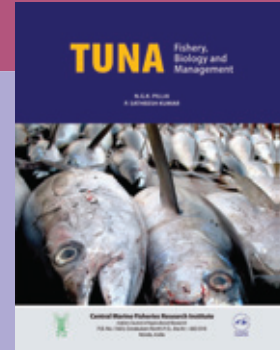


BOOK REVIEW

TUNA - FISHERY, BIOLOGY AND MANAGEMENT

Pillai, N.G.K. and Satheesh Kumar, P., 2014
ICAR-Central Marine Fisheries Research Institute, Kochi
ISBN : 9789382263943, 222 p.



Tunas are highly valued food fishes, targeted by neritic water fisheries and distant water fishing nations. Global tuna production has been estimated to be around 4.3 million tonnes (t) in 2005. The contribution by the Indian Ocean tuna fisheries was 22% of the total tuna production of 1.2 million t. The rapid expansion of the tuna fisheries in the

world oceans, especially the long line fisheries (both ordinary and deep long lining), purse seine fisheries (both log-associated and free school) drift gillnetting (oceanic and neritic), longlining employing converted trawlers, pole and line fishery and sport fishery (angling) urgently necessitated a compendium on the present status of tuna fisheries

in the global scenario. It is in this context that the book "Tuna-Fishery, Biology and Management" has been prepared by N.G.K. Pillai and P. Satheesh Kumar (222 pp) and published by CMFRI (2014).

The subject matter has been presented in eleven chapters and a bibliography. Chapter 1 presents the focus of the study and the source(s) of data such as those from FAO, IOTC, CMFRI, FSI, MPEDA etc and also collected from regular visits to fish landing centers in India. In Chapter 2, the taxonomy, distribution and also the IUCN Red list status of five oceanic species of tunas *Thunnus albacares*, *T.obesus*, *T.tonggol*, *Katsuwonus pelamis*, *Gymnosarda unicolor* and four coastal tunas such as *Euthynnus affinis*, *Auxis thazard*, *A.rochei* and *Sarda orientalis* are presented. Tuna fishing fleet in India has been categorized and tabulated as artisanal crafts and mechanized fishing fleets and fishing gears such as drift gillnets, longlines, hooks and lines, pole and line, troll lines and purse seines are described in the Chapter-3. Application of remote sensing in locating tuna shoals is presented as a compilation of published information. Brief mention of the Fish Aggregating Devices in India has also been made.

Review of the development of tuna fisheries in the World Oceans from pre-1950 to 1990 to present has been presented in Chapter 4. Global tuna production and species composition as of 2008 was presented and discussed. Status of tuna fisheries in the Pacific and Atlantic oceans, biology of tunas such as reproductive biology including gonad development and maturation, spawning, fecundity and Biological Reference Points are presented with passing mention of the migration of tunas in these areas. Tuna fisheries in the Indian Ocean form the content of Chapter 5. Catch and species composition were presented, and major tuna stocks in the Indian Ocean such as Skipjack tuna, Yellow fin tuna, Big eye tuna, Bullet tuna, Frigate tuna and Little tunny are discussed. Biological parameters discussed were food and feeding, length-weight relationship, growth parameters and reproductive biology. Tuna fisheries in the Exclusive Economic Zone (EEZ) of India has been presented in Chapter 6. The current

production of tunas from the neritic and oceanic waters has been estimated to be 81,375 tonnes. Survey details and assessment of tunas and related resources in the EEZ of India have been analyzed and the summary presented. Development of tuna fishery in India as a timeline has been included separately. Tuna production in the EEZ of India have been presented region-wise and species-wise, and the trends were discussed. Island tuna fisheries such as those from Andaman & Nicobar Islands and Lakshadweep Islands was discussed along with production trend and constraints for tuna fisheries development in these island realms.

Climate variability and its impacts on tuna production in the Indian Ocean are the subject matter of the Chapter 7. Satellite data has been utilized, but it was not clear which software was used and which band was selected for the studies. ENSO (El Nino Southern Oscillation) index was presented, and tuna fisheries data from different gears collected from IOTC has been utilized in this study. Environmental data such as Sea Surface Temperature (SST), Sea Level Pressure (SLP), Zonal wind (U), Merdional wind (V) and Scalar wind (W) data were collected from ICOADS. The list of *El nino* and *La nina* years during 1951-2010 has been utilized in the study and Principal Component Analyses (PCA) and Multidimensional Scaling (MDS) has been carried out. Details of oceanographic parameters variability during extreme climatic events in the Indian Ocean such as wind actions, SST, SLP are included. The correlation of *El Nino* and *La Nina* to tuna catch were very informative. It was observed that during strong *El Nino* years the tuna landings decreased in the Indian Ocean due to warm climatic variability, and during weak *El Nino* years, the tuna catch show signs of increase due to optimum SST and SLP values.

Processing technology of exploited tuna resources in India under frozen tuna, canned tuna, *Masmin*, Tuna pickles; tuna paste etc. categories has been presented Processing of value added tuna products such as *Sashimi*, tuna loins, *Sushi*, *Saku* blocks, steaks, battered and breaded products besides the by-products possible from tuna

processing waste has been included in Chapter 8. Global markets for tunas, especially *Sashimi*, frozen and canned tuna are discussed in Chapter 9. From India, chilled Yellowfin tuna, gutted and beheaded tuna and tuna loins are exported. During 2009-2010, tuna export from India was 21,846 t valued at US \$ 34.49 million.

In chapter 10 broad aspects of tuna migration, tuna culture, application of remote sensing in locating tuna shoals, tagging behaviour of tuna species, DNA based stock identification and population genetics of tunas are presented. In Chapter 11, Management of tuna fisheries are discussed. According to FAO (2005), the rate of stock collapse had accelerated throughout the period 1950-2004 and all major species are affected. Excessive deployment of purse seines, management concerns regarding Big eye and Southern Blue fin tuna, Illegal, Unreported and Unregulated (IUU) fishing and the steps taken by IOTC for implementing Quota Allocation System (QAS) are included in this chapter. Major management issues on tuna fisheries in the Indian Ocean are excess fishing capacity, IUU fishing, insufficient financial resources and by catches. Issues like species-specific data collection and analyses, target reference points, efficient management of the harvest, low habitat damage/catch ratio, ecolabelling and certification of tunas and IOTC's efforts to establish strong policy on fishing, curb excess fishing capacity and by-catch management are mentioned. Major issues in the management of tuna fisheries in the Indian EEZ have been presented separately. The last Chapter 12 gives recommendations for the development of Indian Ocean tuna fisheries and tuna fisheries in the EEZ of India. In the former section, steps taken by IOTC for the implementation of Quota Allocation System (QAS) were discussed. Several points under Tuna Conservation and Fishery Management (TCFM) were presented such as reduction of fishing capacity ; area - time closure of fishery; reduction of fishing pressure on the major tuna species and their MSY level; Letter of Permit (LOP) vessels need to report

their catch to the native country; necessity of tuna tagging programme and Quality Assurance System (QAS) for tuna and related fishes. Recommendations for the development of Indian tuna fisheries are included in this chapter. These include development of transportation facilities including flight connectivity; development of a modern long line fleet to produce *Sashimi* grade tunas; HRD for island fishermen in tuna longlining and handling for *Sashimi* grade tunas; annual species-wise stock assessment; tagging of oceanic tuna species; regular supply of raw materials for maximal utilization of Indian processing plants; introduction of modified fishing gears ; abolishing LOP system in the Indian waters ; a sound and effective deep sea fishing policy to be developed; future research should focus utilization of time series data on tuna and environmental variables such as SST, SLP, Chlorophyll and forage distribution; reduction of cost of production to be achieved through small scale fisheries; reduction of import of fishing fleets, and effective utilization of by-catch and discards by processing value added products from them.

In conclusion, it has been stated that the major market species of tunas are a part of international fisheries requiring multilateral co-operation for management, and at all ocean basins fisheries management organizations have been established. Depleted/affected species of tunas were identified, and swift actions are needed for ensuring that tuna populations are maintained at levels of abundance that can support MSYs on sound basis. The publication also presents an exhaustive bibliography on Tunas, Tuna fisheries and their management. This book will function as reference manual for scholars, tuna fishing industry and policy planners involved in tuna fishery management

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