DIGANT DESAI

Yellow-lipped Sea Krait *Laticauda colubrina*: sea kraits move easily on land where they find mates or a resting place; they swim underwater hunting for food with the help of their oar shaped tails

Serpents OF THE sea

by Chetan Rao

Snakes have always evoked a sense of mystery in humans. Many cultures, including ours, revere them as signs of vitality and symbols of productivity. A lot has been written about terrestrial snakes, but not much is written or said about their brethren that have made water their home, and especially those of the sea.

Sea snakes are marine reptiles, and largely found in the seas between Australia and east of Africa – there are no sea snakes in the Atlantic Ocean or the Caribbean Sea. The maximum sea snake diversity exists in the Indian Ocean, with one species, the Yellow-bellied Sea Snake *Hydrophis platurus* moving over to the Pacific, making it one of the most widely distributed snakes in the world.

Sea snakes belong to the family Elapidae, that also includes cobras, mambas, and coral

snakes. Sea snakes have evolved from the Australian elapids, such as tiger snakes and taipans. Not all sea snakes spend their entire life in the ocean. Sea snakes include the fully aquatic snakes or 'true' sea snakes, and the amphibious sea kraits, which can live on land or in water. They are adapted to a life in water, and their laterally compressed body is an adaptation for swimming; they are clumsy or slow when cast ashore.

Unlike sea kraits, which are oviparous (species that produce young from eggs laid on land; this limits their range because they need to stay near land to reproduce), 'true' sea snakes are ovoviviparous (species that produce young from eggs which are hatched within the body of the parent) and hence have became independent of the need for land to lay eggs. Ecologically, sea snakes are mid-trophic level (middle of the food chain) predators. They primarily hunt fish and marine invertebrates, and in turn, they are prey to larger marine predators.

SEA SNAKES OF INDIAN WATERS

Two species of sea kraits are found in the Andaman & Nicobar Islands, and 22 species of hydrophiine snakes have been recorded from shallow waters near shores, estuarine habitats and coral reefs of the Indian coast. Despite their ubiquitous presence, sea snakes have hardly been a subject of systematic studies. Studies in India date back to the colonial era, followed by sporadic studies post-Independence through surveys by the Zoological Survey of India. In 1926, Malcolm Smith, a British herpetologist, had prepared a monograph on sea

Short Sea Snake *Hydrophis curtus* (inset): Juvenile

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Hook-nosed Sea Snake *Hydrophis schistosus* is a widespread species found in the Indian Ocean from the Persian Gulf to Australia

(inset): The Hook-nosed is frequently caught in all types of fishing gear

snakes from the Subcontinent, with taxonomic descriptions. More recently, Aaron Lobo conducted a detailed study of sea snakes in Goa and the Gulf of Mannar, Tamil Nadu. He found the diversity of sea snakes to be higher on the east coast, but with low abundance, while sea snakes were fairly abundant on the west coast, but low in diversity.

SEA SNAKE EVOLUTION

Studies from Australia and Southeast Asia have revealed fascinating insights into their ability to colonize and diversify within the marine realm on multiple instances. Sea snake evolution dates back six to eight million years ago around Australia, making them a relatively young lineage compared to terrestrial snakes. The centre of speciation of sea snakes is in Southeast Asia that occurred around two to three million years ago. The volatile sea level changes that occurred during the last glacial climatic event triggered multiple speciation events amongst sea snakes, leading to high diversity in Southeast Asia. With over 70 species, sea snakes are the most diverse of all marine reptiles, preceding sea turtles and marine iguanas.

Sea snakes are air breathing organisms, and cannot stay underwater for prolonged periods of time; they often drown after getting entangled in fishing nets when they surface to breathe. They are frequently encountered in fishing nets as a bycatch (catch with no value) throughout their distribution range in India. Fishermen physically remove the trapped snakes from the nets, resulting in undesired contact with the animal. Though this can pose a major hazard, as sea snakes are highly venomous and no anti-venom for them is currently available in India, sea snakes hardly tend to bite.

Considering the paucity of information on sea snakes in India, Dakshin Foundation, a non-governmental organization from Bengaluru, collaborated with the Maharashtra Forest Department to investigate the effects of

Yellow-bellied Sea Snake *Hydrophis platurus* is one of the most widely distributed snakes globally

different fishing practices on sea snake assemblages at Malvan in Sindhudurg district. We began a monitoring exercise to record accidental catch of snakes from mechanized gill net boats and fishing trawlers, under the GoI-GEF-UNDP Sindhudurg Project. Our study revealed that two species of sea snakes were frequently caught in all types of fishing gear: Hook-nosed or Beaked Sea Snake *Hydrophis schistosus* and Short Sea Snake *Hydrophis curtus*. The former species was more resilient with fewer individuals found dead on capture. The Short Sea Snake is less tolerant to fishing-related stress and suffered higher mortality. Trawler nets seem to cause the most deaths and are also a grave threat to marine fauna globally.

Sea snakes are harvested for food in Southeast Asia, where they are caught in large numbers. In Australia, the Short Sea Snake and Elegant Sea Snake *Hydrophis elegans* are harvested for the leather industry. In one study from New Caledonia in the southwest Pacific Ocean, a population of sea snakes underwent industrial melanism – an entire population of snakes turned black due to heavy metal pollution, highlighting the risk of bio-magnification, as larger predators fed on these snakes, which can be detrimental to ecosystems in the long run.

Sea snakes, among other marine fauna, mirror the vitality and productivity of our oceans and help us to understand the state of our blue planet.

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