November 2022

Research and Monitoring

Boat Survey for Seagrass habitat mapping and marine megafauna

11 transects perpendicular to the coast spanning a 6 square kilometer area where 5–6 green sea turtles were observed in the Mithapur–Arambada region. Additionally, 6-point counts were done for observations of marine megafauna in a 12 square kilometer area where about 15 Indo-ocean humpback dolphins and 6–7 Green Sea turtles were observed porpoising and foraging respectively close to the Bet Dwarka and Paga reef.

Figure 1: Boat survey, Sousa plumbea, and Chelonia mydas sightings

1. **Seagrass-associated faunal Macrobenthic sample collection and analysis:**

Seagrass-associated macrobenthic sampling for the intertidal and subtidal collection was carried out at Paga, Tam, Chepri reef, Mithapur, and Balapur in November 2022. Seagrass and sediment samples for heavy metals were collected. Seagrass samples were processed for shoot density, biomass (dry weight), and percent cover. A total of 105 samples were collected and 20 samples were sorted to the group level. Samples were washed with water and sieved in (500µm) in the laboratory and sorted according to the group level. Biomass (Wet weight) was taken with the help of weighing balance and preserved in 70% alcohol in Tarson containers and labeled. Water parameters like Dissolved Oxygen, Salinity, Temperature and pH were also collected.

Sediment and seagrass samples for nutrient estimation were also collected and will be sent to HQ for further analysis. Samples will be sent to further taxonomical identification to Annamalai university. Gastropods and Bivalves were identified with the help of the World Register of Marine Species (WoRMS), field guides, and available literature.

Figure 2: Macrobenthic faunal collection and post-processing

2. Underwater Survey for seagrass mapping and associated fauna:

3 belt transects were conducted across the continuous meadow stretching 250 m² area to study seagrass and associated fauna within areas of the Mithapur-Arambada. Species of the Lethrinidae, Mullidae and Gobiidae families were majorly associated with halophila spp. meadows. Sightings of *Chelonia mydas* were also observed on the seagrass meadows during the dive.

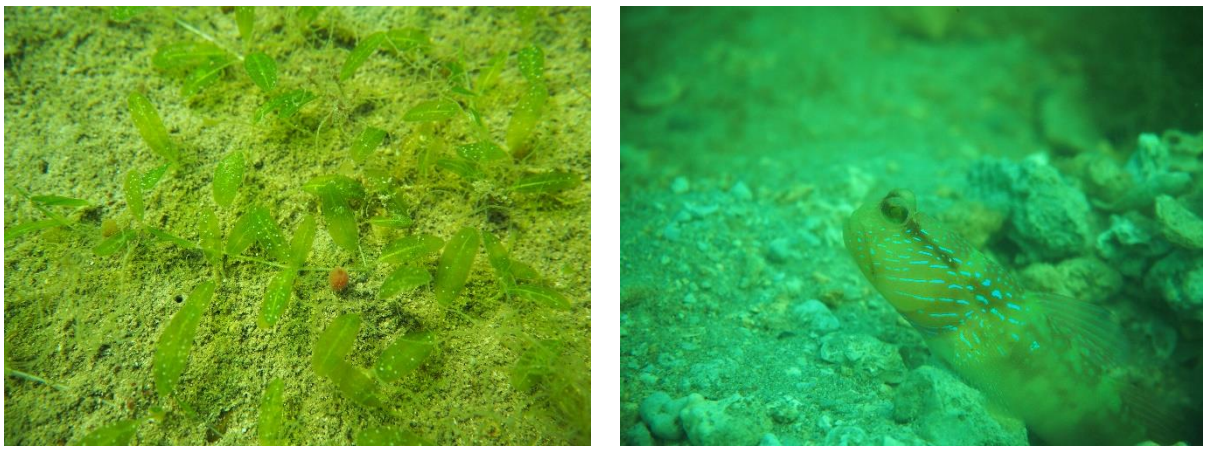


Figure 3: Halophila spp. and associated fauna.

3. Threat mapping in the critical dugong habitat of MNP, Gulf of Kutch.

While conducting the threat mapping survey in the critical dugong habitat of the southwest region of the Gulf of Kutch, ghost nets were removed in the vicinity of Bet Dwarka and Paga, and the improper fishing technique was stopped near the Paga reef.

b. Outreach & Awareness

1. Meeting with stakeholders:

On the 23rd of November, we had a meeting with the DCF Sir Senthil Kumar of Marine National Park, where we gave a presentation about our work in the Gulf of Kutch over the past 5 years and had a thorough discussion regarding the forthcoming work. He expressed interest in organizing future workshops with the Jamnagar and Dwarka forest departments.

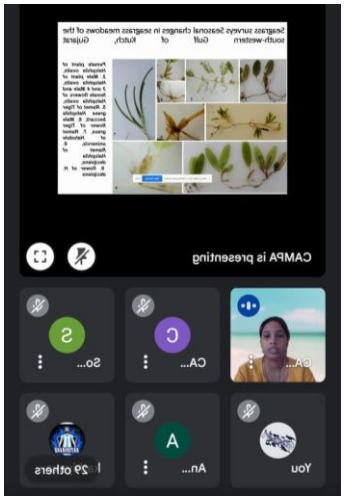
2. 16th November 2022 – an outreach program for 9th & 10th standard students of Kendriya Vidyalaya at Okha Town, Gujarat.

An outreach program for 9th and 10th-standard students was organized at Kendriya Vidyalaya, Okha. The session was attended by a total of 60 students. The students were sensitized to important marine habitats such as seagrass meadows, coral reefs, dugongs, and another marine megafauna. ‘My friend Dugong’ Comic books, stickers, and bookmarks were distributed to the students. The students regularly do beach clean-up activities and will participate with us in our future beach clean-up program. They also pledged to save dugongs.

3. 18th November 2022 - Webinar on Dugong Conservation India

Speaker: Prachi Hatkar

The webinar on "Conservation of Dugongs and their habitats in India" was conducted in collaboration with H. & H.B. Kotak institute of Science, Rajkot**.** A total of 48 participants were registered and e-certificates were given to those participants on 18TH August 2022.



December 2022

1. Boat Survey for Seagrass habitat mapping and marine megafauna

4-point counts were done for observations of marine megafauna in GoK where about 6-7 Indo-ocean humpback dolphins and 4-5 Green Sea turtles were observed foraging close to the Bet Dwarka and Paga reef.

Figure 1: Boat survey, Sousa plumbea, and Chelonia mydas sightings

2. Seagrass-associated faunal Macrobenthic sample collection and analysis

Seagrass-associated macrobenthic sampling for the intertidal collection was carried out at Paga, Tam, Chepri reef, and Mithapur in December 2022. Seagrass and sediment samples for heavy metals were collected. Seagrass samples were processed for shoot density, biomass (dry weight), and percent cover. A total of 120 samples were collected and 129 samples (including those of November) were sorted to the group level. Samples were washed with water and sieved in (500µm) in the laboratory and sorted according to the group level. Biomass (Wet weight) was taken with the help of weighing balance and preserved in 70% alcohol in Tarson containers and labeled. Water parameters like Dissolved Oxygen, Salinity, Temperature and pH were also collected. Sediment and seagrass samples for nutrient estimation were also collected and will be sent to HQ for further analysis. Samples will be sent to further taxonomical identification to Annamalai university. Gastropods and Bivalves were identified with the help of the World Register of Marine Species (WoRMS), field guides, and available literature.

Figure 2: Water parameter data and Macrobenthic faunal collection

3. Underwater Survey for ghost net and plastic removal

The underwater survey was done in the Mithapur- Arambada region to remove ghost nets and plastic litter. The collected litter was then disposed to the local municipal dump yard for further processing.

Figure 3: removing ghost net from the seabed

b. Outreach & Awareness

1. 2nd December 2022 – Capacity building program for Indian Coast Guard Station at Okha

We successfully conducted a capacity-building program for the Indian Coast Guard station at Okha today 2nd December 2022. The session was attended by 35 ICG officers. We briefed them about our project activities, and the role ICG can play in monitoring of Dugongs in the Gulf of Kutch while patrolling. We are grateful for their help and support. A logbook and mugs were distributed.

Figure 2: Capacity building program for Indian Coast Guard Station at Okha

2. 5th December 2022 – Outreach and awareness program at R.K. Bandar

We organized another community interaction on the 5th December 2022 program as part of the Indian coast guard's event today at R.K Bandar with fisheries officers for 70 fishermen from various coastal districts along Gujarat's coastline. We gave them logbooks to record any sightings they come across while fishing and reusable glass cups to help educate them

not to use or throw plastic items into the ocean. The fishermen were also informed about the region's marine megafauna and the importance of seagrass habitat. Members of the Okha Sagar Putra Boat Association and fishermen identified the region’s marine mammals and were eager to share sighting records in the future.

Figure 3: Outreach and awareness program at R.K. Bandar

3. 19th December 2022 – Webinar on Dugong Conservation India

Speaker: Prachi Hatkar

The webinar on "Conservation of Dugongs and their habitats in India" was conducted in collaboration with Think Wildlife Foundation**.** The talk encompassed their behavior, threats to the species, and the restoration of their seagrass habitat. A total of 125 participants had registered for the webinar.

Figure 4: Webinar on Dugong Conservation India

4. Boat Survey for Seagrass habitat mapping and marine megafauna

Observations of marine megafauna in GoK where Indo-ocean humpback dolphins and Green Sea turtles were observed foraging close to the Chepri and Paga reef.

Figure 1: Boat survey, Sousa plumbea sightings

5. Seagrass-associated faunal Macrobenthic sample collection and analysis

Seagrass-associated macrobenthic sampling for the intertidal collection was carried out at Paga, Tam, Chepri reef, and Mithapur in January 2023. Seagrass and sediment samples for heavy metals were collected. Seagrass samples were processed for shoot density, biomass (dry weight), and percent cover. A total of 60 samples were collected and 80 samples (including those from December) were sorted to the group level. Samples were washed with water and sieved in (500µm) in the laboratory and sorted according to the group level. Biomass (Wet weight) was taken with the help of weighing balance and preserved in 70% alcohol in Tarson containers and labeled. Water parameters like Dissolved Oxygen, Salinity, Temperature, and pH were also collected. Sediment and seagrass samples for nutrient estimation were also collected and will be sent to HQ for further analysis. Gastropods and Bivalves, Polychaetes, were identified with the help of the World Register of Marine Species (WoRMS), field guides, and available literature.


Figure 5. seagrass associated benthic faunal collection in Chepri reef

6. Heavy metal sample collection for habitat assessment

The Gujarat team collected 40 sediment samples and 4 seagrass samples for heavy metal analysis from the critical dugong habitat. The analysis of heavy metals such as Nickel, Zinc, Copper, Arsenic, Mercury, Lead, Cadmium, and Chromium. During the study period, sediment samples were taken at a depth of 0-5 cm from the surface in each sampling site. Three replicates were collected at each site. The sediment was kept in acid-washed polyethylene bags. Seagrasses were washed thoroughly with ambient water to remove sediment, debris, and associated fauna. Cleaned seagrasses were placed in acid-washed polyethylene bags and transported to the laboratory in an icebox. The study will provide baseline data for heavy metal exposure in seagrass meadows of Dugong's critical habitat in Marine National Park, Gujarat.


Figure 6. Heavy metal sediment sample collection and seagrass processing

7. Underwater Survey for ghost net and plastic removal

The underwater survey was done in the Mithapur- Arambada region to remove ghost nets and plastic litter. The collected litter was then disposed to the local municipal dump yard for further processing.

Figure 3: removing ghost net from the seabed

Underwater Survey for seagrass associated fauna monitoring and threat mapping

2 square kilometers area was surveyed in the Mithapur- Arambada region. Species of the Lethrinidae, Mullidae, Leiognathidae, and Gobiidae families were majorly associated with these meadows. Also, there was significant amount of macro plastic pollution in this region. Plastic food packets, net pieces and ghost nets were found and removed responsibly.

Figure 7. Ghost net removal

c. Outreach & Awareness

1. 11th January 2023 – Webinar on Dugong Conservation India

Speaker: Shivani Patel

We held an awareness program for the fisheries department on 11th January 2023 in Okha, where we thoroughly discussed with fisheries officers Sir Kamlesh Karena and AD Makwana the number of fishing boats operating from various fishing ports in the GoK region. They also decided to raise awareness about Dugongs and seagrass habitats through their community interaction program with fishermen. We distributed log books and other outreach materials to them.

Figure 8: Program on Dugong awareness in Fisheries office, Okha

2. **National Conference presentation on Review of stranding records of megaherbivore the Dugong (*Dugong dugon*) in the Gulf of Kutch, Gujarat, India- An implication to the conservation of marine mammals** in Gujarat in National Conference on Environment and Biodiversity (NCEB-2022) held on 27and 28 January 2023 organized by In collaboration With Academy of Environmental Biology, Lucknow, Bio Vision Charitable Trust, Maharashtra & National Institute of Wind Energy, Chennai Department.
   Speaker – Prachi Hatkar

Figure 9. Conference presentation at TCSC, Mumbai

February 2022- March 2022

Research and Monitoring

Seagrass mapping

Figure 10. Glimpse of seagrass meadows

Seagrass mapping surveys in the southwestern GoK came to its conclusion at Noru reef. A vast intertidal reef-top meadow was located and mapped. Seagrass health, composition, sediment type, meadow extent and dugong foraging trails was recorded.

First week of February, 2023, another smaller seagrass meadow at Blue Flag beach of Shivrajpur reef was found outside the Gulf. Meadow composed of a healthy bed of *Halophila decipiens*. A new addition to the deep-water meadows mapped outside the Gulf.

Figure 11. Bycatch

Multiple sharks were caught inside the Gulf. A few of animals were caught as accidental by-catch. Photographic evidences were shared by fisher informants from the community, which were passed on to the Gujarat Forest department. The influx of top predators in the Gulf comes after the annual catfish migration from Feb-March.

Figure 12. A glimpse of Awareness and capacity building program

Outreach programmes

Three days 16th-18th Feb, training workshop was organized for frontline staff of the Gujarat Forest department, led by the GEER foundation. DFO Solanki, RFOs, and forest guards of MNP and the territorial sector had attended along with local college students. Presentation of the progress of coastal science in the recent years was discussed and informed. CAMPA-Dugong projects activities, methods and progress these past six years were discussed. Potential for transplantation experiments was considered.

Three day, 25th-27th Feb integrated workshop organized by Gujarat Forest departments; Marine National Park staff at Dwarka district.
This workshop was organized to discuss the role and importance of marine biodiversity with diverse stakeholders in the Gulf of Kachchh, Gujarat. Participants from different backgrounds such the Judiciary department, District collectors' office, Police Service, Revenue Department, Custom Office, Forest Officials and Researchers, and students from local colleges had attended. WII researchers were invited as resource personnels to inform about marine mammal diversity and conservation issues in the Gulf. The history of the Marine national park, and its Laws, regulations and amendments were discussed in the first sessions. The second session was dedicated to open discussions and talks regarding the unique marine ecosystem of GoK and its conservation management techniques. Sustainable livelihood was also discussed in the last session.

On the last day of the training workshop, attendees included forests marine and social departments, Health, Custom, PGVCL, Municipal offices' Chief officer, Education department.

From 4th-6th March, similar integrated workshop was extended in Jamnagar district. All session days were proceeded by a field trip to Lakkhu reef and Khijadiya Bird Sanctuary