ethno botanical aspect of the Biological resources.
- iii. Nature-Interpretation- Interpretation is an educational activity which aims to reveal meaning and relationships through the use of original objects, by giving a first-hand experience and by illustrative media, rather than by plain communication of factual information. Interpretation generates awareness and awareness leads to understanding, which in turn leads to appreciation. In essence, interpretation is vital to elicit support for any conservation programme. MHNP has a very high scope of developing the Nature Interpretation avenue. Display boards, pamphlets/booklets, interpretation centre showcasing the overall components of the Park, including its history, endemism, biogeography and biodiversity values at local, regional and international levels will garner interest amongst the visitors, and in turn strengthen the resolve of conservation of the National

Park area. An Interpretation Centre showcasing the important components of MHNP and its ecological significance is proposed to be developed for this purpose.

CHAPTER - 12

ECO-TOURISM PLAN

The eco-tourism has been defined as responsible travel to natural areas that conserves the environment and sustains the wellbeing of local people. The Ministry of Environment, Forest & Climate Change in the year 2019 circulated a draft policy for eco-tourism in forest and wildlife areas. In the draft policy, it has been inter-alia provided that eco-tourism facilitation within the forest and wildlife areas will be a part of the management plan/working plan of the unit. It has also been provided in the draft policy that sensitive sites like wildlife breeding areas, tribal areas of Particularly Vulnerable Tribal Groups (PVTG) etc. should be excluded from the eco-tourism activities to maintain the sanctity of the forest rights of such tribal people and for maintenance of ecological integrity. The draft policy also stipulates that eco-tourism activities will be eco-friendly in nature and no permanent structure will be established in violation of the Forest (Conservation) Act, 1980 and Forest Rights Act, 2006 and that construction works like permanent buildings for camps, camping complexes with lodging/boarding structures, helipads, new roads, tourist bungalows/commercial lodges etc. for eco-tourism purpose shall not be allowed without clearance under Forest (Conservation) Act, 1980.

The Andaman & Nicobar Administration has also approved a eco-tourism policy guidelines for Andaman & Nicobar Islands in the year 2015. The policy guideline prescribes that for the purpose of eco-tourism in these Islands activities like bird watching, turtle watching, trekking, nature trails, cruising in the creeks/water ways, surfing, snorkelling and more importantly mere watching of scenic beauty of Islands, water bodies etc. shall be promoted. One of the key principles enunciated in the policy is to adopt low impact tourism that protects ecological integrity of the wilderness areas and secures conservation values of the destination and its surrounding areas. The policy also stipulates inter-alia, making appropriate prescription to incorporate low impact eco-tourism in the working plans for the forest areas and in the wildlife management plans of the National Parks and Sanctuaries. The policy also prescribes that only eco-friendly materials and locally available ones will be used for development of eco-tourism infrastructure and such infrastructure will be kept at bare minimum. The policy specifically prohibits construction of concrete infrastructure and buildings for eco-tourism purpose.

On the orders of Supreme Court of India, the Ministry of Environment & Forest appointed Shri Shekhar Singh of Indian Institute of Public Administration, New Delhi as

Commissioner to give a report on the state of forest and other allied matters in the Andaman & Nicobar Islands. The commission submitted the report on January, 2002 in which several recommendations were made. The recommendation No. 40 of the said report state as follows:

“No concrete or permanent infrastructure for tourism should be built on any forest area in the Islands. Tourist activities in forest areas should be restricted to tented accommodation or temporary wooden/prefabricated structures that can be dismantled easily and moved to another site. These areas should remain under the control of the forest department who should be responsible for ensuring that the quantum and type of tourism is such that it does not in any way degrade the forests or other ecosystems.”

The Andaman & Nicobar Administration has accepted the above recommendation.

The Mt. Harriet National Park is quite popular among the tourists coming to Andaman mainly because of its unique biodiversity and location near the capital city of Port Blair. From the data available with the department, it is seen that during the period from 2008 to 2018 there has been a steady increase in the number of tourists visiting the National Park. Compared to 18148 adults visiting the National Park in 2008, 45930 adults visited the Park in 2018. Thereafter, there has been a slight decline in the number of tourists visiting the Park during 2019 and 2020 which may be due to the COVID pandemic prevalent during that period (refer table No. 4.1). Due to the presence of unique flora and fauna, most of which are endemic in nature, untouched tropical evergreen forests and picturesque location of the Park and easy accessibility from the Port Blair town, the Mt. Harriet National Park has immense potential to be developed as an ideal eco-tourism location. Due to the relative inaccessibility of the major portion of the Park to the visiting tourist and the peculiar topography of the Park having steep gradient, the full potential of the Park as an eco-tourism destination cannot be realised at present.

12.1 Objectives

- (a) To exploit the eco-tourism potential of the Mt. Harriet National Park, without denigrating the natural resources and without comprising with the resource integrity of the National Park.
- (b) To maximise economic opportunity to the communities living nearby the Park through encouraging their participation in the eco-tourism activities inside the Park.

- (c) To showcase the natural beauty of the National Park and its unique flora and fauna for educational and recreational purpose and to propagate the message of Nature Conservation among the visiting tourists.
- (d) To promote low impact and high spending tourism activities inside the Park.
- (e) To permit only such activities for the purpose of eco-tourism which have least impact on the natural resources of the Park.
- (f) To showcase the historical sites within the National Park like the summer residence of the then British Commissioner, Artillery Cannon Point, Old Well etc.
- (g) To promote activities like bird watching, trekking, nature trails, forest bathing and other such activities as part of eco-tourism.

12.2 Strategies

- (a) The eco-tourism activities inside the Park will be conducted strictly in accordance with the recommendation of Professor Shekhar Singh, Commission Report accepted by the Hon'ble Supreme Court of India, the guidelines issued by the Ministry of Environment, Forests & Climate Change in this regard and the provisions of eco-tourism policy guidelines notified by the Andaman & Nicobar Administration. Only eco-friendly materials will be used for creation of tourism infrastructure and the same will be kept at bare minimum. Construction of permanent buildings, camping complexes, helipads, new roads, tourist bungalows, commercial lodges and other such permanent structures shall not be allowed inside the National Park area for eco-tourism purposes without obtaining prior statutory clearances as applicable.
- (b) To provide economic opportunities to the communities living nearby the National Park, it is proposed to train unemployed youths of the nearby villages and to utilize their services as nature interpreters, bird watching guides, Park guides and in other ancillary activities.
- (c) The existing inspection paths like Mt. Harriet to Mt. Carpenter to North Bay, Kalatang to Mt. Goodridge to Mt. Harriet, Shoal Bay to Mirchi Dera and Panighat / Mannarghat to Mt. Harriet can be utilized for trekking by the visiting tourists. For this purpose, these inspection paths will be further maintained and developed to be used as a nature trail.
- (d) It is also proposed to develop additional nature trails for the visitors to enhance their experience. In this regard, it is proposed to examine and if feasible, develop a nature trail of appropriate width connecting all the five mountain peaks

in the National Park through the Ridgetop. Log huts and viewpoints can be developed along this nature trail for providing amenities to the visiting tourists. It is also proposed to develop a nature trail between Mt. Harriet and Madhuban.

(e) To encourage nature tourism in a responsible and sustainable manner, it is also proposed to develop a nature trail / cycle track between North Bay Light House to Shoal Bay – 19. Tourist amenities like eco-friendly viewpoints, campsites, etc. will be provided at appropriate places along the nature trail / cycle track for enhanced visitors experience.

(f) Appropriate signages showing the important natural features, details of interesting species of flora / fauna and other relevant information like distances, location of tourist facilities like toilets, water points, etc. shall be displayed along all the patrolling paths / nature trails / cycle tracks for the benefit of the tourists.

(g) The visitors shall be ordinarily allowed to visit the Park between sunrise and sunset only. Detailed standard operating procedure for the tourists and the staff / volunteers managing the eco-tourism activities shall be prepared specifying the do's and don't's for all stakeholders.

(h) An Interpretation Centre will be developed at an appropriate location which will showcase the history, management, unique flora and fauna, special attributes and all other related information for the benefit of the tourists.

(i) The historical sites within the National Park like the ruins of the summer residence of the Commissioner, Military Barracks, Cannon Points, etc. will be developed along with attractive and multi-lingual information boards for the visiting tourists.

CHAPTER - 13

ORGANISATION AND ADMINISTRATION

13.1 Organizational Structure

The Chief Wildlife Warden, Andaman and Nicobar Islands heads the wildlife-wing in the Forest Department. The Principal Chief Conservator of Forests, Wildlife (PCCF,WL) is also designated as CWLW. He is administratively assisted by an Additional PCCF (Wildlife), APCCF (Biosphere Reserve, Biodiversity & Eco-tourism), Conservator of Forests, Wildlife (CF, WL) and Assistant Conservator of Forests, Wildlife (ACF, WL). There are four Divisions under this wing, namely Wildlife Division, with headquarters at Port Blair, Wildlife Division-Mayabundar, with headquarters at Mayabunder, Nicobar Forest Division with headquarters at Campbell Bay and Havelock Division with headquarters at Swaraj Dweep. The Deputy Director, Biological Park, Chidiyatapu also functions under the administrative control of PCCF(WL). All the Divisional Heads of the wildlife and territorial divisions are ex-officio Wildlife Wardens vide Notification No.96/73/F.G/329-Vol.XIII dated 19th July, 1973.The Range Officer working in territorial and Wildlife Division are ex-officio Assistant Wildlife Wardens vide the Notification No. 47/87/No. CF/WL/11 dated 5th June, 1985.

Mount Harriet National Park is one of the protected areas in Wildlife Division, Port Blair and overall control of the park rests with DCF-Wildlife. The Deputy Conservator of Forests is assisted by two Assistant Conservator of Forests- one who looks into the administration part and office workings and the other looking into the implementation of the WLPA, 1972 and functioning of all the Ranges. The Deputy Conservator of Forests is responsible for achieving the management objectives by judicious use of resources, both men and material under his/her disposal. The staff strength of the Division is given at **Appendix- XXII**.

13.2 Existing Administrative set up

Presently the entire activities of MHNP are managed by one Range Officer in charge of Mount Harriet National Park with the headquarters at the park entrance. Besides the Park establishment at the Range Office, there are three other wildlife

camps one each at Shoal Bay, Madhuban and Mirchi Dera. The present strength of staff in MHNP Range is given below:

Table No. 12.1 Staff strength of Mount Harriet National Park

S.No.	Designation	Number
1	Forest Ranger	01
2	Forester	03
3	Forest Guard	03
4	Oiler	01
5	Regular Mazdoor	18

The staff and mazdoors are largely concentrated at the Range office itself, except one forester posted at Shoal-Bay Camp and one Executive staff (Forester/Head Forest Guard/Forest Guard) with two/three mazdoors deputed to Madhuban and Mirchi Dera on rotational duty.

13.3 Buildings and Machineries

A residential complex has been constructed for the staff posted at Mount Harriet National Park as Range Office annexe. The details of major assets available as on date are as under:

Table No. 12.2 AVAILIBILITY OF BUILDINGS AND MACHINERIES

S.No.	Building/machineries	Available	Condition
1	Range Office building	01	Good
2	Protection camp building, Madhuban	01	Good
3	Protection camp building, Mirchdera	01	Good
4	Protection camp building, Shoal bay	01	Dilapidated
5	Type – II Quarter	02	Good
6	3 family Labour Barrack	02	Good
7	Type III Quarter (Ranger)	01	Dilapidated
8	Motor cycle	01	Good
9	Dug out Dinghy	02	Good
10	Other unclassified buildings/huts	02	Good

13.4 Proposed Organizational Structure

Implementation of the present Management Plan requires strengthening of the Mount Harriet National Park Range in terms of its human resource capacity as well as infrastructure. With the undertaking of various eco-tourism activities and wildlife education activities, research and monitoring works etc., apart from the usual manning the camps and office and rendering protection duties for safeguarding the biodiversity and ensuring conservation of the National Park resources, additional manpower is pre-requisite.

Since the Park has interface with South Andaman Division, proper coordination of efforts by South Andaman Division and Wildlife Division will be of prime importance.

The Range Forest Officer, MHNP is accountable for the protection, upkeep and maintenance of all resources entrusted to the Range, namely boats, buildings, VHF network, equipments, jetty at Panighat, mooring buoys, patrolling camps and boundary pillars, etc. He is also responsible for organizing wild animal census in MHNP, ensuring entry fees are collected, fines are imposed and over decorum and discipline is maintained to meet the ends of conservation of MHNP. Apart from MHNP, the Range staff is also deputed on as and when basis to cover the outlying islands like Kyd, Pittman, Duncan and Potanma in the north end of the Park.

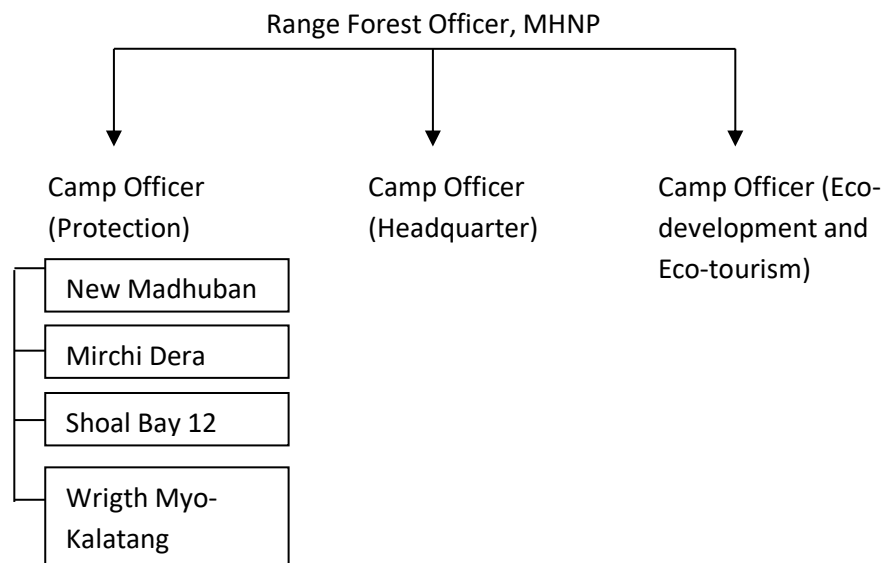
The present deployment and requirement of staff is tabulated below:

Table No. 12.3 TABLE SHOWING PRESENT STAFF DEPLOYMENT AND REQUIREMENT

S.No.	Location	Present deployment	Additional requirement
1	Mount Harriet Park (Range Officer, MHNP)	01 Forest Ranger, 01 FG	02 Safai Karamchari, 02 Watchmen, 01 Heavy Motor Vehicle Driver
2	Head Quarter Camp	01 Forester, 02 FG 01 oiler and 12	01 Dy. Ranger,

		Mazdoors	
3	Eco-tourism Camp	-	01 Dy. FR, 01 Forester, 08 Mazdoors
4	Protection Camp	-	01 Dy. Ranger, 01 Forester, 02 FG and 04 Mazdoors
a.	Madhuban Camp	01 Forester, 03 Mazdoors (rotational duty)	01 Mazdoor and 01 Motor Boat operator
b.	MirchiDera	01 Forester, 03 Mazdoors (rotational duty)	01 Mazdoor and 01 Motor Boat Operator
7	Shoal Bay	01 Forester	01 Forester, 03 Mazdoors
8	Wrightmyo/Kalatang Camp	-	01 Forester, 01 FG, 03 Mazdoors

Given the expanse of the area to be covered and the varied amount of works and responsibilities entrusted to the Range, it is pre-requisite to re-align the workings. Hence in order to streamline the different activities of Range, following administrative structure is proposed:



13.5 Infrastructure Development

Insufficient infrastructure is one of the major constraints in the proper management of the Protected Areas in A & N Islands. Insufficient number of vehicles, boats and communication facilities are major bottlenecks in providing efficient protection to

PAs. It is suggested to improve the existing infrastructure in MHNP through following measures:

- a. Strengthening of mobility of protection team- procurement of one four wheeled vehicle, five motor bikes, one RIB and two fibre speed boats for improving protection. The executive staff shall be trained in handling of the vehicles and watercrafts so as to meet exigent and emergent situations.
- b. Strengthening of telecommunication, e.g., procurement of sufficient quantity of mobile and handheld VHF sets, satellite phones.
- c. Providing internet facilities at Range level, arms and ammunition, binoculars including night vision binoculars and other necessary equipments like GPS.
- d. Construction of Protection Camps at Kalatang/Wrightmyo/Shoal Bay 12/Shoal Bay 19 and 01 Store-cum-Malkhana at Range Office premises.
- e. Construction of camp houses, quarters, labour barracks, sit-outs along inspection paths, nature trails, eco-friendly tourist amenities, watch towers etc. as per field requirement.

13.6 Staff Amenities

The remote protection camps at Madhuban and Mirchi Dera are provided with semi-permanent building with facilities of kitchen, toilets, perennial sweet water well etc. The camps are also provided with solar powered energy and modern VHF instrument for communication with Range Office and Control Room. The persons proceeding for camping duties are provided with dry ration.

To improve the living condition of the staff posted at remote camps, LPG shall be provided for cooking. Further, good and rodent-proof storage units should also be provided. For patrolling along the coast line, as well for reaching strategic locations for patrolling from the eastern edge, a mechanised boat should be placed with each camp 24X7. This could be useful in case of immediate evacuation as well, when necessary. Medical kit is provided at each camp, which should be checked for expiry and replaced in time. Necessary first aid administration shall be taught to the staff so as to attend to emergencies using the medical kit.

CHAPTER 14

FINANCIAL OUTLAY

The estimated cost for the plan for the period from 2021 to 2031 is worked out to Rs.2818.60 Lakh. The estimated cost on each item of work under various plan components namely Protection, Habitat Improvement, Climate Change Mitigation, Eco-development, Research and Monitoring Plans, including Organizational and Administration requirements is shown in **table 13.1** for the period from 2021 to 2031.

The Protection Plan includes activities such as protection camp maintenance, protection activities, procurement of boats and vehicles, procurement of arms and ammunition, construction of watch tower and maintenance of vehicles and watercraft, construction of office, protection camps, training of staff, maintenance of office, maintenance of motor vehicles, amenities to protection camp etc., including upkeep and maintenance of the administrative set up will require Rs. 2163.60 Lakh.

The Habitat Improvement Plan includes activities such as plantation of fruit trees in open area, construction of check dams, stabilization of side of nallah, cleaning and garbage removal, census, training of staff and procurement of equipments will require Rs. 136.0 Lakh.

The Climate Change Mitigation Plan included establishment of weather stations at camps, collaborative studies to be taken up with NRSC, GSI, etc. and for that an amount of Rs. 80.0 lakh is projected.

The Eco-Development Plan includes activities like training of locals as guide, capacity building of staff, organizing awareness workshops and nature camps will require Rs. 330.00 Lakh.

The Research and Monitoring Plan includes activities like terrestrial floral and faunal surveys and census, appointment of research associate, funding small project, training of staff etc. and will require Rs. 109.00 Lakh.

The Eco-tourism Plan includes activities like development of nature trails, suitable signages at strategic points, construction of eco-friendly tourist amenities like toilets, eco-huts, log-huts, log bench, etc.

The fund required for execution of various activities under the aforesaid Plans will be obtained through budgetary support under UT Plan and also for CAMPA funds.