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### FEEDING TRAILS OF DUGONG *DUGONG DUGON* (MÜLLER, 1776) (MAMMALIA: SIRENIA: DUGONGIDAE) IN THE GULF OF KACHCHH, WESTERN COAST OF INDIA

Deepak Apte, Dishant Parasharya & Bhavik Patel

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## FEEDING TRAILS OF DUGONG *DUGONG DUGON* (MÜLLER, 1776) (MAMMALIA: SIRENIA: DUGONGIDAE) IN THE GULF OF KACHCHH, WESTERN COAST OF INDIA



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Deepak Apte<sup>1</sup> , Dishant Parasharya<sup>2</sup>  & Bhavik Patel<sup>3</sup> 

<sup>1,2,3</sup> Bombay Natural History Society (BNHS), Hornbill House, Shaheed Bhagat Singh Road, Fort, Mumbai, Maharashtra 400001, India.

<sup>1</sup> director@bnhs.org, <sup>2</sup> d.parasharya@bnhs.org (corresponding author), <sup>3</sup> b.patel@bnhs.org

**Abstract:** *Dugong Dugong dugon* (Müller, 1776) is the only herbivorous marine mammal distributed along the tropical and subtropical oceans of the Indo-Pacific regions. The record of the species in India is mainly from the east coast including Andaman and Gulf of Mannar. In this note the authors have recorded feeding trails of Dugong on the *Halodule uninervis* meadow in the Gulf of Kachchh, i.e., northwestern part of India. Most of the records of this species from this area are stranding records. This is the second record of the trail from this region.

**Keywords:** Dugong, ecology, *Halodule uninervis*, seagrass, trail.

The Dugong *Dugong dugon* (Müller, 1776) occurs in the tropical and subtropical sea areas of the Indo-Pacific region (Nishiwaki & Marsh 1985), and is classified as Vulnerable in the IUCN Red List (Thornback & Jenkins 1982). In the Indian subcontinent, this protected species occurs in the Gulf of Mannar, Palk Bay, Gulf of Kachchh (GoK), and Andaman & Nicobar islands.

Sivakumar & Nair (2013) gave comprehensive details on the potential regions for Dugong in all the three regions of India. Tuticorin-Tharuvakulam and Roachamanagar Dhanushkodi stretches, including the offshore islands, were identified as critical for Dugong in the Gulf of Mannar (Sivakumar & Nair 2013). Areas in Palk Bay include waters off Dhanushkodi, Rameshwaram, Devipattinam,

Thiruppalaikudi, Morepannai, Mullimunnai, Pudupattinam, Thondi, Mimal, Kottaippattanam, Manamelkudi and Manora. The critical Dugong habitat identified in the Andaman Islands includes the waters off Landfall Island, Reef Island, White-Cliff Island, Smith Island, North Reef Island, Interview Island, Sound Island, Mayabunder, Karmatang, Long Island, North Passage, Ritchie's Archipelago, M.G. Marine National Park, Sister Islands and Brother Islands, as well as parts of Jarawa Reserve and the eastern and southern coast of Little Andaman (Sivakumar & Nair 2013).

The population of Dugong and its habitats are continuously declining in India with about only 200 surviving individuals (Sivakumar & Nair 2013). Several reasons have been attributed to the decline in the Dugong population, including sea grass habitat loss, gill netting, disease, water pollutants, indigenous use and poaching (Sivakumar & Nair 2013). Reviews of Dugong in Indian waters have consistently treated Gulf of Kachchh as an area of little significance (Frazier & Mundkur 1990). Dugong were noted by different researches at different locality in Gulf of Kachchh (Moses 1942; Mani 1960; Silas 1961; Mohan 1963; Frazier & Mundkur 1990; and Singh 2003). Frazier & Mundkur (1990) compiled the dugong

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observation with the help of fishermen interview and reported 18 animals from the Gulf of Kachchh, particularly in Bet Dwarka, Poshitra and their neighbouring areas. Singh (2003) noted four dead Dugong from this region that includes one skull on Bhaidar Island, two dead animals in Bharana and one dead animal on Poshitra coast.

### OBSERVATION

On 27 May 2017, during the marine invertebrate study, the authors visited Narara reef area in the central region of the Gulf of Kachchh. The area is also a part of Marine National Park and Sanctuary—Jamnagar. The area significantly harbors 7.5ha of *Halodule uninervis* Meadow (22.479°N & 69.718°E to 22.483°N & 69.718°E) (Fig. 1). Peculiar grazing pattern was observed in the meadow, and was considered to be a Dugong feeding trail. The grass was completely uprooted and grazed, and the width of the trail varied from 20–28 cm and length varied from 100–520 cm. The trail was recorded at the low tide where during the high-tide the water rises to 4.5m. Photographs and measurements of all the trails were taken (Image 1). International experts were consulted for confirming the trails, which were confirmed as feeding trails of Dugong.

### DISCUSSION

Most of the records of the species are from the western parts of the gulf and majority of the records

are stranded, washed off dead animals questioning the status of the population within the GoK (Table 1). Most observations of the species in GoK are stranding records towards Okha, Poshitra and Bhaider, i.e., opening of the gulf, indicating the population as vagrant or non-resident to GoK. Pandey et al. (2010) recorded the first feeding trail for GoK from the seagrass meadows of Pirotan Island. This is the second record of the feeding trail from the central part of the GoK. Narara is an important Dugong habitat in GoK (Sivakumar & Nair 2013). The observation of Dugong feeding trail in this area is an important but indirect evidence of the presence of the species and is of considerable importance as it indicates the presence of live animals in the central areas of the GoK indicating the presence of the species in this area further more towards the east in GoK. Kamboj (2014) provided status of the seagrass in the Marine National Park and Sanctuary, however, the seagrass beds of Narara are not included in the same. All the stranding records are in proximity to the existing seagrass beds (Table 2; Fig 2).

The Dugong population in the Arabian Gulf is believed to be the second largest in the world after Australia. Akab Island (Umm al Qaywayn, UAE) is the oldest site (6000 years) where Dugong remains have been discovered (Jousse 1999). The Arabian Gulf is considered to contain the most important Dugong habitat in the western half of the Dugong's range (Preen 1989). The population estimate of Dugong in the Arabian Gulf was estimated

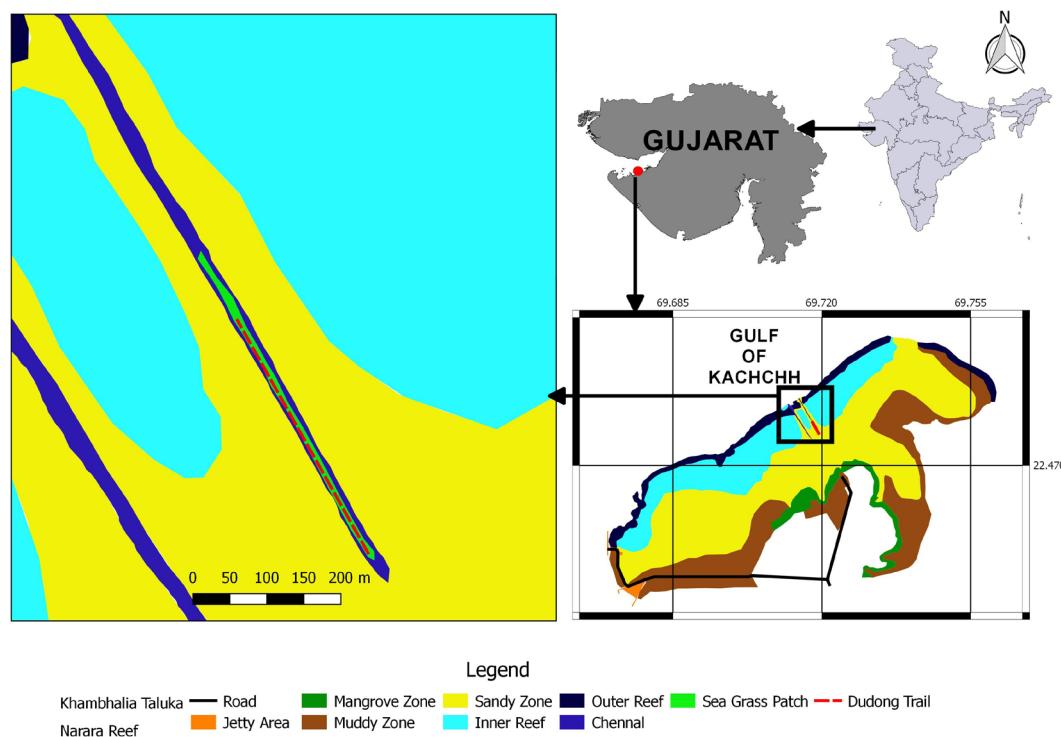


Figure 1. Study area

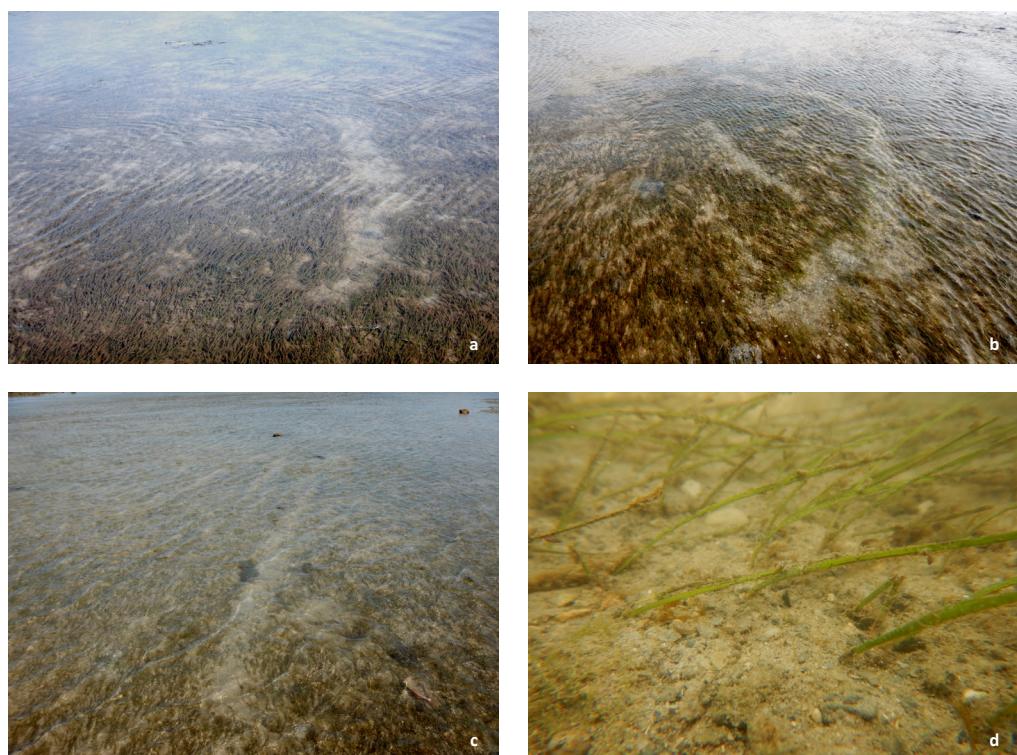


Image 1. a–c - Feeding trails recorded during the study; d - Seagrass *Halodule uninervis* recorded during the study.  
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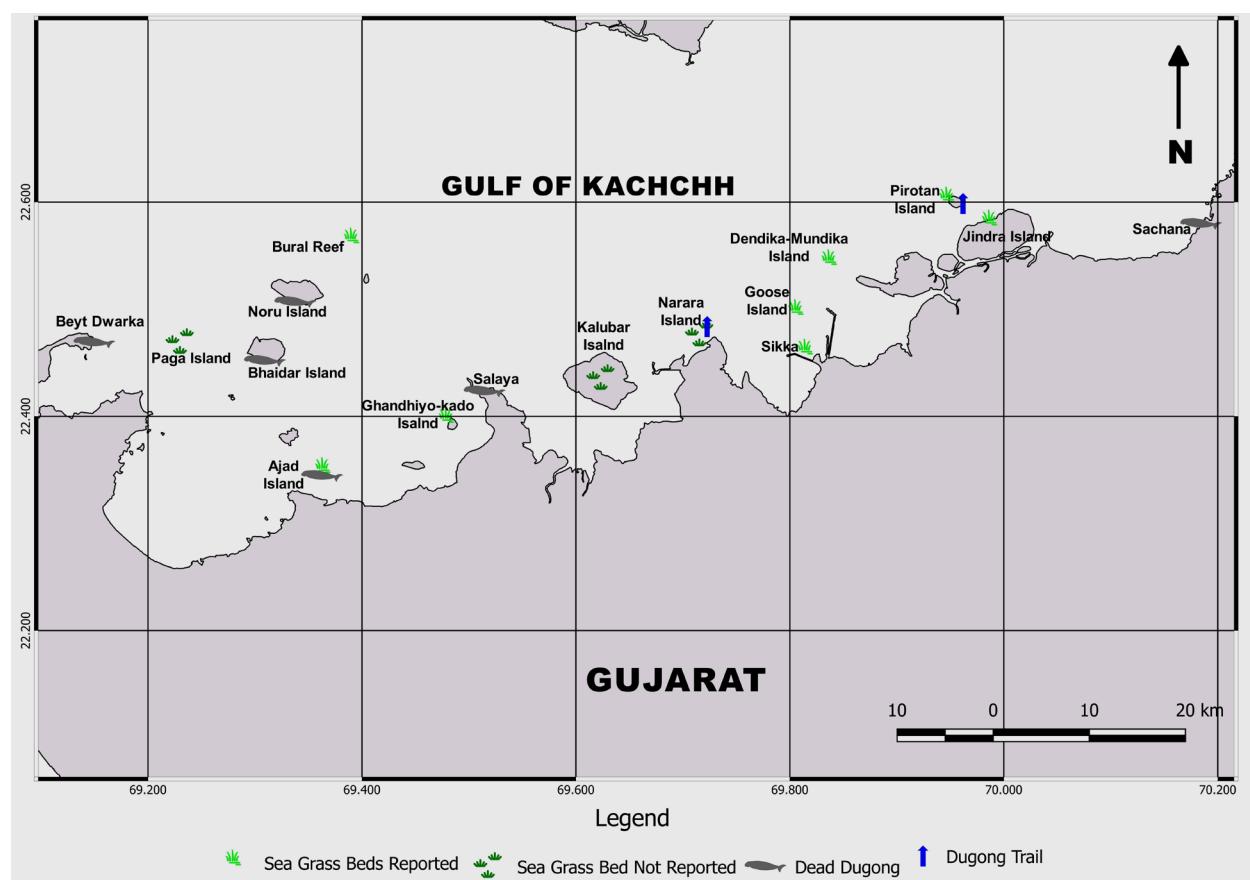


Figure 2. Dugong occurrences and Seagrass beds in the Gulf of Kachchh

**Table 1. Dugong stranding records from Gulf of Kachchh**

	Year	Location	No. of Dugong	Source
1	1877	Sachana	1	Frazier & Mundkur 1990
2	1893	Mandvi	1	Thurston 1895
3	1959	Kalyan Light House	1	Mani, 1960; Silas 1961
4	1962	Pirotan Island	2	Mohan 1963
5	1962	Salaya	1	Mohan 1963
6	1978	Bhaider island	1	Frazier & Mundkur 1990
7	1983	Bet Dwarka	2	Ved 1983
8	1984	Poshitra	1	Singh 1994
9	1987	Bet Dwarka	3	Frazier & Mundkur 1990
10	1987	Poshitra	1	Frazier & Mundkur 1990
11	1987	Poshitra point	1	Frazier & Mundkur 1990
12	2000	Bhaider island	1	Singh et. al. 2004
13	2000	Norru-Bhaider	2	Singh et. al. 2004
14	2002	Poshitra (Shaan)	1	Singh et. al. 2004
15	2003	Poshitra	1	Singh et. al. 2004
16	2004	Poshitra	1	Asari (pers. Comm.)
17	2007	Bet Dwarka	1	Pandey et al. 2010
18	2010	Bet Dwarka	1	Forest Department
19	2013	Mithapur	1	Yogeshkumar et al. 2013

**Table 2. Seagrass meadows in the Marine National Park and Sanctuary (Source: Kamboj 2014)**

	Location	Area (ha)
1	Bhural reef	1321.72
2	Ajad Island	8.94
3	Gandhio Kado Island	3.01
4	Goose reef	15.65
5	Sikka reef	198.81
6	Dedeka Mundeka	354.62
7	Pirotan	504.18
8	Jindra and Chhad islands	25.38
9	Narara (current study)	7.5

to be 1861 individuals in summer and 2185 in winter (Al-Ghais & Das 2001). The phenomenon of winter congregation and dispersed population in summer was also reported by Preen (1989). The feeding trail reported by Anand et al. (2012) was in the month of May and the present study also reports the feeding trail in month of May, i.e., in northwestern Asia including Arabian Gulf and Gulf of Kachchh. The presence of the species in summer gives rise to two different possibilities: (a) the species is present in the area in very low number so that it is not recorded live, or (b) the occurrence is accidental

and result of population dispersal from the Arabian Gulf during summer. The distance between these two sites, however, is more than 1,500km and this hypothesis needs to be assessed by satellite tagging few animals in the Arabian Gulf.

Observations and frequent monitoring of these seagrass meadows may help in understanding the presence and movements of the Dugong population in the area. This information will be valuable for the better management practice of the species in the region.

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