

EXISTENCE OF INSULAR TERRESTRIAL MAMMALS OF THE GULF OF KACHCHH, GUJARAT, INDIA

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ABSTRACT

The Gulf of Kachchh (GoK) has occurrence of species belonging to Cetacea and Sirenia along with terrestrial mammals of the mainland but information on these species are scanty. The islands of the southern GoK geographically comprise of mainland attached intertidal areas, aerial and submerged islands, pinnacles, islets, knolls and reefs. In the present study, a total of seven species of mammals were recorded from 11 islands of the GoK. Among recorded species Golden Jackal was found to be the most common (*i.e.*, 71.4%) followed by Indian Hare (*i.e.*, 14.3%). Among the 11 islands, maximum species (n=4) were recorded from Bet Dwarka. Existence of such species on island is determined by three assumptions: i) proximity to suitable habitat and occurrence of unsuitable habitat as a barrier and ii) human-facilitated dispersal. In addition to islands mammals of the GoK, a total of 24 species of mammals belonging to 7 orders and 16 families were recorded from the entire GoK which is almost 23.1% of total wild mammalian species of Gujarat .

Key words: Gulf of Kachchh, Insular system, Mammals.

Introduction

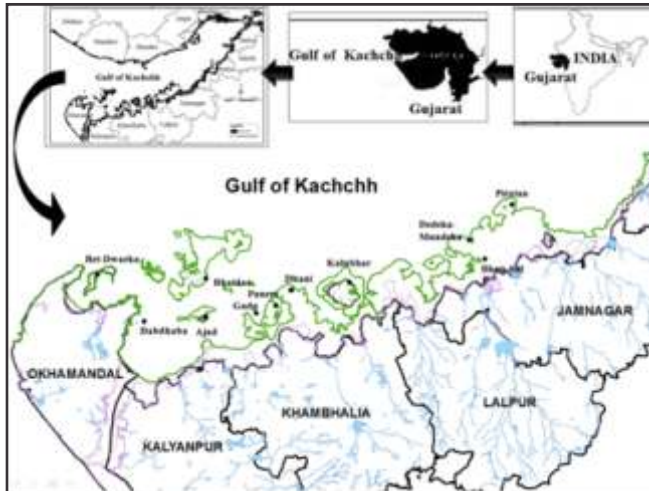
Mammalian fauna of the Gulf of Kachchh (GoK) is mainly represented by Cetaceans (whales, dolphins and porpoises) and Sirenias (Sea Cow) together with the terrestrial mammals of mainland and islands (Lal, 1963; Frazier and Mundkur, 1990; Singh, 2013). Some of the islands of the GoK have existence of domestic mammals such as camel, cat and dog. (Singh *et al.*, 2004). Apart from existence of domestic mammals, insular system of GoK has occurrence of certain species of wild mammals (Singh *et al.*, 2004; Ramkumaran *et al.*, 2017). Such wild mammals include Jackal, Jungle cat, Indian hare and Blue bull. There was a record of Leopard also (Jani and Mishra, 2009). Although many studies have been conducted on the GoK, yet very scanty information is available on mammals of GoK. A compilation of research conducted on GoK by Kamboj *et al.* (2014), contains a total of 223 abstracts, of which only six abstracts are on mammals of the GoK. Moreover, these six abstracts are mainly on stranded or live records of marine mammals. It reveals that very less scientific information is available on the mammals of Gulf of Kachchh especially insular mammals. The present study gives information on insular mammals of the GoK.

Study Area

The study was confined to Gulf of Kachchh, the western most part of Gujarat State, India. Biogeographically,

the GoK falls under the sub-biotic province - 8A (Gulf of Kachchh) of province - 8A₁(West Coast) of Zone - 8 (The Coast of India) (Rodgers and Panwar, 1988). It encompasses an area of around 7,350 km² (Gol, 2002). The GoK is a shallow water body and average depth is 30m ranging from 20m at the head of the Gulf to 60m at the mouth. The minimum depth is 3m in the inner creeks (Nair *et al.*, 1982). The tidal amplitude in the north of the GoK varies from 3 to 8m while in the south it is 3 to 5m (Sengupta and Deshmukhe, 2000). Most of the intertidal areas in the southern GoK have been notified as Marine National Park (162.89 Km²) and Marine Sanctuary (457.92 Km²) (Singh, 1994; Jani and Mishra, 2009). Geographically, intertidal areas of the southern GoK are attached to mainland, aerial and submerged islands, pinnacles, islets, knoll and reefs (GEC, 2011). Aerial and submerged islands along with pinnacles, islets, knoll and reefs make the insular system of the Gulf. Some of the islands of the insular system are very close to the mainland but stretches of creeks separate them from mainland. These islands include Pirotan, Chhad-Jindra, Bhains-bid, Dedeka-Mundeka, Kalubhar, Dhani, Khimara-khat and Garu (Map 1). On the contrary, some of the islands are located very far from the mainland and deep water forms the barrier between islands and mainland. Such these islands include Chank, Ajad, Noru, Bhaidar, Boria, Paga, Goose, Khara-Mitha Chusana, Manmarodi & Langhamarodi, Lefa and Dabdabha (Map 1).

A total of 24 species of mammals belonging to 7 orders and 16 families have been recorded from the entire GoK contributing about 23.1% of total wild mammalian species of Gujarat State.



Map 1: Insular system of the Gulf of Kachchh - Study area.

Methodology

Spatial and temporal observations were carried out through line transect and point sampling methods. The coastal area and insular systems of the GoK were covered for recording occurrence of mammals. A total of 15 transects were laid on 13 islands and 72 transects were laid on coastal areas. The length of each of the 15 transects was 2km, hence, the total length of transects was 30km. The transects were treated as open-width transects. The repeated observations were made covering three distinct seasons, i.e. summer, winter and monsoon for three years. Along with transect based observations, opportunistic observations were also carried out.

Results and Discussion

Existence of total seven wild mammalian species was recorded from insular system of the GoK in present study and these species were primarily terrestrial. The recorded insular terrestrial mammalian species in the present study were Blue bull (*Boselaphustrago camelus*), Golden Jackal (*Canis aureus*), Grey mongoose (*Herpestes edwardsii*), Indian gerbil (*Tatera indica*), Indian hare (*Lepus nigricollis*), Jungle cat (*Felis chaus*) and some unidentified rodents. Jani and Mishra (2009) mentioned that Jackal and Fox were found on the islands. In addition, shrew, house rats, hare, porcupine and jungle cat were also found in Dwarka and Kalyanpur taluka. Jani and Mishra (2009) emphasized that most of the mammals of the GoK have little impact or dependency on marine flora and fauna except jackal and fox which feed on crabs. In the present study, distribution of the insular terrestrial mammal was recorded on 11 islands of the total 13 islands studied. The species were also found to be distributed on mainland areas of the GoK. Fishermen inform that insular terrestrial mammals exist on other islands such as Manmarodi, Dabdaba, Devadi, Noru-Bhaidar and Sikka too. Among the

all species, Golden Jackal was found to be the most common animal, frequently occurring (i.e., 71.4%) species in the GoK (Fig. 1, Table 1). During the study, a total of 22 individuals were recorded through direct sighting from 10 different islands. The largest pack of 10 individuals was recorded from Pirotan Island and 4 individuals from Kalubhar Island. Another frequently occurring species was Indian Hare (i.e., 14.3%) in the GoK (Fig. 1, Table 1). Among the 13 islands, maximum species viz., Golden Jackal, Blue bull, Grey Mongoose, Indian Hare and rodents, were recorded from Bet Dwarka. Dabdaba has existence of Golden Jackal, Indian Hare and rodents (Table 1).

The recorded species are primarily terrestrial and Island inhabitation might be obligatory for them. Exact cause of the existence of primarily terrestrial species on insular system of the GoK is difficult to determine due to unavailability of historical study on the occurrence of terrestrial mammals on insular system of the GoK. However, some assumptions are put forward to explain the existence of animals.

Assumption 1: Proximity to suitable habitats on islands but barrier of unsuitable habitat

Many of the islands of insular system are very close to the mainland. However, they are separated with creeks and large mudflat areas. The width of the creek is not that much but water retains throughout the time even during low tide. These habitats function as barrier of unsuitable habitat for certain mammalian species and it is difficult to cross by them. However, the species like Golden Jackal have ability to disperse by swimming also. It can be assumed that any single animal or group of animals from the meta-population on mainland might have swim and crossed the barrier of unsuitable habitat to reach in suitable habitat available on islands. Moreover, another assumption can also be made that meta-population of animals on mainland were flooded and somehow crossed the barrier of unsuitable habitat and sheltered on proximal

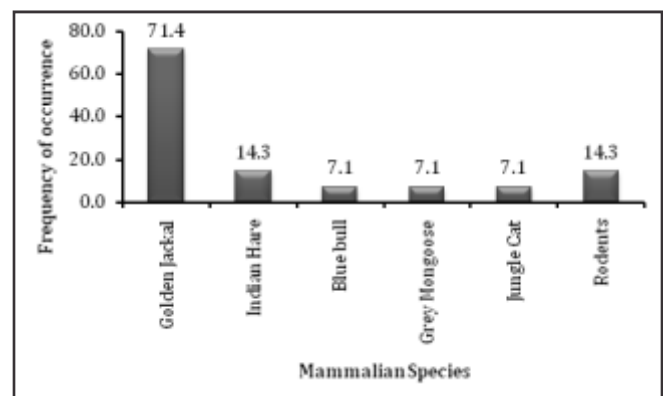


Fig. 1: Frequency of occurrence of insular terrestrial mammal.

Table 1: Occurrence of various insular terrestrial mammal species on different islands.

S.No.	Islands	Insular terrestrial mammal species						
		Blue bull	Golden jackal	Grey mongoose	Indian gerbil	Indian hare	Jungle cat	Other rodents
1	Ajad	-	-	-	-	-	-	-
2	Bet Dwarka	+	+	+	-	+	-	-
3	Bhaidar	-	-	-	-	-	+	-
4	Bhainsbid	-	-	-	-	-	-	-
5	Dedeka	-	+	-	-	-	-	-
6	Dabdhaba	-	+	-	-	+	-	+
7	Dhani	-	+	-	-	-	-	+
8	Garu	-	+	-	-	-	-	-
9	Kalubhar	-	+	-	-	-	-	-
10	Mundeka	-	+	-	-	-	-	-
11	Panero	-	+	-	-	-	-	-
12	Pirotan	-	+	-	-	-	-	-
13	Sanero	-	+	-	+	-	-	-

'+' indicates presence and '-' indicates absence

Island having suitable habitat. Due to nonexistence of other wild species on islands, sheltered species could survive successfully. This assumption helps to explain the existence of Golden Jackal on Dedeka, Dhani, Gadu, Kalubhar, Mundeka, Panero and Pirotan. These islands are not attached with the mainland but small stretches of creeks, barrier of unsuitable habitat separate them from mainland. Dabdhaba Island is covered with scrub vegetation and connected to the mainland through Devadi Island at the time of neap low tide (Singh *et al.*, 2004).

Assumption 2: Human-facilitated dispersal

The distribution of animals is also possible due to human activity factors. In the GoK, there is transition of fishing vessels among different islands and mainland. Usually, vessels are loaded with food materials caught from sea as well as available from mainland. This food may attract wild animals of different trophic level such as Jackal, cats, rats and other rodents. Unknowingly, some animals might have transited from mainland to insular system along with fishing vessels. Once reaching their, population of such animals might have multiplied on islands. Such human-facilitated dispersal assumption helps to explain the existence of jackals, mongooses,

gerbils, jungle cats and other rodents on islands which are close to mainland as well as far from mainland.

Among the all islands, maximum species (n=4) were recorded from Bet-Dwarka (Table 1). Existence of two species viz., Golden Jackal and Grey Mongoose may be understood through two above mentioned assumptions. But occurrence of Blue bull and Indian Hare is uncertain as Island is far from the mainland and as both animals are herbivores and usually timid and shy towards human presence. Therefore, both assumptions, independently, do not help to determine existence of the two species on Bet-Dwarka. However, Singh *et al.* (2004) reported occurrences of jackals, wolves, jungle cats, dogs etc. on Bet-Dwarka and also mentioned that the Island has all the domestic animals, as it is inhabited island.

In addition to insular terrestrial mammalian of the GoK, a total of 24 species of mammals belonging to 7 orders and 16 families were recorded from the entire GoK. Earlier, a total of 22 species of wild mammalian species were encountered in the GoK and adjoining areas by Singh *et al.* (2004). Considering total 104 wild mammalian species of Gujarat, the GoK represented about 23.1% species richness (Singh, 2013).

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कच्छ की खाड़ी, गुजरात, भारत के द्वीपीय स्थलचर स्तनधारियों का अस्तित्व

संदीप बी. मुंजपारा, जिगर जोशी, आर.डी. कम्बोज एवं हर्षद साल्वी

सारांश

कच्छ की खाड़ी में मुख्य भूमि के स्थलीय स्तनधारियों के साथ सीटेसीया और सिरिनिएलांग से संबंधित प्रजातियां पाई जाती हैं किन्तु इन प्रजातियों पर सूचना अपर्याप्त है। दक्षिणी कच्छ की खाड़ी की द्वीप भौगोलिक रूप से मुख्य भूमि से सम्बद्ध अन्तः ज्वारीय क्षेत्रों, वायुवीय और जलमग्न द्वीपों, शिखरों, द्वीपीकाओं, टीलों और समुद्री चट्टानों को मिलाकर बना है। वर्तमान अध्ययन में कच्छ की खाड़ी के 11 द्वीपों से स्तनधारियों की कुल सात प्रजातियां अभिलिखित की गई हैं। अभिलिखित प्रजातियों में से सुनहरा सियार सबसे आम (यथा-71.4%) पाया गया इसके बाद भारतीय खरगोश (यथा-143%) था। 11 द्वीपों में से बेट द्वारका से अधिकतम प्रजातियां ($n=4$) अभिलिखित की गईं। द्वीप में इस तरह की प्रजातियों के अस्तित्व को तीन मान्यताओं द्वारा निर्धारित करते हैं (i) द्वीपों में उपयुक्त आवास से समीपता परन्तु रोध के रूप में अनुपयुक्त आवास की प्राप्ति और (ii) मानव-सुसाध्य फैलाक। कच्छ की खाड़ी की द्वीप स्तनधारियों के अलावा, सम्पूर्ण कच्छ की खाड़ी से 7 गणों और 16 कुलों से संबंधित स्तनधारियों की कुल 24 प्रजातियों को अभिलिखित किया गया, जो गुजरात राज्य के कुल जंगली स्तनधारियों का लगभग 23.1 प्रतिशत है।

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