

Amphibians and Reptiles in Andaman and Nicobar Islands : Diversity and Distribution

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Introduction

Andaman and Nicobar Islands located in the Bay of Bengal are endowed with enriched faunal communities situated between 6°- 14°N latitudes and 91°- 94° E longitudes. This archipelago comprised of 572 islands and it is one of the three biodiversity hotspots in India. The archipelago of Nicobar separated from Andaman group of Islands by 140 km wide 10° channel and from Sumatra by Great channel. Habitats of these islands represented by tropical rain forests, mangroves, bays, estuaries and freshwater. Andaman and Nicobar Islands and its distinct geographical zone are home to endemic, certain large species of reptiles and amphibians.

Herpetofaunal studies of these islands started as early in Nineteenth century by Czech naturalists Stoliczka (1838-1874) (Das, 1999). Stoliczka (1873) reported 13 species of lizards, 10 species of snakes and three species of frogs. Edward Blyth (1810-1873) wrote the first account of herpetofaunal community of these islands based on his collection made during the period (1841 - 63) (Das *et al.*, 1998). Anderson (1833-1900), Scalater (1863-1944), Annandale (1876-1924), findings of Hora (1895-1955) are the major contributors of herpetology during nineteenth century (Harikrishnan *et al.*, 2010). Review of few snakes and new species description made by Sclater (1891) based on the materials in Indian museum collection at Kolkata. During 1960's the amphibians were studied serially by Biswas and Sanyal (1965), Tiwari and Biswas (1973), Manushkani and Sarkar (1980) through Zoological survey of India. In spite of several studies on ecology, population, distribution on various faunal groups in Andaman and Nicobar Islands the herpetofauna is still least studied taxa in this archipelago. This paper presents the diversity, distribution, abundance of **amphibians and reptiles** based on the recent surveys conducted by Zoological survey of India, Port Blair.

Material and methods

Random surveys were conducted in Andaman group of islands and Great Nicobar Island to document the amphibian and reptile species at 41 localities during January 2012 to November 2013 (Table 1). The surveys were intensified on grasslands, marshy vegetation, streams, and perennial rivers for amphibians during night hours while trees and marshy area surveyed for arboreal species. The collected specimens were fixed in formalin and stored in 70% ethanol and brought to laboratory. Voucher specimens were deposited at National Zoological Collections of Zoological Survey of India, Port Blair. The species diversity and abundance were calculated by using **Shannon-Weaver diversity index** (Shannon, 1948). The statistical analysis of data was made with **Simpson's diversity index** (Simpson, 1949), **Pielou's Evenness Index** (Pielou, 1966) and **Jaccard similarity index** (Jaccard, 1912).

Result

During the present study period a total of **9 species of amphibians** belong to 7 genera, 4 families and **32 species of reptiles** belong to 25 genera, 12 families were recorded (Table 2). Among the species reported, **1 species of amphibians and 10 species of reptiles are endemic to Andaman and Nicobar Islands**. The reptilian family Colubridae represented with more number of species (9). The endemic species *Xenochrophis tytleri* was recorded from north, middle and south Andaman group of islands. Total of 10 species of amphibians reported from Great Nicobar so far. Few species such as *Hylarana erythraea*, *Duttaphrynus melanostictus* and *Hylarana nicobariensis* were highly abundant than *Microhyla heymonsi*, *Polypedates insularis* and *Limnonectes shompenorum* in Great Nicobar Island. The **maximum species richness** (amphibians 7, reptiles 15) and abundance (amphibians 218, reptiles 236) were

Table 1 : Coordinates of Study area in Andaman and Nicobar Islands

Area surveyed	GPS Co-ordinates		Area surveyed	GPS Co-ordinates	
Little Andaman Island	10° 44'595 N	92° 34' 310"E	Ross Island	13° 24' 539 N	92° 53' 348 E
Port Blair	11° 37' 01.4"N	92° 43' 59"E	Land Fall Island	13° 37'840 N	93° 01'429 E
North Bay	11° 42'25.88"N	92° 45'01.86"E	Kalighat	13° 6' 48 N	92° 59' 470 E
Rutland Island	11° 29'13.97"N	92° 40'07.61"E	Peacock Island	13° 33'807 N	93° 03'137 E
Mount Harriet	11° 42'58.13"N	99° 44' 37.9"E	Kishore Nagar	13 ° 25' 905 N	93 ° 6' 28 E
Pongibalu	11° 30'956 N	92° 39' 206 E	Radha Nagar	13 ° 24' 539 N	92 ° 53' 348 E
Ritchie's Archipelago			Kalpong	13 ° 38' 128 N	93 ° 2' 623 E
Neil Island	11°50' 08.63" N	93° 02'41.21" E	Shibpur	13 ° 14' 439 N	92 ° 2' 971 E
Havelock Island	11° 59' 03.3" N	93° 00'20.37" E	Great Nicobar		
Inglis Island	12° 08'07.50" N	93° 07'04.97"E	East West Road	6° 57' 945 N	93° 55' 229" E
Outram Island	12° 13'31.91" N	93° 05'00.29" E	Shastri Nagar	6° 47' 783 N	93° 53' 297 E
John Lawrence	12° 04'09.90" N	93° 03'03.64" E	Shompen Hut	6° 57' 997 N	93° 49' 545 E
South button Island	12° 16'28.54" N	93° 01'34.68" E	Gandhi Nagar	6° 50' 215 N	93° 53' 381 E
Middle Andaman			Afra Bay	7° 11' 111 N	93° 44' 305 E
Mayabunder	12° 57' 416 N	92° '50' 58" E	Galathea Bay	6° 49' 237 N	93° 51' 881 E
Tugapur	12° 50' 678 N	92° 51' 358 E	Laxmi Nagar	6 ° 53' 375 N	93 ° 53' 178 E
Mohanpur	12° 57'416 N	92° 50' 058 E	Johinder Nagar	6 ° 57' 945 N	93 ° 55' 229 E
Rangat	12° 30'23.12" N	92° 54' 50" E	Magar Nallah	6 ° 59' 505 N	93 ° 54' 818 E
Karmatang	12 ° 51'242 N	92 ° 56' 42 E	Govind Nagar	6 ° 59' 945 N	93 ° 54' 112 E
Danapur	12 ° 54'620 N	92 ° 54' 291 E	Rajiv Nagar	7 ° 0' 925 N	93 ° 55' 916 E
North Andaman			Kondul island	7 ° 11' 286 N	93 ° 42' 145 E
Diglipur	13° 15' 219 N	93° 2' 489" E	lawful Greek	7 ° 10' 36 N	93 ° 52' 245 E

recorded from Great Nicobar Island. The Shannon diversity index (H') ranged from highest species diversity in Great Nicobar Island (amphibians 1.415, reptiles 1.937) and lowest species diversity of amphibians (0.4926) in South Andaman and reptiles (1.352) in Ritchie's Archipelago. The 'D' value Simpson index of species richness showed maximum in Great Nicobar (amphibians 0.7132, reptiles 0.783) and lowest species richness of amphibians (0.3133) in South Andaman and reptiles (0.5516) in Ritchie's Archipelago. Similarity between localities given in separate table (Tables 3 and 4) Pielou's evenness indices of amphibians (0.9969) are high in North Andaman and reptiles (0.5454) in Middle Andaman.

Discussion & conclusion

Andaman and Nicobar Islands have dense vegetation, freshwater swamps, and perennial rivers which plays a vital role in amphibian and reptilian population. During this survey only three common species of Amphibian were recorded from Andaman Islands, of which the occurrence of *Hoplobatrachus tigerinus* found in Neil and Havelock Islands (Figure 1). The observation of this species is a new report to Neil and Havelock islands in Andaman Islands as its occurrence was not listed in earlier literature. *Poly-pedates insularis* a tree frog described by Das (1995) observed in marshy vegetation and on trees from 5

S.No	Species	South Andaman				Ritchie's Archipelago				Middle Andaman				North Andaman								Great Nicobar Island																		
		Little Andaman	Port Blair	North Bay	Rutland Island	Mount Harriet	Pongblau	Neil	Havelock	Ingilis	Otrium	John Lawrence	South butron	Mayabunder	Tugapur	Mohanpur	Ranghat	Karmatang	Danapur	Diglipur	Ross Island	Smith Island	Land Fall Island	Kalighat	Pacock Island	Kishore nagar	Kalpang	Shibpur	East West Road	Shastri Nagar	Gandhi Nagar	Afra Bay	Calahtha Bay	Laxmi Nagar	Johinder Nagar	Magar Nallah	Covind Nagar	Rajiv Nagar	Kondul Island	lawful Creek
1	Amphibians <i>Dactylophrys indanostictus</i> (Schneider, 1999)	7	12	3	3	4	7	13						9		11			16				3	2	5	3	17	3	2	6	7	2	5	8	16	3	10	5		
2	<i>Fekuraya caneriona</i> Gravenhorst, 1829																										3						1		2					
3	<i>Fekuraya limocharis</i> (Gravenhorst, 1829)			7				11					8						7		25	2																		
4	<i>Mesobyla leymosi</i> Vogt, 1911																													1			2							
5	<i>Hoplobatrachus tigerinus</i> (Daudin,1802)						27	9																																
6	<i>Limnonectes shompenorum</i> Das, 1998																											2												
7	<i>Hylarana nica bartensis</i> (Stoliczka, 1870)																										13	10	7	3					12					
8	<i>Hylarana erythraea</i> (Schlegel, 1837)																										36						11	15	4					
9	* <i>Polydactylus insularis</i> Das, 1995																										5	2	1	2					2					
Total No of species		2				3				2				2				63								7														
Total No of individuals		36				67				28				63								218																		
Diversity Indices																																								
Indices		South Andaman				Ritchie's Archipelago				Middle Andaman				North Andaman								Great Nicobar																		
Shannon-Weaner Diversity Index		0.4926				0.9913				0.5983				0.69								1.415																		
Simpso n's Diversity Index		0.3133				0.5952				0.4082				0.4969								0.7132																		
Pielou's Evenness Index		0.8183				0.8982				0.9095				0.9969								0.5883																		

Table 3 : Similarity index of amphibians of Andaman and Nicobar Island

	South Andaman	Ritchie's Archipelago	Middle Andaman	North Andaman	Great Nicobar
South Andaman		0.8	1	1	0.22
Ritchie's Archipelago			0.8	0.8	0.2
Middle Andaman				1	0.22
North Andaman					0.22
Great Nicobar					



Figure 1 : *Hoplobatrachus tigerinus* Adult with Sub Adult



Duttaphrynus melanostictus Schneider, 1799



Calotes versicolor (Daudin, 1802)



Xenochrophis tytleri (Blyth 1863)



Fejervarya cancrivora (Gravenhorst, 1829)



Bronchocela danieli (Tiwari and Biswas, 1973)



Ramphotyphlops braminus (Daudin, 1803)

Figure 2 : Some Herpetofauna of Andaman and Nicobar Islands



Hylarana erythraea (Schlegel, 1837)



Cyrtodactylus rubidus
(Blyth, 1861)



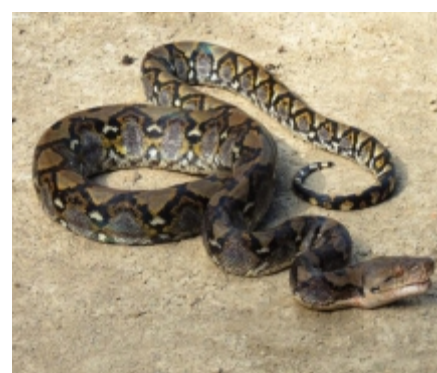
Cryptelytrops andersoni
(Theobald, 1868)



Microhyla heymonsi Vogt, 1911



Varanus salvator andamanensis
Deraniyagala, 1944



Python reticulatus (Schneider,
1801)

Figure 2 contd. : Some Herpetofauna of Andaman and Nicobar Islands

different localities in Great Nicobar which is **endemic and rare species of this Island**. *Limnonectes shompenorum*, another endemic and rare species noted at night in shompen hut and 35th km Kopenheat road in Great Nicobar which contained undisturbed evergreen forests. According to the observation it has fast swimming and jumping capability. A common toad *Duttaphrynus melanostictus* has observed 41 different localities which are in great population however its mortality due to road kill also observed in high because of the slow locomotion. One large female individual of this species observed in nallah in Great Nicobar Island where it often occupied by sea water. Tadpoles and sub adults of this species noted in small ponds at Shompen hut, Kondul Island and Lawful Greek were it covered by dense forest which is far away from human habituated residences. *Python reticulatus* (Schneider, 1801) is one of the larger non venomous snakes were found in Great Nicobar comparatively less in number. Two individuals of this snake were observed near to human settlement

and rescued them and released into biosphere reserve area. Salt water crocodile *Crocodylus porosus* is the largest reptile observed in Magar Nallah in seawater inundated area of Great Nicobar Island. Occasionally it hunts domesticated cattle's. *Cerberus rynchops* is one of the non – poisonous snakes observed in the estuary area at nighthour only and often noted its land-dwelling habit (Figure 2). Harikrishnan *et al.*, (2012) described a new species *Coryphophylax brevicaudus*, which is restricted to Andaman Islands only. In the present study, *Coryphophylax subcristatus* is the most common species recorded in 20 different localities from Andaman Islands including northern most Landfall Island, Peacock Island and Table Island. Based on field observation, its population is very higher in Havelock Island. According to Becker *et al.*, (2007) habitat features had a vital role in distribution of amphibians. The lizard, in the genus *Coryphophylax* observed in moist and dried coastal areas. Amphibians and reptiles prefer highly moist area for their extant, the surveyed areas in

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Total No of individuals

Table 5 : Contd.

Indices	Diversity Indices				
	South Andaman	Ritchie's Archipelago	Middle Andaman	North Andaman	Great Nicobar
Shannon-Weaver Diversity Index	1.456	1.352	1.696	1.411	1.937
Simpson's Diversity Index	0.5908	0.5516	0.7294	0.601	0.783
Pielou's Evenness Index	0.3573	0.3514	0.5454	0.3726	0.4623

* Indicates endemic species to Andaman and Nicobar Islands

Andaman and Nicobar islands consists of more freshwater swamps. Threats to herpetofauna are anthropogenic activities such as commercial plantation, deforestation for agricultural and road construction were observed in Great Nicobar and North Andaman. It was also frequently observed that several road kill reptiles such as *Calotes versicolor*, *Gekko smithii*, endemic snakes *Xenochrophis tytleri*, *Trimeresurus purpureomaculatus andersoni*, *Bungarus andamanensis* and amphi-bians such as *Duttaphrynus melanostictus*, *Hylarana erythraea*, and *Polypedates insularis* in Mayabunder, Great Nicobar and Diglipur respectively due to vehicular traffic. According to IUCN red lists about 8 species of amphibians and 11 species of reptiles are least concerned, 1 species of amphibian is endangered and 1 species of reptile is Data Deficient. Out of the present report **17 species of reptiles are yet to be assessed by IUCN while 3 species are vulnerable**. Since this is the preliminary investigation, long-term studies are required to assess the herpetofauna of this archipelago.

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