Status of the Colonial Breeding Waterbirds in Kumarakom Heronry in Kerala, Southern India

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Received 10 November 2006; accepted 24 February 2007

Abstract: We studied the status of breeding waterbirds in the Kumarakom Heronry in the KTDC Tourist Complex, Kumarakom, Kerala, southern India, during the period June to August 2004. Ten species of waterbirds belonging to the families Anhingidae, Phalacrocoracidae, Ardeidae and Threskiornithidae were breeding in the study area. The Little Cormorant *Phalacrocorax niger* was the most numerous species during the period of this study, and the Little Egret *Egretta garzetta* the least numerous. The Black-crowned Night Heron *Nycticorax nycticorax* was present in reduced numbers compared with earlier reports. At one stage during the study, the numbers of Oriental Darters *Anhinga melanogaster* comprised about 8% of the South Asian population of this near threatened species. The Black-headed Ibis *Threskiornis melanocephalus* was found nesting in this area for the first time. Major factors having a detrimental effect on the ecosystem were a lack of regeneration of mangroves, uncontrolled growth of exotic weeds and the release of sewage water into the area. Increases in the populations of the two cormorant species and Oriental Darter and the decrease in the Black-crowned Night Heron population could be related to the construction of Thanneermukkom Saltwater Barrier across Vembanad Lake and resulting changes in the ecology of the southern portion of the lake. Because of its importance for breeding waterbirds and other migratory birds, the Kumarakom area has the potential for the establishment of a Waterbird Sanctuary.

Keywords: Heronry, population, nest, colony, threats, Ramsar site, Kumarakom, Kerala, India.

وضعیت پرندگان آبزی جوجه‌آور در کلنی حواصیل‌ها در ناحیه کوماراکوم، کِرالا، جنوب هند

چکیده: ما وضعیت پرندگان آبزی جوجه‌آور را طی دوره ژوئن تا آگوست ۲۰۰۴ در محل تجمع حواصیل‌ها در ناحیه کوماراکوم در مجموعه توریستی KTDC در منطقه کرالا واقع در جنوب هند بررسی کردیم. ده گونه از پرندگان آبزی متعلق به خانواده‌های مارگردن، باکلان، حواصیل و اکراس در حال جوجه‌آوری در منطقه مورد مطالعه بودند. باکلان کوچک (*Phalacrocorax niger*) دارای بیشترین تعداد و اگرت کوچک (*Egretta garzetta*) دارای کمترین تعداد طی مدت مطالعه بودند. حواصیل شب (*Nycticorax nycticorax*) در مقایسه با گزارش‌های قبلی دارای جمعیت کمتری بود. در مرحله اول این مطالعه، تعداد مارگردن هندی (*Anhinga melanogaster*) حدود ۸٪ جمعیت منطقه جنوب آسیا را تشکیل می‌داد. اکراس سرسیاه (*Threskiornis melanocephalus*) برای اولین بار در این ناحیه دارای آشیانه‌سازی بود. عوامل مهم دارای اثرات زیان‌بار روی اکوسیستم شامل عدم رشد مجدد مانگرو، رشد کنترل نشده علف‌های هرز و رهاسازی فاضلاب در این ناحیه بودند. افزایش در جمعیت دو گونه باکلان و مارگردن هندی و کاهش در جمعیت حواصیل شب می‌تواند مرتبط به احداث دیواره نمکی تانیرکوم در عرض دریاچه ومباناد و در نتیجه تغییر در اکولوژی بخش جنوبی این دریاچه باشد. به علت اهمیت ناحیه کوماراکوم برای پرندگان ابزی جوجه‌آور و دیگر پرندگان آبزی، این ناحیه به طور بالقوه به عنوان پناهگاه پرندگان آبزی ارزشمند خواهد بود.

INTRODUCTION

Kumarakom along the southwest coast of the state of Kerala in India is an important area for wildlife because of the presence of migratory waterbirds and a large heronry in the Kerala Tourist Development Corporation (KTDC) Tourist Complex. During the 1970s and 1980s, the Baker Estate as the KTDC property was then known was the only place in Kerala where Black-crowned Night Herons *Nycticorax nycticorax* bred. Neelakantan (1996) recorded 3000 to 4000 Night Herons breeding in a marshy area in the northwest part of the estate. After the area was taken over by the KTDC, there was a proposal to clear the mangrove belt along the backwater and construct cottages, bars *etc*. Following a sustained public protest, the Kerala State Science and Technology Committee and Prof. V.K. Damodaran visited the area and recommended that a detailed study be carried out on the flora and fauna of the estate. The Centre for Earth Science Studies was entrusted with this study, and submitted a report to the Government of Kerala recommending that the area be protected. Following this study, in 1989 the Wildlife Advisory Board of Kerala recommended that the Government should declare the Baker Estate as a Bird Sanctuary. However, contrary to this scientific advice, 13 hectares of the land were given to a venture company. This company cleared the mangroves, converted the area into a lawn, and constructed a boat jetty for use by tourists. In the process, a stand of the mangrove *Kandelia candel* was totally destroyed (Ramachandran & Mohanan 1990). During the 1990s, the venture company cleared bamboo clumps, trees and half of the mangroves, and installed powerful electric lights on the trees. These activities directly affected the breeding birds and as a result one third of the birds left the area (R. Sugathan, pers. comm.).

The Kumarakom heronry is currently owned by the KTDC. Various individuals and NGOs have documented the waterbird populations in this area on an annual basis (Anon. 1993, Sreekumar 2001, 2002, 2003, 2004). However, prior to the present investigation, no detailed study of the breeding birds had been undertaken. The main objectives of the present study were to monitor changes in the status of colonial breeding waterbirds in the Kumarakom heronry and to determine the major threats to the heronry.

STUDY AREA

Kumarakom is situated in the Kuttanad wetlands of Kerala. The Kuttanad is primarily a deltaic low-lying formation of land with backwaters, canals and network of streams. It is a highly fertile tract of land replenished by silt brought down by four river systems, namely the Achankovil, Pamba, Manimala and Meenachil, which are connected to the sea by Vembanad Lake (Padmakumar *et al.* 2002). The Kumarakom heronry is located in the KTDC Tourist Complex (76°25'–76°26'E, 9°37'–9°38'N) and lies 0.75 to 1 m above sea level. It is one of the biggest heronries in Kerala, and is situated at the eastern fringe of the Vembanad estuary that forms an integral part of the Vembanad-Kole Ramsar site (Fig. 1). Moreover, Vembanad Lake has been identified as one of India's Important Bird Areas (Islam & Rahmani 2004). The heronry covers 112 acres (45.3 ha), and is 14 km west of the town of Kottayam. It is bounded to the east by the Kumarakom–Vechoor road, to the north by the Kavanar River, to the south by a farm of the Regional Agricultural Research Station of Kerala Agricultural University, and to the west by the freshwater-dominated southern part of Vembanad estuary. The estuarine zone near the tourist complex contains organically rich sediments, which make it a highly preferred habitat for breeding shrimps. The primary vegetation includes mangroves such as *Avicennia officinalis, Bruguiera gymnorrhiza, Rhizophora mucronata* and *Sonneratia caseolaris,* marshy mangrove associates and hydrophytes. Some of the native vegetation has been converted to coconut *Cocos nucifera* and rubber *Hevea brasiliensis* plantations.

MATERIAL AND METHODS

The present study was undertaken during the period June to August 2004. Direct total counts were used to determine the populations of colonial breeding waterbirds. Birds were identified and counted with the aid of Bushnell

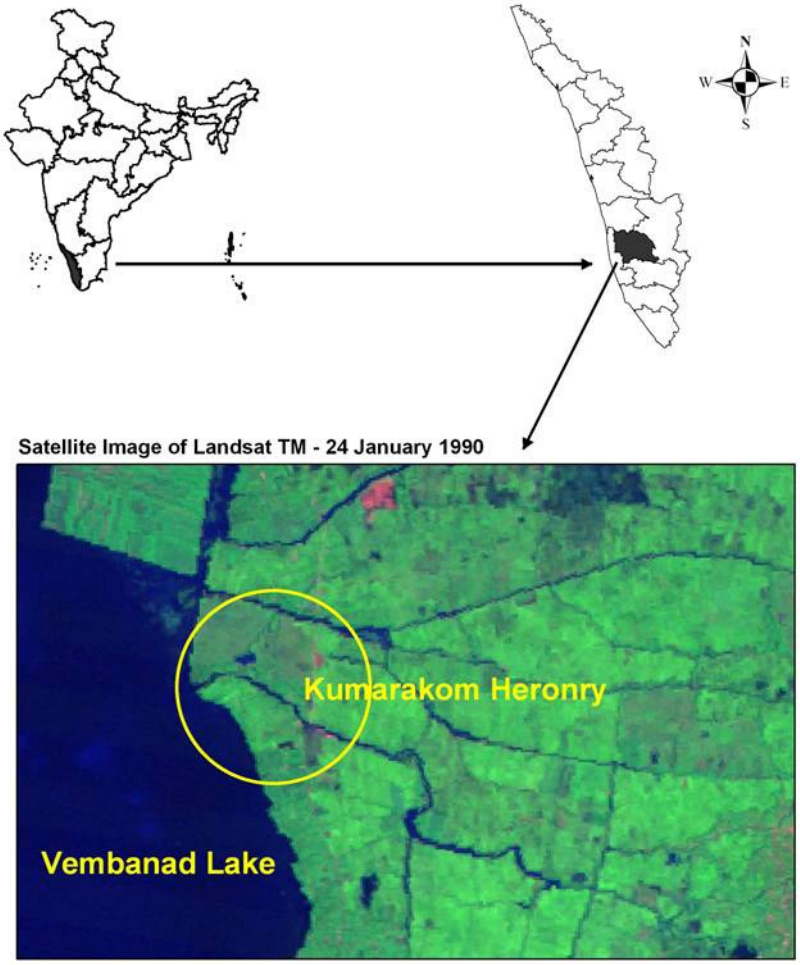

Figure 1. Location of Kumarakon Heronry

7x35 binoculars. Bird counts were carried out once a week by walking along the footpaths on the dykes in the early morning (0600 to 1000 hrs) and again in the evening (1700 to 1900 hrs). The counts were not always carried out at intervals of exactly seven days because of adverse weather conditions, and in a few instances, the weekly count had to be abandoned due to heavy southwest monsoon (June to September) rainfall. The average of the morning and evening counts was taken as the daily count and rounded up to the nearest whole number. The nests in each tree were counted and marked by plotting the nest location on white paper. In this way, newly built nests were easily identified and added to the previous count to give the total number of nests present. Major factors detrimental to the heronry were documented by general observation throughout the study period. No efforts were made to quantify these factors scientifically.

RESULTS

Ten species of colonial waterbirds belonging to four families, Anhingidae, Phalacrocoracidae, Ardeidae, and Threskiornithidae, and one order, Ciconiiformes, were found breeding in the Kumarakom heronry. The Little Cormorant *Phalacrocorax niger* and Indian Cormorant *Phalacrocorax fuscicollis* had the largest populations throughout the entire period of the study. The Little Cormorant was the most numerous of all species, with 2183 birds counted during one of the morning counts in June (Table 1), and the Little Egret *Egretta garzetta* was the least numerous.

An average of 211 individuals of the near threatened Oriental Darter *Anhinga melanogaster* was recorded on the third count in July, and the highest single count of this species was 276. The Black-headed Ibis *Threskiornis melanocephalus* is another near threatened species that was present in considerable numbers. The ibises did not start nesting until July, and hence no counts were made for this species in June. The highest average count of this species during the survey was 175 in August, but 208 individuals were counted in one of the evening counts.

A total of 1068 nests were counted. The Little Cormorant was the most abundant breeding species with 331 nests, followed by Indian Cormorant (168 nests) and Oriental Darter (157 nests). The least common species were Little Egret and Great Egret with four nests and 11 nests respectively. Sixty-four nests of Black-headed Ibis were recorded. For Little Cormorant, Indian Cormorant, Intermediate Egret, Purple Heron and Indian Pond Heron, the number of nests recorded reached a peak in June. For Oriental Darter and Great Egret, the peak was in July, and for Black-crowned Night

Heron, Little Egret and Black-headed Ibis it was in August (Table 2).

In all species except Black-headed Ibis, the number of nests had declined by the last week in August.

The following were identified as the major factors having an unfavorable effect on the ecosystem:

i) local extinction of mangrove species due to the lack of regeneration;
ii) release of sewage water from the adjacent luxury hotels;
iii) conversion or alteration of vegetation, especially mangroves, for tourist developments;
iv) cutting of trees for firewood on the dykes, which act as a buffer zone between terrestrial and marsh habitats.

Table 1. Weekly and maximum counts of ten species of waterbirds in the Kumarakom heronry.

Count Date	Oriental Darter	Little Cormorant	Indian Cormorant	Black-crowned Night Heron	Little Egret	Intermediate Egret	Great Egret	Purple Heron	Indian Pond Heron	Unidentified egret	Black-headed Ibis
03 Jun. 04 (Week 1)	61	1058	553	759	5	65	8	17	19	14	-
10 Jun. 04 (Week 2)	87	1051	478	209	8	112	7	19	19	11	-
17 Jun. 04 (Week 3)	209	1709	945	188	2	322	10	43	42	85	-
24 Jun. 04 (Week 4)	181	1756	984	221	4	170	19	27	77	47	-
08 Jul. 04 (Week 2)	149	943	512	139	9	86	8	13	28	12	93
15 Jul. 04 (Week 3)	211	1136	753	136	4	82	26	21	38	64	101
28 Jul. 04 (Week 5)	215	979	622	92	3	64	22	14	24	16	87
10 Aug.04 (Week 2)	172	912	417	97	3	31	18	12	18	30	85
18 Aug.04 (Week 3)	160	850	454	106	6	28	25	11	9	77	144
26 Aug.04 (Week 4)	151	757	427	98	4	33	14	7	14	52	175
Maximum count	**276**	**2183**	**1058**	**1402**	**14**	**322**	**33**	**49**	**106**	**117**	**208**
1% South Asian Biogeographical Population	**40**	**1,500**	**300**	**1,000**	**600**	**250**	**250**	**250**	**10,000**	**-**	**100**

Table 2. Weekly counts of nests and estimated total number of breeding pairs of ten species of waterbirds in the Kumarakom heronry.

Date	Oriental Darter	Little Cormorant	Indian Cormorant	Black-crowned Night Heron	Little Egret	Intermediate Egret	Great Egret	Purple Heron	Indian Pond Heron	Unidentified egret	Black-headed Ibis
03 Jun. 04 (Week 1)	38	243	157	2	2	26	1	6	13	0	-
10 Jun. 04 (Week 2)	76	215	74	12	3	85	6	18	38	0	-
17 Jun. 04 (Week 3)	89	207	94	15	3	78	8	17	54	0	-
24 Jun. 04 (Week 4)	106	211	114	18	2	74	10	19	64	13	-
08 Jul. 04 (Week 2)	126	123	74	21	3	58	10	17	51	17	5
15 Jul. 04 (Week 3)	135	92	65	38	3	47	11	14	45	13	26
28 Jul. 04 (Week 5)	98	133	44	65	3	40	10	9	23	9	29
10 Aug.04 (Week 2)	89	141	4	58	1	19	9	5	4	17	27
18 Aug.04 (Week 3)	86	136	7	74	3	26	8	3	1	43	33
26 Aug.04 (Week 4)	94	91	4	52	3	17	7	4	0	27	58
Estimated total breeding pairs	**157**	**331**	**168**	**88**	**4**	**93**	**11**	**25**	**84**	**43**	**64**

DISCUSSION

Of the ten species that were found breeding in the Kumarakom heronry during the present study, nine had previously been reported to breed in the area (Sreekumar 2003), and one, the Black-headed Ibis, was found breeding for the first time. Two of the ten species, Oriental Darter and Black-headed Ibis, are globally near threatened (BirdLife International 2001).

The numbers of Indian Cormorants, Indian Pond Herons, Black-crowned Night Herons, Intermediate Egrets and Black-headed Ibises recorded during the present study were higher than the numbers in mid-winter reported by Sreekumar (2001, 2002, 2003 & 2004). However, the number of Purple Herons was well below the previous maximum count of 88. Furthermore, the number of nesting Black-crowned Night Herons was much lower than the number (3000 to 4000 individuals) reported by K.K. Neelakantan during the 1970s and 1980s (Sreekumar 2002). Changes in the condition of the lake and feeding habitats could have affected the population of this species. This type of reduction in numbers could be balanced if favorable conditions became available for the species. Such a balancing of populations from one year to the next has been recorded by Jenkins (1999) in the Water Rail *Rallus aquaticus*. In species living in an unpredictable and seasonally unfavorable environment, high productivity from clutches in one year may balance low productivity in other years. Ogden *et al.* (1980) have postulated that storks may move between colonies or sub-regions during unfavorable local conditions. However, no other large colonies of Black-crowned Night Herons have as yet been reported in the vicinity of the Kumarakom heronry.

The congregations of Little Cormorants, Indian Cormorants and Oriental Darters were the largest ever recorded in the area (B. Sreekumar, pers. comm.), with the numbers of Little Cormorants and Indian Cormorants exceeding the previous maximum counts throughout the entire study period. These recent increases in the cormorant and Oriental Darter populations and the decrease in the Black-crowned Night Heron population may be due to the construction of Thanneermukkom Saltwater Barrier in the Vaikom part of Vembanad Lake. Since the construction of the barrier, the southern part of the lake has become a freshwater body. Populations of freshwater fish species have increased in the area and these presumably comprise the major food source for the cormorants and Oriental Darters, although there have been no studies to prove this. All of the studies concerning fishes have been related to the decline in commercially important estuarine species, and there is now a need for detailed studies of the freshwater fish populations and their influence on the bird populations.

The increase in the Oriental Darter population in the area may be due to an increase in the freshwater fish populations. Alternatively, it could be the result of habitat loss in other areas. In recent years, the Oriental Darter population in the Periyar Tiger Reserve has declined, possibly as a result of competition for nest sites with the Great Cormorant *Phalacrocorax carbo* (Sashikumar & Palot 2002). This may be one of the reasons for the increased Oriental Darter population at Vembanad Lake. Rahmani *et al.* (2002) reported that 83 Great Cormorants were observed in Kerala during the winter of 2001/02, and the presence of Great Cormorants has already been reported from Vembanad Lake and adjacent areas (Sreekumar 2003). In future, this may affect the breeding population of Oriental Darter in the Kumarakom heronry.

According to the report of the Waterbird Census in India in 2002, only 489 Oriental Darters were recorded in the whole of India (Rahmani *et al.* 2002). Zachrias & Gaston (2003) reported that the Oriental Darter population had declined in Kerala over the past three decades. The numbers of Oriental Darters recorded at Kumarakom heronry during the 2001 to 2004 January mid-winter waterbird counts conducted by Kottayam Nature Society with the help of Kerala State Forest and Wildlife Department were 65, 10, 23 and 42 respectively (Sreekumar 2001, 2002, 2003, 2004; Sreekumar & Narayanan 2004). The much larger numbers of Oriental Darters present during the breeding season suggest that birds from other areas also congregate here to breed. Clearly, this important breeding population must be protected and monitored.

Vembanad Lake and adjacent areas are included in the Vembanad-Kole Ramsar site,

which was designated in November 2002 (Sreekumar 2003). According to Wetlands International (2002), the South Asian biogeographical population of Oriental Darter is estimated at 4000 individuals. The maximum number of darters recorded during the present study was 276 in one count in July, and based on the number of nests recorded, the total breeding population was estimated at 314 individuals. Thus the population of Oriental Darters in the Kumarakom heronry represents about 8% of the South Asian population. The numbers of Oriental Darters remained almost stable throughout the study. The Black-headed Ibis is another near threatened species that was present in the study area in considerable numbers. The maximum count of 208 individuals represents at least 2% of the South Asian population, which has been estimated at less than 10,000 individuals (Wetlands International 2002). The numbers of three other species in the Kumarakom heronry, Indian Cormorant (1058), Black-crowned Night Heron (1402) and Little Cormorant (2183), exceed the 1% thresholds for their biogeographical populations (Wetlands International 2002). Thus for five species the site qualifies as a Wetland of International Importance under Criterion 6 of the Ramsar Convention on Wetlands.

According to Boyd & King (1959), a nest count is theoretically the best measure of a breeding population. A total of 1068 nests of all waterbird species were counted in the study area, indicating a breeding population of 2136 waterbirds. Compared with the total numbers of birds counted, the numbers of nests of Little Cormorant and Black-headed Ibis were low. The Indian Cormorant and Oriental Darter were the second and third most numerous species at Kumarakom, with 168 and 157 nests respectively, making these the largest colonies of these two species in Kerala (Sreekumar, pers. comm.). The Black-headed Ibis was found breeding for the second time in Kerala; the only previous report of the nesting of this species was in Wayanad District (Balakrishnan & Thomas 2004). The Black-headed Ibises started breeding in July and the maximum number of nests was observed in August, by which time the number of nests of other species had started to decline.

The Little Cormorant and Indian Cormorant were commoner than all other species both in terms of numbers of birds and numbers of nests recorded. A similar situation was recorded in Mangalavanam mangroves, Cochin, where the Little Cormorant was the dominant species (Jayson 2001). According to Sreekumar (2001), K.K. Neelakantan reported 1500 to 2000 nests of the Black-crowned Night Heron in the Kumarakom heronry during the monsoon breeding seasons of the 1960s and 1970s. Only 88 nests were located during the present study, indicating that there has been a 96% decline in the breeding population of this species. Various changes have occurred in the area, such as reduction in the extent of reed-beds *Phragmites karka* in which the herons breed, changes in the ecology of Vembanad Lake and adjacent regions due to the construction of Thanneermukkom Saltwater Barrier, changes in the fish population and habitat destruction, which could have adversely affected the breeding population of Black-crowned Night Herons. The number of breeding Purple Herons has also declined; only 25 nests were recorded during the present study whereas 75 nests were recorded in this heronry by P.K. Uthaman in 2003 (B. Sreekumar, pers. comm.).

Conservation

The Kumarakom heronry and adjacent areas area still remain unprotected. Appropriate conservation strategies should be developed and a protected wetland area should be established including parts of Kerala Tourism Development Corporation's Tourist Complex, Pathiramanal Island and a portion of the lake between these two areas. This could be achieved through the involvement of the local Panchayaths, NGOs, various stakeholders and the Forest Department. Successful conservation of waterbird species will depend on an improved understanding of their ecological requirements and patterns of movement (Fellowes *et al.* 2001). Further detailed study of the each species should therefore be conducted to gain a thorough understanding of its fluctuations in numbers, seasonal changes in distribution and temporal pattern of migration. Most importantly, the ecological requirements of the breeding birds should be studied in detail. Nesting success and the survival of young would be improved by allowing a buffer of

natural vegetation to develop along the margins of the marsh and restricting access to tourists during the breeding season, especially in the vicinity of the main nesting area. Observation towers equipped with telescopes could be used by tourists wishing to watch the nesting birds. Studies should be carried out on the recent changes in the ecology of Vembanad Lake and habitat changes in the Kumarakom Tourist Complex, and the impact that these are having on the feeding habitat of the birds. Creation of awareness among the general public of the need to protect the remaining mangroves and heronry should be given high priority.

Other recommendations are as follows:

i) A complete ban on the conversion or alteration of the vegetation, especially mangroves.
ii) Restoration of mangroves in the area.
iii) Effective measures to check the release of sewage water into the area, including the lake.
iv) The collection of trees for firewood should be strictly banned, since this adversely affects the growth of mangroves and other plants.

CONCLUSION

As a wetland ecosystem, this area is important for breeding and roosting waterbirds. It holds one of the largest breeding colonies and roosts of cormorants, herons and egrets in Kerala, and supports important populations of two globally near threatened birds – Oriental Darter and Black-headed Ibis. In the breeding season, which takes place during the monsoon, the number of birds in the heronry increases because of the immigration of birds from other areas. Management of the wetlands is crucial for the conservation of these species, especially the resident waterbirds that spend the greater part of their life in the wetlands (Vijayan 1995). Although the Ramsar site designated in 2002 includes both Vembanad Lake and Kole Wetlands, there is no definite connection between Vembanad and the Kole wetlands, and both have the potential to become independent Ramsar sites. Hence, we propose that Vembanad Lake should be declared as a Ramsar site in its own right. We also propose that Kumarakom heronry should be declared as a separate Important Bird Area (IBA), and that the whole area has the potential to be declared as a Protected Waterbird Sanctuary.

Acknowledgements: The first author is grateful to Dr V.S. Vijayan, former Director of the Salim Ali Centre for Ornithology and Natural History (SACON), for funding the student project and providing facilities; to Dr A.P. Thomas, Director of the School of Environmental Sciences (SES), Mahatma Gandhi University, Kottayam, Kerala, for constant encouragement; and to Dr S.N. Prasad, Senior Principal Scientist, Landscape Ecology Division, SACON Deccan Regional Station, for providing facilities. We extend our sincere thanks to J. Ranjini, Anoop Das, Balakrishnan, R. Dhanya of SACON, J.C. Mathew, V.P. Sylas of SES and K.S.G. Sundar for their help, encouragement and valuable comments. We would also like to thank Dr B. Sreekumar, President of the Kottayam Nature Society, S. Dipu and D.V. Raju for their support and timely assistance during the fieldwork. We are also thankful to the two anonymous referees for their valuable suggestions and comments to improve this paper.

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