
Birds of Lakshadweep Islands

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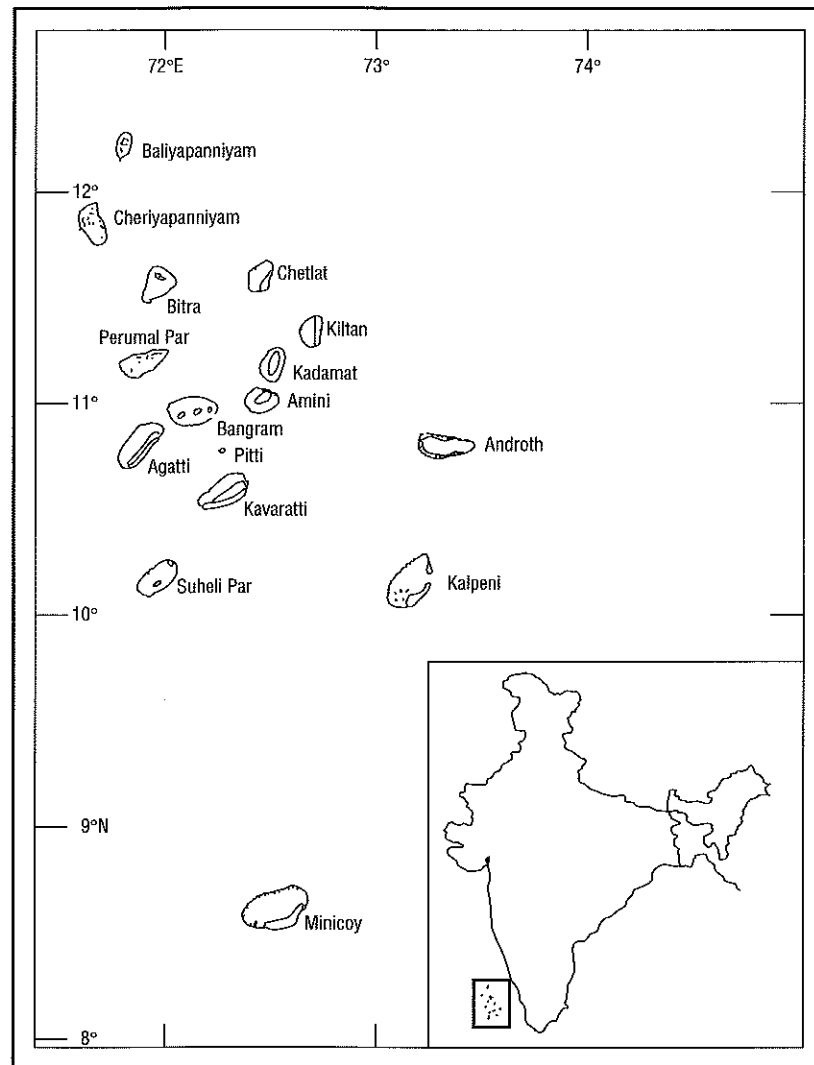
Lakshadweep archipelago supports a scanty avifauna with only two resident passerine species. On Pitti there is a large breeding colony of Sooty Terns *Sterna fuscata* and Brown Noddies *Anous stolidus*. Most of the atolls serve as staging grounds for a variety of shorebirds in winter. The uninhabited atolls Suheli and Bangaram supported relatively richer avifaunas. Increased human population density appeared to affect the ecology of most inhabited islands. Substitution of indigenous vegetation with monoculture plantations and predation of tern eggs are among the factors limiting bird populations in the islands.

Though Palaearctic migrants disperse widely during the northern winter, in many of their wintering habitats, particularly certain island groups in the central Indian Ocean, their status remains little studied. Lakshadweep, off the west coast of Kerala is a regular staging ground for many shorebird species. There have previously been brief accounts by Hume (1876), Gadow and Gardiner (1903), Ellis (1924), Betts (1939) and Burton (1940); also more recent reviews by Mathew and Ambedkar (1964), Mohan (1989), Anon. (1991) and Daniels (1992), but all of these previous accounts were based on brief trips of less than a month duration. The present report is based on a study carried out to assess and update the status of migrant and resident birds in the archipelago. The study was conducted between 15 August 1985 and 31 July 1986 (and a few days in December 1988) in the Union Territory of Lakshadweep. The observations were mostly carried out on Kavaratti, the most centrally placed of the islands. Kavaratti is about the same distance from the mainland as it is from the other islands of the archipelago. Two heavily populated islands were not visited: Androth which is probably the oldest in the Lakshadweep group and does not have the typical reef-lagoon components of a coral atoll, and Chetlat, one of the northernmost islands. All of the other inhabited islands, as well as the majority of the uninhabited islets, were visited (Fig. 1), including the far-flung isolated reefs of Baliapannium and Cheriyaannium, and also Perumal Par, an uninhabited atoll with hardly any island interphase except for a centrally placed reef flat. The duration of time spent in each island is given in Table 1.

STUDY AREA

Lakshadweep is an archipelago of coral atolls, reefs and sandbanks. In all, there are 36 islands and tiny islets situated between 8°N and 12°13'N and between 71°E and 74°E. They lie about 220-440 km off the west coast of Kerala. Most of the islands are widely separated from each other. In the

Figure 1. The Lakshadweep Islands



island group, cumulatively having a surface area of 32 km², only ten are inhabited: Kalpeni, Androth, Kavaratti, Amini, Kadmat, Agatti, Kiltan, Chetlat, Bitra and Minicoy. Bitra is the smallest inhabited island. Though the land area of the islands is small, the lagoon area is vast, with a total surface area of 4,200 km². Surrounding this are 20,000 km² of territorial waters and about 700,000 km² of economic zone, thus making Lakshadweep

Table 1. Visits to islands of Lakshadweep

Inhabited		
Kalpeni	1986:	5 January and 9 February
Kavaratti	1985:	18 August; 23, 25 and 26 September; 1, 2, 5-7, 9, 11, 12, 29 October; 3-10 November; 21, 25, 26, 29 December
	1986:	3, 29, 30 January; 11, 12, 17 February; 9, 12, 23, 30 March; 1, 5, 9, 12-14, 18,9 April; 26 May; 10, 29 June; 21 July
	1988:	22 December
Agatti	1986:	25, 29 April
Amini	1986:	28 March
Kadmat	1985:	3, 14 November
Kiltan	1986:	27 March
Bitra	1986:	25, 26 March; 22 April
Minicoy	1986:	4 May; 28 June
Uninhabited		
Pitti	1986:	21 April
	1988:	25 December
Suheli Vallyakara	1986:	1 January
	1988:	23 December
Suheli Pitti	1988:	24 December
Suheli Cheryyakara	1986:	2 January
Bangaram	1986:	6 April
Parli	1986:	27 April
Tinnakara	1986:	28 April
Perumal Par	1986:	24 April
Cheryapannium	1986:	23 April
Baliapannium	1986:	23 April

a truly large territory (Government of India 1985). Even during the supposedly fair weather months the vagaries of the weather often make travel between the islands difficult. All of the islands, except Androth, are roughly crescent-shaped and have a north-south disposition. To the east are rocky beaches and to the west are the lagoons. The island Androth lies east to west and has no lagoon. The surface of the islands lies at 1-4 m above M.S.L. The islands have a warm and humid climate. The temperature ranges between 25.4°C and 31.1°C. The annual rainfall varies between 151 cm and 164 cm, with most of it falling in June-August during the south-west monsoon (Mannadiar 1977). The north-east monsoon is comparatively weak and sets in during October-November. During much of this time, the wind blows with a speed range of about 10 to 20 knots (18 to 40 km) from the west and the sea becomes rough; surface communications between the islands are then difficult. April and May are the hottest months. During the rest of the period, from November to May, the weather is generally good and

the sea is calm. The soil of the islands is calcareous and highly porous, being derived from weathered coral boulders and shingles. Due to the high percolation rate of the soil a quantity of rain water infiltrates underneath, forming the ground water lens which floats over the denser saline water underneath. The vegetation of all the islands is broadly similar. The Coconut *Cocos nucifera*, which grows ubiquitously in most of the islands, is a cultivated species. Among the wild flora, a laurel shrub *Scaevola sericea*, Wild Heliotrope *Tournefortia argentea*, a bushy shrub *Pemphis acidula* and a variety of other shrubs, including *Lantana camara*, have been found. Screw pine *Pandanus tectorius* has been found growing on a few islands such as Minicoy and Bangaram. *Ziziphus jujuba* and *Thespesia populnea* have a wide distribution. The ground vegetation consists of *Spinifex littorens*, *Commelina bengalensis* etc. (Further details on the vegetation are given by Sivadasan and Joseph 1981).

METHODS

The study was based on direct observations made while walking around the islands, usually in the early morning or late afternoon, and during inter-island and island-mainland voyages in steamers and motor launches. A pair of 7x30 binoculars was used. Although no trapping of birds was carried out, many specimens could be physically examined after being noosed by local children. Similarly, pet birds caught locally and kept in several individual households were examined. Some of the field observations were documented by photographs.

VISITS TO ISLANDS

Kavaratti, the third largest island in the Lakshadweep group, is the most centrally placed island and is situated at 10°33'N 72°38'E, approximately 400 km west of Cochin. Quite typical of Lakshadweep islands, Kavaratti has a north-south linear disposition and occupies the eastern rim of the crescent-shaped atoll, with a lagoon to the west. The maximum length of the island is 6 km and the breadth at its narrowest point is less than 100 m. Except for a brief respite for a week or so in some months, observational data on Kavaratti were collected right through the observation period. The Oriental White-eye *Zosterops palpebrosus* was observed breeding from March to May on Kavaratti. Seven abandoned nests were noted, made in small or medium-sized trees and at heights varying from 4-5 m. Both the sexes participated in nest-building, which in one case was noted as taking 6 h 10 mins, and the materials used were the fibres of coconut husk, cobwebs, grizzled leaves and chicken-down.

Pitti (10°30'N 72°30'E). The tiny seabird island of Pitti ('Pakshipitti' as it is locally known) which is 20 km north of Kavaratti, is an exposed reef, the accessibility of which is almost always difficult. On our first visit to Pitti in April 1986, repeated attempts to land were foiled because of bad weather; however, after some time, an experienced islander did manage to swim across to the islet and retrieved eggs of the Sooty Tern *Sterna fuscata*, Great Crested Tern *S. bergii* and Brown Noddy *Anous stolidus*. The exact number of breeding birds could not be ascertained. On our second visit, in December 1988, the sea was calm enough for us to swim ashore and look at the birds. Only Sooty Terns and Brown Noddies were present. Although there were no hatchlings, eggs of both species were found. There were 5,000-6,000 Sooty Terns and 8,000-9,000 Brown Noddies. A total of 400 eggs was found, two-thirds of which belonged to Sooty Terns. Large congregations of the two species occurred side by side on the dry coral bed but were not intermixed. Interestingly, Hume (1876) found nesting Sooty Terns and Brown Noddies intermingled at Cherbaniani. The Pitti reef flat, though teeming with birds for much of the year, appeared to be absolutely devoid of any guano. It is probably because the reef, only 1.5-2 m above M.S.L., gets periodically rinsed by the surf from all sides. It is therefore puzzling to see reports elsewhere about appreciable quantities of guano being found on the islet (Mannadiar 1977). Pitti islet is nearly square in shape and is about 200 x 300 m in area. In early November 1985, young Sooty Terns were noted on Kavaratti, having been brought by islanders from Pitti. Hume failed to see any birds on Pitti island in late February 1876. Mathew and Ambedkar (1964) collected young Great Crested Terns and Brown Noddies in October, and they suggested that large numbers of both species nest on the island between April and November every year and also that October marks the end of the breeding season. On enquiry, most islanders asserted that there is a peak in breeding activity during the south-west monsoon period from June to August. Alcock (1902) saw the chicks of two types of terns in November but he was unable to identify the species concerned. It appears that there is an extended breeding period on Pitti, and it is also probable that the terns have an irregular breeding cycle. However, a clear picture has not emerged yet and the extent of breeding activity during the monsoon needs to be ascertained. Especially noteworthy is the possibility of an irregular breeding cycle of *Sterna bergii* in the tropical Indian Ocean as conjectured by Feare (1979). The account in Anon. (1991) provides further details of the breeding terns, with estimates of the total numbers present in October 1963 (20,000), February 1978 (12,000), May 1990 (4,000), February 1991 (2,000) and April 1991 (8,000), suggesting that there has been a significant decrease in numbers in recent years.

Baliapannium (or Cherbaniani) is a large atoll, 'oval shaped and about 6 miles by 2 miles in its extreme dimensions' as Hume (1876) described it.

Towards the northern extremity of the atoll is an islet some 200 m long and 50 m broad. The islet is very similar to Pitti in appearance, but is much more accessible as it is within the lagoon, protected by the reef. The islet is devoid of any vegetation and the substrate is littered with coral shingles and boulders. Baliapannium was described as having a large breeding colony of terns by almost all the authors who previously visited it. Both Hume and Betts recorded Sooty Terns and Brown Noddies breeding there. Mathew and Ambedkar collected Great Crested Tern eggs and Bridled Tern *S. anaethetus* nestlings. We, however, found Baliapannium devoid of any breeding birds even on our second visit in April, 1986. There were flocks of Ruddy Turnstones *Arenaria interpres* on the islet and large congregations of Great Crested Terns and Lesser Crested Terns *Sterna bengalensis* on the outlying sandbank. The absence of breeding birds could be due to the sporadic incursions into the area by fisherfolk from Chetlat and Bitra. The islanders, however, testified to some breeding activity on the islet during the monsoon season, when the reef flat remains undisturbed.

Cheriyapannium (or Byramgore) was visited on 23 April 1986. It is a very large atoll, and at high water there is practically no land area exposed. Except for a few terns *S. bengalensis* and *S. bergii*, not many birds were observed.

Perumal Par, an atoll situated south-west of Bitra, was visited on 24 April. This atoll appeared very similar to Baliapannium, with an extensive lagoon. Towards the south-eastern extremity of the reef is an exposed islet within the lagoon. Here also, fishermen from the neighbouring islands make overnight visits and, quite understandably, no birds were observed. However, two large congregations of terns, most likely *S. bergii* and *S. bengalensis* were observed a short distance north-east of the atoll. Large hunting flocks of terns are a common feature in the neighbourhood of atolls and over different parts of the sea between the islands. Flying-fish, an important prey of the Tuna *Euthynnus pelamis*, are numerous and are caught by the terns.

Suheli atoll was visited twice, once in January 1986 and, later, in December 1988. *S. bergii* and *S. bengalensis* were fairly numerous around the atoll. On 'Suheli Pitti', a 1 km long linear islet formed within the lagoon near the north-eastern part of the reef, between Valiyakara and Cheriyakara, a flock of *S. bergii* and *S. bengalensis* was found in almost equal proportions (Table 2). It was reliably learnt from the islanders that until five years ago, 'Suheli Pitti' was used as a breeding ground by terns. No previous authors appear to have described Suheli Valiyakara. 'Suheli Par' as it is also known, is south-west of Kavaratti and is situated at 10°05'N 72°18'E. It is the largest uninhabited island and retains much of its natural vegetation. Suheli

Table 2. Estimates of tern populations in the different islands

	<i>Anous stolidus</i>	<i>Sterna fuscata</i>	<i>S. bergii</i>	<i>S. bengalensis</i>
Kavaratti	-	2	-	-
Pitti	8500	5500	-	-
Suheli	-	-	298	280
Bangaram	-	-	200+	246+
Perumal Par	-	-	70+	70+
Bitra	-	-	-	2
Cheriyapannium	-	-	20	-
Baliapannium	-	-	250	40

Cheriyakara, the smaller island in the atoll, though devoid of any permanent settlements, is replete with biotic activity for six months from mid-October to mid-April. The waters around the atoll are rich in fishery resources and men from Kavaratti and Agatti go to stay there and catch fish, which they dry and produce 'mas'. The 'offal' that is left over after the production of mas provides good manure for coconuts, which thrive well. Valiyakara, on the other hand, is virtually deserted though visited by people at least twice a year for the collection of copra. Many of the coconut trees in Valiyakara are retarded, but there is luxuriant ground vegetation. The vegetation, particularly in the southern end of the island, is so thick that it is often impenetrable. The 'strand coral' is composed of plants such as *Scaevola sericea*, *Pemphis acidula*, *Tournefortia argentea*. Of all the islands, Suheli has a greater representation of migrant and resident avifauna. The Grey Heron *Ardea cinerea* is a resident found either singly or in pairs on most islands visited. They were found in greater numbers where they bred on Suheli and the Bangaram group of islands. The breeding season of the Grey Heron is given by Ali and Ripley (1987) as from July to October in northern India and from November to March in southern India. However, from circumstantial evidence, it appears that, in Lakshadweep breeding takes place from June onwards. Suheli Valiyakara and Parli, in the Bangaram atoll, where Grey Herons nest, are uninhabited islands visited by islanders from October to May. Young Grey Herons were brought to Kavaratti as pets from Suheli Valiyakara in October, by people visiting the atoll after the monsoon. On both the occasions the atoll was visited, the Black-capped Kingfisher *Halcyon pileata* was observed. The marine life around Suheli is so rich that a proposal has been made to declare this area as a Marine National Park (Menon 1976).

Bangaram atoll is situated at 10°56'N 72°17'E, north-east of Agatti, and is visible from the latter. There are two larger islands, Bangaram and Tinnakara, and two smaller islands, Parli 1 and Parli 2 within the lagoon;

all are uninhabited. Bangaram is the largest island in the atoll and is characterised by a 1 km long linear brackish water pond at the centre of the island, extending to the northern extremity. The pond is fringed by Coconut Palms and *Pandanus* thicket. The northern and southern ends of the island have thick vegetation and the beach at several places above high water mark is carpeted by ground vegetation, consisting of *Cyperus* and *Spinifex littorens*. The beach consists of a fine sediment of corals and a variety of shorebirds frequent the intertidal area. The fringes of the pond at low tide provide a varied habitat of mudflat and shallows for a variety of wading birds. There are many exposed sandbanks at the fringes of the reef where hundreds of terns, particularly *S. bergii* and *S. bengalensis* congregate.

Table 2 gives estimates of the numbers of terns observed in the different atolls visited. It therefore appears that, except at Pitti, where *S. fuscata* and *A. stolidus* are the predominant species, in all the other atolls *S. bergii* and *S. bengalensis* are the commoner species, occurring in approximately equal proportions.

Such observations, as described above, point to the state of flux regarding the status of populations of terns in the different atolls. Until about the 1830s enormous numbers of seabirds used to breed in Bitra (Betts 1939). When Hume visited the island in 1876, Bitra was still uninhabited but people used to visit the island for tending the coconuts. As recently as 1963, Mathew and Ambedkar observed *S. anaethetus* and *S. bergii* breeding at Baliapannium. It is probably the cumulative effect of population increase and the consequent proliferation of plantations; camping on the uninhabited islets by fishermen; and direct predation of eggs, that have contributed to either the cessation of breeding activity in certain islets, or to the shifting of entire breeding colonies from one locality to another. Anyhow, the single greatest threat to the breeding colonies of seabirds of the Lakshadweep archipelago appears to be large scale predation of tern eggs. Even though it is a quarter of a century since Pitti was declared a bird sanctuary, the islanders continue to plunder the eggs and the only respite for the birds comes in the form of the monsoon, from May to September, when the reef is inaccessible. It is to be noted, in this connection, that of the 20 *S. fuscata* colonies in the western Indian Ocean, 10 have become extinct in the last hundred years and 4 have become reduced in numbers (Feare 1984). Among the factors that Feare suggests as having contributed to the decline in numbers of seabirds are alteration of habitat, i.e. substitution of indigenous vegetation with plantations, usually of coconuts; guano extraction; introduction of exotic animals; and direct predation of eggs. Of these, the first and last are relevant to Lakshadweep.

RESULTS

The species of birds observed in Lakshadweep are listed in the appendix, together with a summary of observations reported by other authors - a total of 82 species.

On Kavaratti, the arrival of the first northern migrants coincided with the waning of the south-west monsoon in September; by November most of the birds had arrived. The numbers and variety were maintained until about the second week of April when, quite abruptly, the number of birds declined, indicating their departure. A surge in numbers was observed once in November and for a second time towards April. Remnant migrants were encountered as late as the last week of May. June and July, the monsoon months, were practically bereft of birds, although the Mongolian Plover *Charadrius mongolus* was occasionally sighted. The Mongolian Plover was found to be the most abundant species on Kavaratti, closely followed by the Ruddy Turnstone. In almost all the other islands surveyed, the Ruddy Turnstone vastly outnumbered any other shorebird species. Even on such dry reef flats as Pitti and Baliapannium, large flocks of Ruddy Turnstones were met with. On all the islands except Kavaratti, the Grey Heron appeared to be the second most abundant species. This resident species, however, was found in greater numbers on uninhabited atolls such as Suheli and Bangaram. Much of the avian activity on Kavaratti was concentrated at the southern extremity of the island where no permanent human habitation exists. The birds fed on small crustaceans, copepods and other invertebrates on the intertidal shelf.

The children of Lakshadweep have a penchant for snaring birds with a crude noose spread on the beach. The captured birds are pinioned and then they are kept in households as pets. Several species, including Common Teal *Anas crecca*, Ruddy Shelduck *Tadorna ferruginea*, Whimbrel *Numenius phaeopus*, Grey Heron, Cattle Egret *Bubulcus ibis*, Sooty Tern including young ones, Ruddy Turnstone, Common Sandpiper *Tringa hypoleucos*, Terek Sandpiper *T. cinerea*, and Rock Pigeon *Columba livia* were found.

The Oriental White-eye *Zosterops palpebrosus* is a resident species on Kavaratti and Kadmat where it was observed in large numbers. On Kavaratti, despite the greater population pressure and corresponding denudation of plant cover, these small birds thrive, probably because the House Crow *Corvus splendens*, a potential predator, is absent from this island. On Kadmat, the White-eyes thrived, presumably because the natural vegetation is more abundant and there is less population pressure on this island; feeding parties consisting of 30-40 White-eyes were often seen on the coconut fronds and inflorescences. Hume (1876) described it as occurring in all the islands. However, during the present study, the bird was not met with on Kalpeni, Amini, Suheli or Bitra.

The Asian Koel *Eudynamis scolopacea*, Brown Shrike *Lanius cristatus*, Greater Coucal *Centropus sinensis*, Black Kite *Milvus migrans*, Common Kestrel *Falco tinnunculus* and Indian Roller *Coracias benghalensis* were among the land birds recorded once or on several occasions during the study period. The House Crow was not observed on Kavaratti though it was present on Kalpeni, Amini, Kadmat and Minicoy. Two species of terns, the Sooty Tern and Brown Noddy were observed breeding in large numbers on Pitti. The Great Crested Tern and Lesser Crested Tern were also common in the archipelago. The uninhabited atolls, Suheli and Bangaram, appeared to support a relatively richer avifauna than the inhabited ones. Altogether 49 species were observed by us, of which 17 are new additions to the Lakshadweep avifauna.

DISCUSSION

The occurrence and seasonal variation in numbers of different birds on Kavaratti suggest that birdlife is generally scanty on Lakshadweep. While this is largely true in the case of most of the inhabited islands, the variety and numbers of birds are greater in certain uninhabited islands such as Suheli and Bangaram. Observations by Hume (1876) and Mathew and Ambedkar (1964) also lend credence to this view. Large breeding colonies of pelagic terns were observed in reefs and islets such as Pitti. Though a majority of the birds are migrants arriving from their Palearctic breeding grounds in the north, a small percentage of southern hemisphere birds may also arrive, as evidenced by the records of petrels and shearwaters (Mathew and Ambedkar 1964, Betts 1939). It is also possible that a small number of tropical breeding birds arrive by island hopping from the south or from elsewhere. Phillips (1963) noted that some exchange of birdlife took place between Addu Atoll in south Maldives and Chagos archipelago in the south. Possibly, those that spread across the Maldivian atolls do spill to some extent into Lakshadweep and vice versa. The species profile and the pattern of occurrence of birds studied on the west coast of Malabar in Kerala (Kurup 1991) was found to be remarkably similar to those in Lakshadweep.

HUMAN POPULATION AND ITS IMPACT ON THE ECOLOGY OF THE ISLANDS

The population density of each island is high, averaging about 4,000 per island (1981 census). There are numerous wells and tanks littered throughout the inhabited islands, and there are many open pits used for defecation. The extreme porosity of the calcareous soil and the high water table contribute to the easy infiltration of nitrogenous waste materials into the freshwater

sources. This, together with the burial of dead bodies in the highly porous soil, and the offal left over after the production of 'mas' from the tuna catch, badly contaminate the ground water. Undoubtedly, the quality of the environment in these areas has been affected. There is substantial quarrying for coral boulders and shingle for construction purposes; if this continues at the current rate, it is likely to affect even the physical existence of the coral atolls. There is denudation of green cover almost everywhere as construction activities have resulted in the large scale clearing of natural vegetation in all the inhabited islands. Except for patches of *Pemphis acidula* and *Scaevola sericea* most of the original vegetation of Kavaratti has been lost. Even uninhabited islands are being used for coconut cultivation. All these factors have probably affected birdlife too. Except for uninhabited atolls such as Suheli and Bangaram, and the reefs of Pitti, Baliapannium and Perumal Par, most other areas do not harbour a profuse avifauna any longer.

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APPENDIX

SYSTEMATIC LIST OF THE BIRDS OF LAKSHADWEEP

- RUDDY SHELDUCK *Tadorna ferruginea*. One captive individual was noted on Kavaratti.
- COMMON TEAL *Anas crecca*. Several captive specimens were found on Kavaratti. Noted by Ellis, and Betts found a dried head on Amini and was told they were regular winter visitors in varying numbers.
- GARGANEY *Anas querquedula*. One noted in captivity in December 1988. Daniels saw it in April 1988.
- FERRUGINEOUS POCHARD *Aythya nyroca*. Daniels saw it in April 1988.
- EURASIAN HOOPOE *Upupa epops*. Sightings claimed by several islanders.
- INDIAN ROLLER *Coracias benghalensis*. Observed several times on Kavaratti, between December and April. Burton saw several on Chetlat and one on Bitra in November.
- COMMON KINGFISHER *Alcedo atthis*. Mathew and Ambedkar saw one on Kavaratti. Mohan (1989) noted it on Bangaram, Tinnakara-Parali, Bitra and Kiltan.
- WHITE-THROATED KINGFISHER *Halcyon smyrnensis*. One was seen on Bitra on 25 March 1986.
- BLACK-CAPPED KINGFISHER *Halcyon pileata*. Observed on Suheli Valiyakara on both visits in 1986 and 1988, and once on Kavaratti in 1988.
- PIED CUCKOO *Oxylophus jacobinus*. Recorded by Subiah (1978).
- COMMON CUCKOO *Cuculus canorus*. Seen once on Kavaratti in December 1985.
- GREY-BELLIED CUCKOO *Cacomantis passerinus*. Recorded by Anon. (1991).
- ASIAN KOEL *Eudynamis scolopacea*. Observed several times on Kavaratti. Hume found it on every inhabited island that he visited. Forbes recorded it in February. Mathew and Ambedkar saw it on Agatti and Mohan (1989) saw it on Kiltan. Daniels listed it as a resident. Recorded by Anon. (1991).
- ROSE-RINGED PARAKEET *Psittacula krameri*. Daniels saw it in April 1988, but noted that these were probably recently escaped birds. Recorded by Anon. (1991).
- LITTLE SWIFT *Apus affinis*. Listed by Anon. (1991).
- ASIAN PALM-SWIFT *Cypsiurus balasiensis*. Found on several occasions on Kavaratti.
- OWL Strigidae. A large owl was flushed from *Pemphis* thicket on Kalpani in January 1986.
- BROWN WOOD OWL *Strix leptogrammica*. Noted on Bitra by Hume, who noted that it had been introduced to check rodents.
- ROCK PIGEON *Columba livia*. Feral birds were common on Kavaratti.
- ORIENTAL TURTLE-DOVE *Streptopelia orientalis*. Mathew and Ambedkar collected one on Chetlat. Mohan (1989) noted it on Suheli and Kalpani in 1987.
- CRANE *Porzana*. One seen near the brackish water pond on Suheli Cheriyaakara in December 1988. Listed by Anon. (1991) as Little Crane *P. parva* but the identification was not confirmed.
- WHITE-BREADED WATERHEN *Anaethya phoeniceus*. One seen in *Pandanus* thicket near the brackish water pond on Bangaram. Gadow and Gardiner took a young bird from a nest on Minicoy at the end of July, 1899. Ellis recorded it as a resident and Daniels saw one on Minicoy in April 1988. Burton saw a 'water rail, unidentified' on Bitra. Seen by Anon. (1991).
- SNIFE *Gallinago*. Seen on Kalpani, Bangaram and Suheli Cheriyaakara.
- BAR-TAILED GODWIT *Limosa lapponica*. Six were seen on Kalpani.
- BLACK-TAILED GODWIT *Limosa limosa*. Seen once on Kavaratti in April 1986.
- WHIMBREL *Numenius phaeopus*. Found in small numbers on almost all the islands visited. A flock of 12 was seen on Parli in April 1986. Mathew and Ambedkar saw one about 10 miles off Kavaratti. Recorded by Anon. (1991).
- EURASIAN CURLEW *Numenius arguata*. Far less common than Whimbrel, but seen on Suheli and Bangaram in large numbers. Hume collected it on Kadmat and Agatti, and Mathew and Ambedkar saw three on Bitra. Recorded by Anon. (1991).
- COMMON REDSHANK *Tringa totanus*. Seen on Bangaram and one was found in captivity on Kavaratti.
- COMMON GREENSHANK *Tringa nebularia*. Found throughout the winter, in small numbers, in all the atolls. Only recorded previously by Hume who shot one on Kadmat. Recorded by Anon. (1991).
- GREEN SANDPIPER *Tringa ochropus*. Noted on Kavaratti and Bangaram.
- WOOD SANDPIPER *Tringa glareola*. Singles noted on Kavaratti and Suheli Cheriyaakara.
- THREE SANDPIPER *Tringa cinerea*. Several noted in captivity on Kavaratti. Recorded by Anon. (1991).
- COMMON SANDPIPER *Tringa hypoleucos*. The most numerous wader after Ruddy Turnstone. Usually seen singly or in pairs, but 10 were noted roosting on a floating platform in the Bangaram lagoon. Gadow and Gardiner saw it on Minicoy in August. Recorded by Anon. (1991).

RUDDY TURNSTONE *Arenaria interpres*. The commonest wader: a flock of 500 was noted on Baliapannium atoll. Hume also found it to be the commonest bird, and it is strange that it is not mentioned by Ellis nor by Betts. Recorded by Anon. (1991).

GREAT KNOT *Calidris tenuirostris*. Only recorded by Hume, who saw two on Bitra.

SANDERLING *Calidris alba*. Three were noted on Suheli Pitti. Hume collected two on Bitra. Recorded by Anon. (1991).

LITTLE STINT *Calidris minuta*. Mathew and Ambedkar saw it on the coral reefs on Agatti, Chetlat and Bitra. Recorded by Mohan (1989) on six different islands and by Anon. (1991). Burton saw 'stints' on Bitra.

EURASIAN THICK-KNEE *Burhinus oedicnemus*. Observed once on 14 November 1985 at the northern extremity of Kadmat.

BLACK-WINGED STILT *Himantopus himantopus*. Daniels saw it once in April 1988.

EURASIAN AVOCET *Recurvirostra avosetta*. Burton saw some on Bitra.

PACIFIC GOLDEN PLOVER *Pluvialis fulva*. More numerous on Kavaratti than the Grey Plover. Gadow and Gardiner recorded it on Minicoy and Mathew and Ambedkar saw it on Chetlat and Bitra. Recorded by Anon. (1991).

GREY PLOVER *Pluvialis squatarola*. Apparently a winter visitor to all the islands, although Betts did not record it and Mathew and Ambedkar only saw a single bird on Chetlat. Recorded by Anon. (1981).

KENTISH PLOVER *Charadrius alexandrinus*. Seen only on Suheli Cheriyaakara. Recorded by Hume, and Mathew and Ambedkar saw it in flocks of 8 to 10 on Chetlat and Bitra.

MONGOLIAN PLOVER *Charadrius mongolus*. One of the commonest waders, found in all the islands. Hume collected three on Kadmat, but saw no others. Betts collected one out of a flock of six on Kiltan, the only ones he saw. Recorded by Anon. (1991).

GREATER SAND PLOVER *Charadrius leschenaultii*. Sparingly distributed; in greatest numbers on Suheli Valiyakara. Hume collected it on Kadmat and Kiltan.

CRAB PLOVER *Dromas ardeola*. A flock of 10 was seen on Suheli Pitti in December 1988. Hume noted a flock on Perumalpar and Mathew and Ambedkar saw a pair on Bitra. Daniels saw it in April 1988. Recorded by Anon. (1991).

SOUTH POLAR SKUA *Catharacta maccormicki*. Daniels saw it in April 1988. In addition Mathew and Ambedkar saw unidentified skuas near Baliapannium atoll and between Calicut and Kavaratti.

POMARINE JAeger *Stercorarius pomarinus*. Daniels saw it in April 1988, and Pocklington (1967) saw a bird, probably of this species, on 5 April 1965.

PARASITIC JAeger *Stercorarius parasiticus*. Daniels saw it in April 1988.

LESSER BLACK-BACKED GULL *Larus fuscus*. One was noted in captivity on Kavaratti. Burton mentions 'a number of sea gulls' on Bitra and Kadmat.

GULL-BILLED TERN *Sterna nilotica*. Seen by Anon. (1991).

LESSER CRESTED-TERN *Sterna bengalensis*. Found with Great Crested-Terns but in smaller numbers. May breed on Pitti. Recorded by Anon. (1991).

GREAT CRESTED-TERN *Sterna bergii*. Found in large concentrations near Baliapannium (250), Perumal Par, (280), Bangaram and Suheli atolls. Eggs were collected on Pitti in April 1986. Recorded by Anon. (1991).

LITTLE TERN *Sterna albifrons*. Hume collected several on Baliapannium. Recorded by Anon. (1991).

WHITE-CHEEKED TERN *Sterna repressa*. Hume collected two immatures on Baliapannium.

BRIDLED TERN *Sterna anaethetus*. Hume noted it on Baliapannium, and Mathew and Ambedkar ringed chicks there; however, none was seen in April 1986.

SOOTY TERN *Sterna fuscata*. Between 5,000 and 6,000 were seen on Pitti in December 1988. Young birds were collected and taken to Kavaratti in October 1985. Recorded by Anon. (1991).

BROWN NODDY *Anous stolidus*. Between 8,000 and 9,000 were found with many Sooty Terns on Pitti in December 1988. Recorded by Anon. (1991).

LESSER NODDY *Anous tenuirostris*. Recorded on Minicoy.

OSPREY *Pandion haliaetus*. Betts saw one on Kadmat and one on Kiltan.

BLACK-WINGED KITE *Elanus caeruleus*. Recorded by Hume, who collected it on Amini and Kadmat.

BLACK KITE *Milvus migrans*. A winter visitor to Kavaratti, observed between September and March.

WHITE-BELLIED FISH-EAGLE *Haliaeetus leucogaster*. Only noted by Hume who saw one soaring over Amini.

WESTERN MARSH-HARRIER *Circus aeruginosus*. One was seen flying low over the lagoon near Suheli Valiyakara. Listed by Daniels.

PALLID HARRIER *Circus macrourus*. Recorded by Ellis; Burton, who noted it on Chetlat; and Betts, who saw two on Kiltan.

MONTAGU'S HARRIER *Circus pygargus*. Recorded by Ellis and Burton, who saw it on Bitra.

SHIKRA *Accipiter badius*. Seen once on Kavaratti in December 1988.

COMMON KESTREL *Falco tinnunculus*. One noted at the southern end of Kavaratti. Hume found it on all of the islands he visited. Betts recorded it on Amini and Kadmat. Recorded by Anon. (1991).

PEREGRINE FALCON *Falco peregrinus*. Hume described it as a regular migrant.

RED-BILLED TROPICBIRD *Phaethon aethereus*. Recorded by Hume: 30 miles from Baliapannium; and Betts: two during the passage from the mainland, but at least 50 miles from the nearest shore. Daniels saw it in April 1988.

MASKED BOOBY *Sula dactylatra*. Daniels listed it as a resident. Feare listed it as a questionable breeding species.

RED-FOOTED BOOBY *Sula sula*. Hume saw a large flock of what he believed to be this species near Perumal Par. Daniels listed it as a resident. Feare listed it as a questionable breeding species.

BROWN BOOBY *Sula leucogaster*. Hume saw one on Baliapannium, and collected one on Perumal Par. Daniels listed it as a resident. Feare listed it as a questionable breeding species.

GREAT CORMORANT *Phalacrocorax carbo*. Listed by Anon. (1991).

LITTLE EGRET *Egretta garzetta*. Noted uncommonly on Kavaratti, Bangaram and Suheli Cheriyaakara. Gadow and Gardiner saw one on Minicoy in July 1899. Daniels saw it in April 1988 and listed it as a possible resident. Recorded by Anon. (1991).

WESTERN REEF-EGRET *Egretta gularis*. One was seen by Hume on Bitra, and it was possibly seen on Kavaratti by Mathew and Ambedkar. Daniels listed it as a possible resident. Recorded by Anon. (1991).

GREY HERON *Ardea cinerea*. Found in small numbers in almost all the atolls, and found breeding on Suheli Valiyakara and Parli islet. Hume suspected that it bred on Agatti (not Bangaram as reported by Betts) because he noted stick nests in two or three trees. Gadow and Gardiner, and Ellis, mentioned a breeding colony on Viringilli, a small islet in the Minicoy lagoon.

PURPLE HERON *Ardea purpurea*. Seen by Anon. (1991).

CATTLE EGRET *Bubulcus ibis*. Found between November and April on Kavaratti; a flock was noted on Kadmat. Daniels saw it in April 1988 and listed it as a possible resident. Recorded by Anon. (1991).

INDIAN POND-HERON *Ardeola grayii*. Observed on Kavaratti, Suheli Cheriyaakara and Bangaram. Hume saw it on Amini and on Kadmat, Betts saw one on Amini, and Mathew and Ambedkar saw one about 15 miles off Bitra. Daniels listed it as a possible resident. Recorded by Anon. (1991).

STRIATED HERON *Butorides striatus*. Hume collected one on Kadmat and Betts saw one on Amini. Daniels saw one in breeding plumage in April 1988. Recorded by Anon. (1991).

YELLOW BITTERN *Ixobrychus sinensis*. Seen by Anon. (1991).

STORK Ciconiidae. Burton saw a 'large black and white stork' on Bitra.

GREAT FRIGATEBIRD *Fregata minor*. Listed by Anon. (1991).

WEDGE-TAILED SHEARWATER *Puffinus pacificus*. Betts mentioned several solitary shearwaters with dark underparts seen during the passage from the Malabar coast. Daniels saw it in April 1988.

AUDUBON'S SHEARWATER *Puffinus lherminieri*. Ellis considered it to be a resident species. Feare listed it as a questionable breeding species.

JOUANIN'S PETREL *Butorides fallax*. Daniels saw it in April 1988, and Pocklington (1967) saw 'dark gadfly petrels', probably of this species, on 5 September 1963.

WILSON'S STORM-PETREL *Oceanites oceanicus*. Only found once, about 28 km off Cochin, but local fishermen considered that it was not uncommon. Previously recorded by Mathew and Ambedkar between Calicut and Kavaratti, and by Mohan (1989) off various islands in early 1987.

SWINHOE'S STORM-PETREL *Oceanodroma monorhis*. Mathew and Ambedkar noted one caught on a ship between Chetlat and Bitra on 20 October 1963. Mohan (1989) noted very small numbers off Agatti, Bangaram, Tinnakara-Parali, Bitra and Kadmat during a visit from January to April 1987. Pocklington (1967) saw 'more than 35 dark storm-petrels', probably this species, at 10°53'N 72°45'E on 15 March 1965.

INDIAN PITTA *Pitta brachyura*. Seen by Anon. (1991).

BROWN SHRIKE *Lanius cristatus*. Observed on several occasions on Kavaratti between November and April, and seen once on Kadmat. Betts saw one on Kiltan. Seen by Anon. (1991).

HOUSE CROW *Corvus splendens*. Betts described it as occurring only on Kalpeni, Amini and Androth. It now occurs on Kadmat and has reportedly been introduced on Minicoy. Daniels listed it as an introduced resident.

COMMON MYNA *Acridotheres tristis*. Ali and Ripley (1983) mention that it was introduced to Lakshadweep but give no further details. It has not been recorded by any of the surveys.

SAND MARTIN *Riparia riparia*. Recorded by Anon. (1991).

BARN SWALLOW *Hirundo rustica*. Gadow and Gardiner saw several on Minicoy between 1 and 4 September. Mathew and Ambedkar saw a few birds off Kavaratti. Mohan (1989) noted it on Bitra, Kiltan and Amini in 1987. Daniels saw it in April 1988. Seen by Anon. (1991).

RED-RUMPED SWALLOW *Hirundo daurica*. A large flock was seen on Suheli Cheriyaakara.

NORTHERN HOUSE-MARTIN *Delichon urbica*. Recorded by Ellis; also by Mathew and Ambedkar: one on a ship between Calicut and Kavaratti, and a flock of 10 on Chetlat.

ORIENTAL WHITE-EYE *Zosterops palpebrosus*. The only resident species on the majority of the islands. It was numerous on Kadmat and Kavaratti, and was found breeding on the latter. Mohan (1989) noted it on Agatti, Bangaram, Tinnakara-Parali and Bitra, and it has also been reported from Androth, Chetlat and Suheli Valiyakara.

BLYTH'S REED-WARBLER *Acrocephalus dumetorum*. Recorded by Anon. (1991).

WHITE WAGTAIL *Motacilla alba*. Recorded by Anon. (1991).

YELLOW WAGTAIL *Motacilla flava*. Two were seen on Suheli Cheriyaakara in December 1988. Mathew and Ambedkar saw a 'flock of some six birds', apparently of the race *thunbergi*, on Bitra. Daniels saw it in April 1988. Seen by Anon. (1991).