pathogen[14]. The consortium is comprised of cyanobacterium (*Phormidium corallyticum*) and other bacteria[15–18].

M. digitata has been reported to be the dominant species and has high recruitment rate in the GoM[3,4]. This species has been associated with fast growth and propagation[19]. Hence in a reef like the GoM, where recovery is in process[3,5], *M. digitata* can increase the live coral cover due to its fast-growing nature. Unfortunately, mass mortality of this species would affect the overall live coral cover. Temperature elevation and nutrient enrichment have earlier been suggested as a trigger for sudden disease outbreaks[20,21]. We found no obvious proliferation of algae or eutrophication in the study area, which rules out hazardous nutrient enrichment. In 2010, mass mortality of *Pocillopora damicornis* colonies was recorded in Shingle Island of the GoM due to temperature-triggered BBD. Water temperature in the GoM may reach up to 33°C during summer, and it has been reported that *M. digitata* is prone to temperature elevation[4]. Hence, persistent high temperature could have triggered the outbreak of BBD among *M. digitata* colonies as they occur in very shallow waters where the temperature is relatively high. Although other factors such as pollution, sedimentation and nutrient enrichment may not be the immediate cause of the disease, they might worsen the situation in future. It is difficult to prevent coral diseases and cure them; however, the managers could intervene to reduce the driving factors. While temperature cannot be controlled, steps could be taken to address the other potential issues such as pollution. Further studies are also needed to ascertain the exact causative agent or combinations of agents that lead to sudden outbreaks of coral diseases.

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Electric ray *Narcine timlei* (Torpediniformes: Narcinidae) from Chilika lagoon, Odisha, India

The Chilika, situated along India's eastern coast (in Odisha), is the largest brackish water lagoon in Asia with water spread varying from 906 km^2 during summer to 1165 km^2 during monsoon. It is among the most internationally focused Ramsar site in India owing to its rich biodiversity[1], including species that have been categorized as threatened by IUCN. The spatial and seasonal variability in salinity gradient delineates the lagoon into four ecological zones[2], i.e. Northern Sector (2.8–14.4 ppt), Central Sector (6.9–16.3 ppt), Southern Sector (9.4–13.1 ppt) and Outer Channel (12.6–32.2 ppt) (Figure 1). The lagoon had turned into a completely freshwater system due to closure of sea mouth. It

portrays one of the most successful models of eco-restoration, by creation of an artificial mouth during 2000 to let seawater in for restoring its regime[1].

Electric rays have fascinated naturalists since ancient times[3] and have been used as model organisms in biomedical research, owing to their unique ability in generating electric discharge from two kidney-shaped electric organs located at the base of the pectoral fin. These elasmobranchs, belonging to the order Torpediniformes, are distributed worldwide in temperate and tropical waters with a total of 79 extant species[4]. In India, the group is represented by 14 recorded species distributed among three families (Torpedinidae, Narcinidae and Narkidae)[4], with *Narcine* (family Narcinidae) being the largest genera comprising six recorded species. Lack of comprehensive taxonomic studies and inconclusive checklists have been impediments to elasmobranch research in India, despite its rich diversity[5]. Among elasmobranchs in Indian waters, electric rays are the least studied.

The electric ray, *Narcine timlei* (Bloch & Schneider, 1801) was recorded from the Chilika lagoon during March 2013 from 'Khonda' (net box traps that are widely employed for fishing in the lagoon) operated at a site (19°39′43.1″N; 85°30′03.7″E) which is approximately 4 km from the New Mouth area (Figure 1). To our knowledge, there are no previous records of the occurrence of electric rays from Chilika lagoon as also from Indian brackish water ecosystems. The specimen (female with total length of 168 mm) was identified using standard taxonomic keys[6,7] and deposited at the Zoological Survey of India, Kolkata as a voucher specimen (ZSI F 11285/2). Table 1 summarizes the morphometric measurements of the specimen, made with a digital calliper, along with the respective body proportions. The fresh specimen (Figure 2 *a*) is reddish-brown on the dorsum and whitish ventrally. *N. timlei* belongs to the family Narcinidae, popularly known as numbfishes, which comprises small to medium sized batoids with large oval/shovel-shaped discs; stout shark-like tails; entirely naked body (without dermal denticles); five small gill openings on underside of anterior half of pectoral fins and large kidney-shaped electric organs at the bases of pectoral fins which is visible through the skin as cluster of hexagonal markings (Figure 2 *b*). The distinctive diagnostic characters of *N. timlei*, as depicted in taxonomic keys[6,7], include subtrapezoidal disc; first dorsal fin commences behind the hind basal end of the pelvis fin and is somewhat smaller than the second dorsal fin (clearly evident from morphometric measurements depicted in Table 1); broad skinny keel along the side of the tail, which extends to the base of the caudal fin; dorsal surface with reddish-brown colouration (with or without spots) and whitish colouration on the ventral side. Five more specimens of *N. timlei* (147–160 mm in total length) were later recorded during June 2013 from 'Khonda' catches near Nalaban Sanctuary (salinity 27.83 ppt), which is about 30 km into the lagoon from the sea mouth, and at Satpada (32.5 ppt), about 11.8 km into the lagoon from the sea mouth (Figure 1), indicating the presence of the species well within the lagoon.

In general, the preferred habitat of numbfishes includes inshore areas with soft sandy bottom, muddy enclosed bays, estuaries, coral reefs and upper continental slopes[6]. *N. timlei* is known to occur in both inshore and offshore continental tropical waters of the Indo-West Pacific region[8]. As the species is encountered in

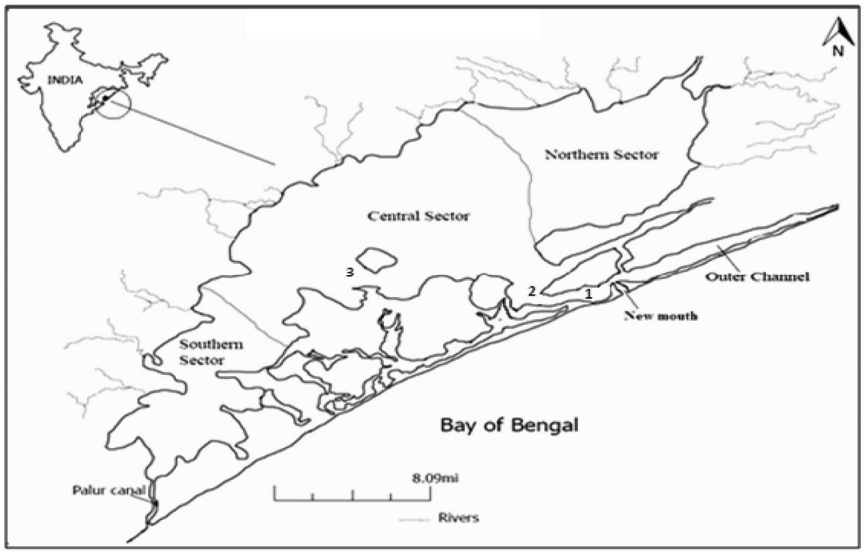

Figure 1. Map of Chilika lagoon showing the locations from where *Narcine timlei* was recorded. 1, Site where the first specimen was collected; 2, Satpada; 3, Nalabana Sanctuary area.

Table 1. Measurements of *Narcine timlei* from Chilika lagoon

Morphometric measurement	Value (mm)	Total length (%)
Disc width	73	43.45
Disc length	74	44.05
Inter-orbital width	11	6.55
Spiracle diameter	4	2.38
Inter-spiracular width	10	5.95
Eye diameter	2	1.19
Mouth width (closed)	14	8.33
Length from snout to middle of cloaca	90	53.57
Length from middle of cloaca to tip of caudal	78	46.43
Length – snout to third gill slit	50	29.76
Length – snout to fifth gill slit	60	35.71
Inter-branchial width (first)	25	14.88
Inter-branchial width (third)	21	12.50
Inter-branchial width (fifth)	16	9.52
First dorsal fin – base length	8	4.76
First dorsal fin – height	11	6.55
Second dorsal fin – base length	11	6.55
Second dorsal fin – height	14	8.33

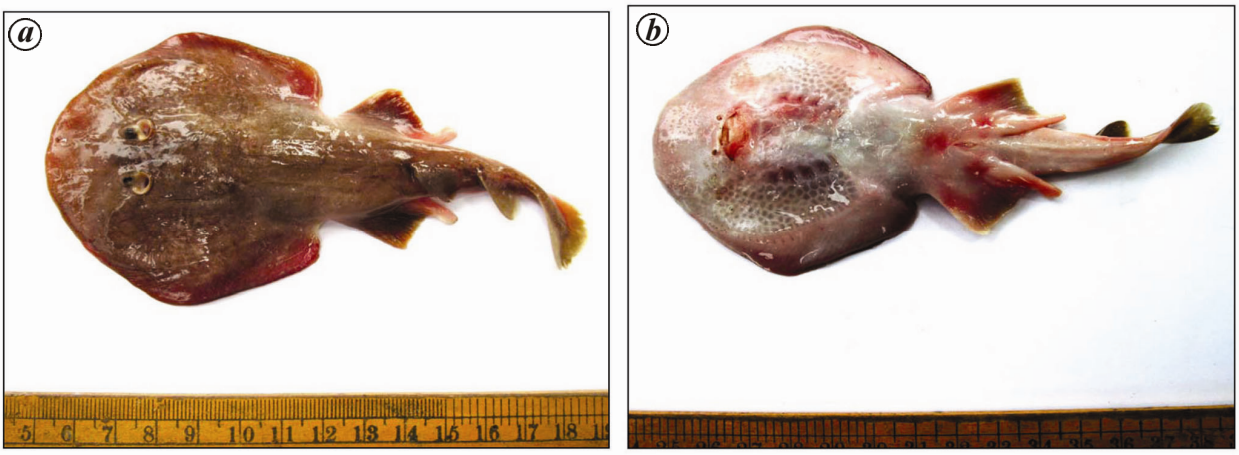

Figure 2. *Narcine timlei* (female) recorded from Chilika lagoon: ***a***, Dorsal view; ***b***, ventral view.

trawls as by-catch, existing information on its distribution along the Indian coast is exclusively based on observations at selected fish landing centres (along both the coasts).

The fish species distribution along a brackish water lagoon is strongly influenced by its connectivity with the adjacent marine waters. Low depth and narrow width of the mouth limit the entrance of marine elasmobranchs into a lagoon[9]. Opening a new mouth (200 m width and 5.5 m depth) for the lagoon during 2000 has favoured the entry of many stenohaline marine fishes into Chilika promoting the marine elasmobranchs into the lagoon as well[1]. A total of 13 species of elasmobranchs were recorded during post-restoration period of which several species/groups such as bamboo sharks (Hemiscylliidae), hammer-head sharks (Sphyrnidae), guitar fishes (Rhinobatidae) and bull shark (*Carcharhinus leucas*) were recorded for the first time from Chilika lagoon[10]. There are reports that some of the large-sized elasmobranchs reside in the deeper pools of the Outer Channel for a considerably long period of 7 months in a year[11].

Though there are no specific records on the salinity tolerance range of *N. timlei*, available information suggests that the species commonly inhabits inshore marine waters (salinity of about 35 ppt). Most typical elasmobranchs can survive salinities as low as 50% of seawater. if acclimatized. The higher salinity at New Mouth (30.2 ppt) during March 2013 along with the increased tidal flux was conducive for *N. timlei* to have entered into the lagoon through the mouth. With the gradual increase in salinity from March to June 2013, the species might have extended its range towards the Central Sector (Nalaban). Due to scarcity of information regarding its distribution, abundance and biology, *N. timlei* had been categorized as 'data deficient' by IUCN[8]. Such high level of uncertainty in conservation status further elevates the risk as it has been stated by IUCN that the absence of records/information may actually indicate dangerously low abundance of a species.

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