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# Seafood Watch Assessment of Indian Squid-A Clarification by ICAR-CMFRI

Indian marine fisheries have been in a phase of significant expansion over the past decade. As international import standards become increasingly stringent, the transparency and factual accuracy of the state of resources and fisheries in countries such as India, which have a substantial stake and increasing prospects in this sector, are being subjected to the scrutiny by a plethora of agencies. A case in this context is the assessment report of Monterey Bay Aquarium's (MBA) Seafood Watch ([www.seafoodwatch.org/recommendation/squid/indian-squid-15605?species=396](http://www.seafoodwatch.org/recommendation/squid/indian-squid-15605?species=396)) which provides recommendations for three major commercially imported squid species to the United States: the Indian squid (*Uroteuthis (Photololigo) duvaucelii*), the Mitre squid (*U. (P) chinensis*) and the Swordtip squid (*U. (P) edulis*). In this backdrop, being a top-notch Research Institute focussing exclusively on marine resource assessment and augmentation, the Indian Council of Agricultural Research-Central Marine Fisheries Research Institute (ICAR-CMFRI) has noted inadequacies and inappropriateness in the evidence furnished as well as in the analysis carried out by the auditors of the MBA's Seafood Watch Report based on the assessment criteria in the Seafood Watch Standard for Fisheries (ver. F3). These three inshore Indo-Pacific species have a wide distribution in three different EEZs extending from west of the Indian Ocean to the western Pacific. According to the Institute's objective evaluation, this report is skewed without taking into cognizance the entire gamut of scientific evidence available and the species has been erroneously branded under the "Avoid" category.

Further, the MBA's report finds the data collection architecture having "shortfalls" despite the fact that marine fish landings in India are incessantly monitored. The estimated production statistics are regularly worked out based on surveys under a multistage stratified random sampling design. These are then populated systematically in the National Marine Fishery Resources Data Centre (NMFDC) of ICAR-CMFRI, along with proper metadata documentation (CMFRI, FRAD, 1969, Varghese *et al.*,

2021). When such a comprehensive mechanism is in place, the assertion made by MBA is unfounded. ICAR-CMFRI team has carried out a detailed scrutiny of the claims which are listed in the MBA report, based on four assessment criteria. Our points of divergence regarding each criterion-based statement are detailed below.

## Observations on the Assessment Criteria

### Criterion 1: Impacts on the Species under Assessment

Cephalopods including squid, cuttlefish, and octopus are commercially exploited all along the Indian Coast, catering to the export trade since the mid-seventies (Meiyappan and Mohamed, 2000), and the squid fishery which began in 1961 has been systematically monitored and recorded since then. The stock assessment indicates that the yield of *U. (P) duvaucelii* along the eastern Arabian Sea is closer to the estimates of MSY for the squid fishery along the west coast of India (Sasikumar *et al.*, 2017). Further, the smoothed production time series assessment of *U. (P) duvaucelii* off the SW coast of India classifies it under the 'abundant' category (Venkatesan *et al.*, 2017). The recent ageing studies based on hard parts (statoliths) suggest that *U. (P) duvaucelii* has a short lifespan of <1 year, with year-round recruitment, fast growth rates, and rapid population turnover (Sajikumar *et al.*, 2022). Additionally, the occurrence of egg mops in gelatinous finger-like strands attached to the substratum in shallow intertidal areas implies that the spawning of squid happens in coastal benthic habitats (Asokan & Kakati, 1991), which are non-trawlable. In these sheltered areas, the female squids are less susceptible to fishing mortality. This can be corroborated by their skewed sex ratio in trawl catches. Hence, the chances of egg survival and recruitment are also relatively high. Apart from this, the mechanized fishing operation is prohibited in inshore waters by law through various



*Uroteuthis duvaucelii*

State Marine Fisheries Regulation Act. This minimizes the overlap of the fishing effort (gear interaction) with the inshore distribution of squids, particularly during spawning and egg laying, when they aggregate very close to the shore.

## Criterion 2: Impacts on Other Species

To address the impact of bottom trawling, which is widely recognized as having a high impact on benthic invertebrates, it is observed that squids, by virtue of their distribution, are caught by high-opening off-bottom trawl that is operated above the sea bottom.

**Bycatch species:** In India, specific stock assessment studies have been carried out for many of the dominant bycatch species, including some of the common sharks and rays, and they are not grouped under the common denomination "forage fish". The catch profile for the commercial trawl fisheries in India and detailed reports on bycatch and discards along the Indian Coast are available at <http://eprints.cmfri.org.in/>. The reference, Gibinkumar *et al.*, (2012) used for scoring Criterion 2 is inappropriate since it describes the catch from a shrimp trawl (29m head rope length), which is distinct from the high opening off-bottom trawl employed for squids (99-110m head rope length). The high opening off-bottom trawls used in squid fisheries are therefore less likely to interact with the benthic invertebrates, corals and biogenic habitats of forage fish, finfish, sharks and turtles in the country.

**Elasmobranchs:** Several measures are currently in place in India to monitor and manage shark fisheries and the adoption of a NPOA-sharks is under consideration. Even though "160 species of sharks" are reported in Indian seas, this number includes many species which either occur occasionally or do not fall in the assorted category so much as to prominently figure in the landings under any category. The dominant species in trawl fisheries are *Rhizoprionodon* spp. and *Scoliodon laticaudus*. Both species are small sharks with faster generation time and hence have the potential for population recovery in the face of overfishing. Other dominant species, including the *Carcharhinus* and *Sphyrna* species are primarily taken with pelagic drift gillnets and longlines, with the exception being smaller individuals of *C. falciformis* in stray numbers and *Sphyrna lewini*, for which management measures have been suggested; Minimum Legal Size has been proposed for *S. lewini* (Thomas *et al.*, 2021). Thresher sharks, Mackerel sharks and Oceanic white tip sharks are also caught in pelagic drift gillnet and longline fisheries.

The high figure of 74,943 MT of elasmobranch landings reported in 1998 was primarily attributable to the rampant whale shark hunting along several parts of the Indian Coast. In 2001, the whale shark was listed under Schedule I of the Indian Wildlife (Protection) Act, 1972 as a "protected species". The subsequent reduction in the proportion of sharks in the total landings may be the result of the diversion of fisheries to other resources or grounds. The complete ban on shark fin trade implemented in India

in 2015 (Govt of India, through Notification No.110/ (RE-2013)/2009-2014) may be a factor for reduced landings of sharks.

The Rapid Stock Assessment (Kizhakudan *et al.*, 2015) which used data on total shark landings, also included landings by gears besides trawls. This is not indicative of landings from trawl fishing alone. Further, being a method that is done exclusively on the smoothed production time series, the results are subject to high levels of sensitivity. The mechanised fishing and deep-water fishing indicated by ICAR-CMFRI (2017) refers to the exploitation of sharks as targeted and/or bycatch resources in gillnets and longlines, especially those directed towards the exploitation of large pelagic resources such as tunas and billfishes. The majority of shark and ray species that are regularly caught as bycatch in trawl fisheries are smaller species with relatively high resilience and therefore with relatively high bounce-back potential.

**Turtles:** India attaches great importance to the protection of sea turtles. One of the world's largest mass nesting or Arribada "arrival by sea" of the Olive Ridley turtle takes place along the coast of Odisha from December to March, supporting a nesting population of about 0.6 million Olive Ridelys and making this one of the most crucial conservation areas for this species worldwide. The intense turtle nesting beach in Odisha, where 90% of all turtles in India nest, is protected as a wildlife sanctuary and national park. The Empowered Committee of the Supreme Court (2003) recommended banning gillnets within 5 km of the three mass nesting beaches for three months during the breeding season.

In India, the live turtles caught in the nets are released back into the sea.

Turtle Excluder Device (TED) are used in trawls for releasing the turtles and reducing mortality. These measures can potentially reduce the bycatch as well.

Many studies have reported that gear modifications and operational changes are successful in mitigating turtle bycatch.

Religious and cultural values attached to sea turtles in many coastal regions of the country serve as deterrents to targeted hunting.

Almost all coastal states of India have allocated no-trawl fishing zones under the 'Fishing Regulation Act'. Apart from these, coastal states observe a seasonal mechanized fishing closure of 61 days.

The recent study on the turtle-fishing gear interaction conducted concurrently along the whole Indian coastline using a stratified random sample design, has put the mortality figures at a very low level viz., 1025 (Jayasankar *et al.*, 2022). The trawl interactions accounted for the maximum fatality (21%) followed by small gillnets (20%). Despite the uncertainties surrounding the adoption of TED, the overall picture of turtle mortality from fishing elicits the least amount of concern and is within the limits set by NOAA. The Indian fishermen's increased awareness and traditional consciousness toward the ecosystem are mostly responsible for this degree of comfort.

**Coral and other biogenic habitats:** In scientific research, it is often necessary to rely on information from multiple secondary sources indirectly cited in review papers to evaluate a topic comprehensively. However, to make the best decisions, it is necessary to verify such information before drawing conclusions. This assessment utilizes information from several such indirect sources. For example, Dineshbabu *et al.* (2014) is a review paper that cites Bagirathan *et al.* (2014) to discuss the impact of trawling. However, Bagirathan *et al.* are not describing the impact of high-opening off-bottom trawl or squid fishery on any of the vulnerable coral species. Similarly, Saroj *et al.* (2016) is a review article and doesn't report the results of any pertinent scientific research as cited in the report.

### Criterion 3: Management Effectiveness

The effectiveness of Fishery Management is considered "ineffective" in the assessment report, by attributing lack of effective measures to address the overcapacity of the fleets and reducing fishing efforts in India. However, effective input and output controls exist under the Marine Fisheries Regulation Acts in the various maritime states of India. The input controls include cod end mesh size limitations, engine HP capacity, control over destructive fishing practices, seasonal mechanized fishing closures (effort reduction), spatial control limiting the areas fished. The output controls include MLS (8 cm DML for *U. (P.) duvaucelii* Vide GO(P) No:40/15/F &PD dtd. 24.7.2015 & GO(P) No:11/2017/ F &PD dtd.17.5.2017-

Kerala State; GO No. AHF 157 SFS 2018 Bangalore dated 26/6/2019-Karnataka State; GO No. No. DF/ENF/NOTI-IMPL-MLS/2020-21/5042 dated 7/1/2020- Goa, Daman and Diu) to reduce fishing pressure on juveniles and IWPA to protect ETP species. Further, the management effectiveness in the Marine fisheries sector is apparent in the specifics of the fine levied by the respective State Department for the violation of the Marine Fisheries Regulation Act. For instance, the Kerala State, Under the scheme 'Conservation and Management of Fishery resources' details the Monitoring Control and Surveillance measures followed including the fine collected and boats confiscated for violation of MFR Act (Marine Fisheries 2405-00-103-91 <https://fisheries.kerala.gov.in/achievements>).

## Criterion 4: Impacts on the Habitat and Ecosystem

The squids are caught in high-opening off-bottom trawl nets operated in the water column. Due to the nature of fishing operations, the squid fishery in the Indian Seas has no impact on the benthic habitat.

## Conclusion

In light of these clarifications, the MBA team which has performed this assessment, would be advised to conduct a re-evaluation of the status verdict delivered for the Indian squid, based on scientifically robust data/published information. This would probably lead them to arrive at a "Safe" tag to be issued for the species, which will facilitate the seafood trade by clearing the air in the minds of both consumers and fishers.

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