Short Communication

Conservation needs of the coconut crab *Birgus latro* on the Nicobar Islands, India

VARDHAN PATANKAR and ELRIKA D'SOUZA

Abstract We describe the distribution of the coconut crab *Birgus latro*, categorized as Data Deficient on the IUCN Red List, local perspectives towards the species, and its conservation needs on the Nicobar Islands in the eastern Indian Ocean. The species is threatened with extinction across most of its range and in India it is found only on a few islands in the Andaman and Nicobar archipelagoes. We carried out informal discussions with Nicobari communities to examine issues regarding conservation of the species and conducted timed searches in areas where coconut crabs were likely to be found. The discussions revealed that there are social taboos against hunting the coconut crab on most of the Nicobar Islands. However, on some islands these taboos are not being followed and community members may hunt the crab for consumption. Athough the coconut crab is legally protected under the Indian Wildlife Protection Act none of the villagers were aware of this. Of the six islands surveyed we recorded the presence of 17 and 14 crabs on two islands, respectively. On four islands villagers reported the presence of the crab prior to the tsunami of 2004, and on two of these islands the species may now be locally extinct. A small population size and a fragmented distribution in areas of coconut plantations suggest that the species is threatened. We recommend monitoring and detailed research on the ecology and genetics of the coconut crab, along with community-based conservation initiatives to conserve the species and its habitat.

Keywords *Birgus latro*, coconut crab, India, Nicobaris, Nicobar Islands, social taboos

The coconut crab *Birgus latro*, categorized as Data Deficient on the IUCN Red List (Eldredge, 1996), is the largest land crab. It occurs on oceanic atolls and islands in the Indo-Pacific region and is reported to grow up to 35 cm in length and weigh up to 5 kg. The species' only dependence on the sea is for releasing eggs, which hatch in contact with seawater; the planktonic larvae then migrate onto land where they develop into long-lived adults (Reese & Kinzie, 1968). The successful recruitment of larvae to the adult population is irregular (Schiller et al., 1991; Schiller, 1992).

In many parts of its range the coconut crab is hunted for consumption. A slow growth rate and long life span combined with high levels of exploitation and habitat degradation make the species susceptible to overexploitation (Fletcher & Amos, 1994) and in many countries the crab is virtually extinct (Schiller, 1992). However, the length of the planktonic larval phase of the species, which is 3–4 weeks, could provide sufficient time for dispersal and thus establishment of new populations (Brown & Fielder, 1991; Lavery et al., 1995). Conservation of the coconut crab would not only benefit the current population but also help in the establishment of new populations.

In India the coconut crab occurs on some islands of the Andaman and Nicobar archipelagoes. In the Andaman Islands the species has been reported from South Sentinel (Alcock, 1905) and Little Andaman Island (M. Chandi, pers. comm.). In the Nicobar Islands the species has been reported from Car Nicobar (Hume, 1874), Katchal, Great Nicobar, Little Nicobar, Camorta, Menchal and Cabra Island (Daniel & Premkumar, 1968; Altevogt & Davis, 1975; Bhaskar & Rao, 1992). These islands were severely affected by the tsunami of 2004 (Ramachandran et al., 2005), with the destruction of coastal habitats and some coastal fauna, including the endemic Nicobar megapode *Megapodius nicobariensis* (Sivakumar, 2004). The tsunami could also have affected the coconut crab as it inhabits narrow stretches of coast adjoining coconut plantations (Sankaran et al., 2005). Although incidental sightings after the tsunami confirmed the continued presence of the coconut crab in the Nicobar Islands (Patankar, 2007; Sivkumar, 2010) its status was previously unknown.

The coconut crab is afforded the highest level of legal protection in India, categorized under Schedule-I of the Indian Wildlife Protection Act. However, this categorization was based on secondary data rather than field investigations of the species. Lack of information regarding the population, especially following the 2004 tsunami, and existing practices pertaining to hunting of the species has hampered the conservation of the species. The aim of this study was to assess the distribution of the coconut crab's habitat and local

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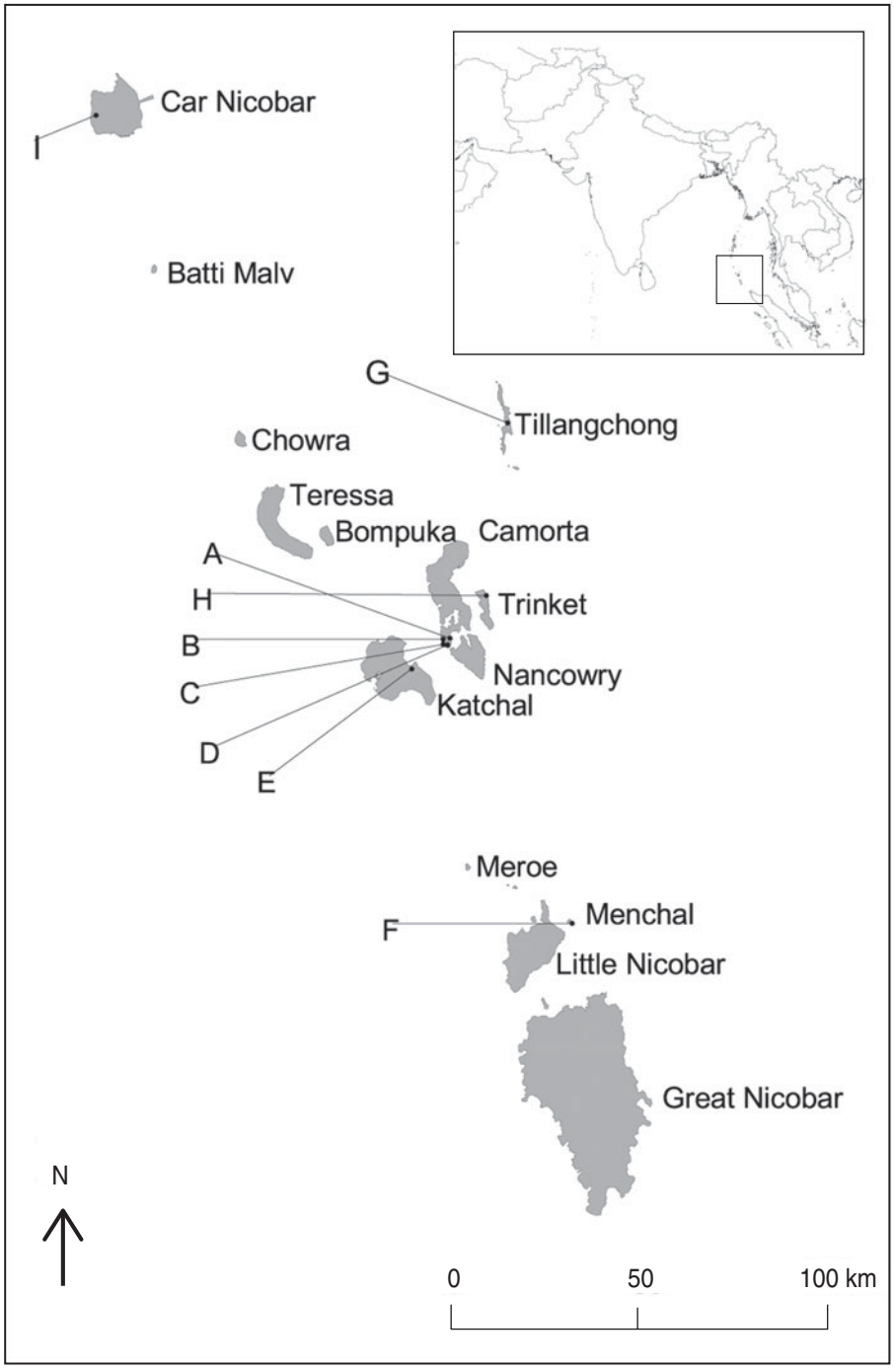

FIG. 1 The Nicobar Islands, India, indicating the nine forest fragments (A–I) in which we searched for the coconut crab *Birgus latro*. The rectangle on the inset indicates the location of the Nicobar Islands in the eastern Indian Ocean.

attitudes towards the species to provide recommendations for appropriate management and conservation.

The 2,000 km^2 Nicobar Islands lie in the south-east Bay of Bengal in the eastern Indian Ocean. The archipelago comprises 21 large and small islands, of which 12 are inhabited (Fig. 1). To the south lies the Great Nicobar group comprising two islands $>$ 100 km^2, nine islets $>$ 5 km^2, and a few rocks; 58 km north of the Great Nicobar group is the Nancowry group comprising three islands $>$ 100 km^2, two, of 36 and 67 km^2, three $<$ 17 km^2, two small islets and a few rocks. The northernmost islands comprise Batti Malv and Car Nicobar, 88 km north of the Nancowry group. Two indigenous groups of people inhabit the Nicobar Islands, the Shompens and Nicobaris, along with some settlers from the Indian mainland. The islands receive heavy rainfall from the south-west and north-east monsoons. The coastal forests of the islands comprise evergreen rainforests and some areas have been planted with coconut palms.

During 2008 we conducted informal discussions with Nicobari communities in 11 villages close to potential crab habitats in Car Nicobar, Camorta, Trinket, Katchal and

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Little Nicobar islands to investigate the likely habitats of coconut crabs, any taboos and people's perceptions of the conservation of the species. Based on the information received in these discussions we searched all potential coconut crab habitats (coastal forests, and crevices, caves and hollow tree stumps in these forests) on four inhabited (Car Nicobar, Camorta, Trinket and Katchal) and two uninhabited islands (Tillangchong and Menchal) during March–May 2008. The coconut crab is nocturnal (Reyne, 1939; Held, 1963) and night-time searches could result in individual crabs being counted more than once. We therefore carried out surveys during daylight. In each potential location we inserted a small digital camera inside burrows to confirm the presence of crabs. We recorded the number of hours spent searching in each forest fragment, the approximate area of the fragment, the width of each burrow entrance and its distance to the nearest coconut palm, and made observations of the coconut crab's habitat.

We found that there are social taboos associated with hunting of coconut crabs on the Nicobar Islands. None of the villagers were aware that hunting the crab is illegal and that the species is protected under the Indian Wildlife Protection Act. On Camorta Island it is believed that consumption of the crab could bring bad luck and also cause illness that could lead to death. If an individual falls ill following consumption of a coconut crab members of the family make a wooden replica of the crab and perform rituals at the site where the crab was caught. In two villages on Camorta (Nuot and Payuha), small-scale local consumption of the crab is allowed but hunting of the crab by people from nearby villages is prohibited. On Menchal Island the crab is believed to be protected by the spirit of the island, and hunting and consumption of the crab is prohibited in all the villages of Little Nicobar Island, which is close to Menchal Island. However, the villagers of Pulopanja on Little Nicobar Island hunt the coconut crab for consumption. A few villagers, on all the islands surveyed, had never seen a coconut crab but all were aware of the species. The villagers of Katchal Island hunt the coconut crab. On all islands surveyed hunting of the crab for consumption was widespread among young people, whereas elders followed the social taboos set by the community.

Details of the forest fragments searched and the number of coconut crabs located are given in Table 1. On Katchal and Tillangchong we searched for 6 and 4 hours, respectively, but did not locate any coconut crabs, although villagers indicated that the species is present on these islands. We did not locate the species on Car Nicobar and Trinket and villagers indicated they had not seen the coconut crab after the 2004 tsunami and they believe the species is now extinct on their islands. However, further surveys are required on these two islands to confirm this. We located the crab only on Camorta and Menchal islands.

TABLE 1 Areas of the nine forest fragments searched (see letters in Fig. 1 for locations), search effort and total number of coconut crabs *Birgus latro* recorded on the six islands.

Island	Forest fragment	Area (km^2)	Search effort (hours)	No. of crabs
Camorta	A	0.33	4	1
	B	0.87	8	5
	C	0.76	8	4
	D	1.20	8	7
Katchal	E	2.00	6	0
Menchal	F	2.78	6	14
Tillangchong	G	1.73	4	0
Trinket	H	2.26	6	0
Car Nicobar	I	1.21	5	0

On Camorta we found 17 crabs in a forest fragment of 3.2 km^2 during a search effort of 28 hours and on Menchal 14 crabs in a forest fragment of area 2.8 km^2 during a search effort of 6 hours. All crabs seen were within 50 m of a coconut palm. We sighted 11 crabs in burrows under fallen trees, four between roots of trees and 13 in rock crevices. Two individuals were observed feeding on coconut kernel and one was observed walking on the sandy shore. The soil inside and at the entrance of burrows was dark brown in colour and rich in organic matter. The entrances were clear of debris and covered with finely shredded coconut coir. The widths of the burrow entrances were 25–45 cm. None of the burrows were found in sandy areas close to the shore.

On all the islands surveyed social taboos are associated with consumption of the coconut crab. The fact that these taboos are still being followed to some extent indicates there is a level of awareness regarding the crab. Currently the only apparent threat to the coconut crab is, however, from hunting for consumption. The proximity of the coconut crab to coconut palms indicates that coconut plantations are an important habitat for the crab. These plantations are regularly visited by the islanders and, as the signs of crab presence (e.g. coconut husk) are conspicuous, these could render them susceptible to hunting. Although the species is protected by legislation the level of awareness of this legislation is low. Furthermore, the indigenous communities of the Nicobar Islands are exempted from the Wildlife Protection Act under the Andaman and Nicobar Protection of Aboriginal Tribes Regulation, 1956, and are allowed to hunt wildlife for subsistence. Legislation for threatened species can be effective if social conditions encourage self-regulation (Reiser et al., 2005) and the social taboos forbidding hunting of the coconut crab on the Nicobar Islands could, if strengthened, be used to promote the coconut crab as a flagship species for raising environmental awareness. As numerous crabs were sighted on Camorta and Menchal these islands could be suitable for the initiation of conservation efforts.

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We recommend that more extensive surveys be carried out in all potential coconut crab habitats on the Andaman and Nicobar archipelagoes and that the Andaman and Nicobar Forest Department conduct detailed studies of the coconut crab in collaboration with research institutions working in the islands. Investigations using molecular techniques and population genetic analyses, to assess variability and gene flow between island populations, are also needed. Such research will not only provide new information on the ecology and biology of the species but also identify source metapopulations and provide empirical and technical support for the species' conservation.

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Biographical sketches

Vardhan Patankar studies coral reef communities and patterns of marine resource use in the Nicobar Islands. His interests are in understanding community dynamics of marine ecosystems and social issues related to marine biodiversity conservation. Elrika D'souza is studying the interactions between dugongs and seagrass meadows around the Andaman and Nicobar Islands.