

# Evolution of Fisheries and Aquaculture in India



**N.G.K. Pillai & Pradeep K. Katiha**

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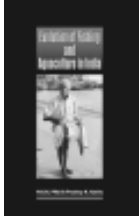
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## Marine ecosystems

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### Physical features

India has a coastline of 8129 km long. The average width of the continental shelf from the base varies from 32 km off the Andhra Pradesh coast to 174.6 km off the northwest coast. Off Kerala it is about 65 km and off Goa and Karnataka it is over 90 km. The total area of EEZ of India is estimated at 2.02 million km<sup>2</sup> against its land area of about 3.2 million km<sup>2</sup> comprising of 0.86 million km<sup>2</sup> on the west coast, 0.56 million km<sup>2</sup> on the east coast and 0.60 million km<sup>2</sup> around Andaman and Nicobar islands. The continental shelf area between 0 and 50 m and between 0 and 200 m depth, is estimated at 191972 km<sup>2</sup> and 452060 km<sup>2</sup> respectively. In consideration of the general topographical features, physical nature of the sea, nature of the sea bottom, distribution pattern of the species, their abundance and fishery characteristics, the west and east coasts can be broadly divided into northern and southern parts. Primary and secondary productivity is higher on the west coast compared to the east, mainly due to the strong upwelling process with a consequential effect on the fishery. The northwest coast (15°-23°N Lat) comprising of the maritime states of Gujarat and Maharashtra has extensive fishing grounds and the sea bottom is generally muddy while the southwest coast (8°-15°N Lat) covering Goa, Karnataka, Kerala and west coast of Tamil Nadu has a narrow continental shelf with less extensive fishing grounds. The southeast coast (10°-15°N Lat) comprising of the coastline of Tamil Nadu and Pondicherry is characterised by coral and rocky grounds while the sea bottom of the northeast coast (15°-21°N Lat) covering Andhra Pradesh, Orissa and West Bengal is predominantly muddy and suitable for bottom trawling (Fig. 33).

### Oceanographic features

The northern Indian Ocean, together with its two major bays, the Arabian Sea and the Bay of Bengal, is landlocked in the north by the Asian continent which separates the northern Indian Ocean from the deep-

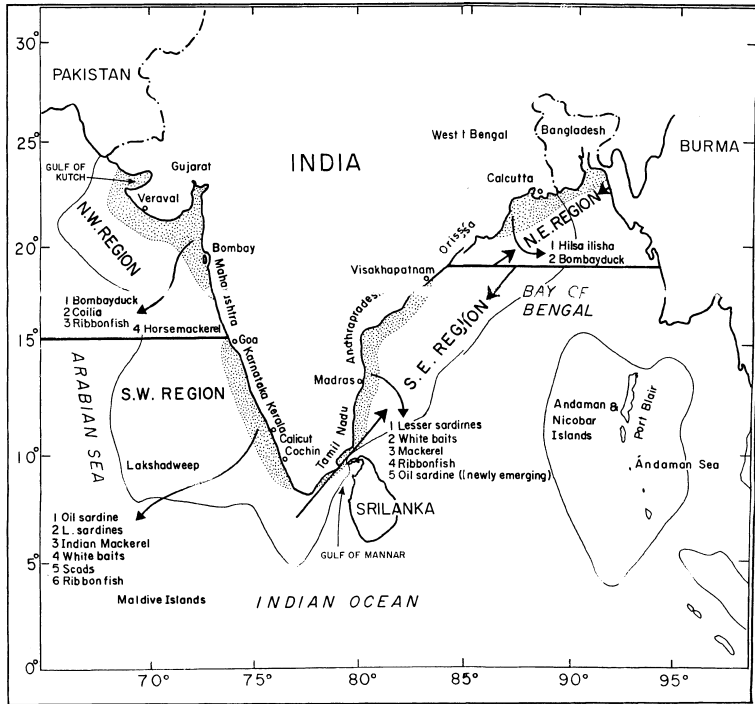


Fig. 33. Exclusive Economic Zone of India indicating the distribution of major fishery resources

reaching vertical convection areas of the Arctic seas and the cold climate regions of the northern hemisphere. This geographic separation is a major factor, which determines the oceanographic conditions of the northern Indian ocean. Circulation of waters in the Arabian Sea and Bay of Bengal is influenced by pattern of winds associated with the summer and winter monsoons and comprise the monsoon current, the equatorial current and the equatorial counter current (Varadachari and Sharma, 1967). The monsoon current which is westerly during the north east monsoon period (October-December) and easterly during the south west monsoon season (May-October) have significant impact on the coastal fisheries. Average salinity value ranges between 34-37‰ in Arabian Sea and 30-34‰ in Bay of Bengal. Both sea and land breeze are common in this area except during the southwest monsoon (along the west coast) and the northeast monsoon season (along the east coast) (Pillai *et al.*, 1997).

In the Arabian Sea, the temperature ranges between 23-29 °C and in the Bay of Bengal between 27-29°C. With regards to vertical distribution

of temperature in the Bay of Bengal, the thermocline is usually below 50-55 m, occasionally going down to 100-125 m while in the Arabian sea, it fluctuates a great deal, showing definite seasonal trends (Rao, 1973). Coastal upwelling occurs in varying intensities along the west and east coast of India, corresponding with the southwest monsoon and determines seasonal productivity patterns. During the months of strongest monsoon winds, also coinciding with upwelling, linear banks of greenish, highly organic and mobile mud (*Chakara*) form inshore in many areas between latitudes 8 and 10° N (Bristow, 1938). On the southwest coast of India, particularly in the region between Alleppey and Calicut, mud banks are formed due to the lifting of silt laden bottom waters during the southwest monsoon. This phenomenon is associated with fisheries of considerable magnitude in the inshore waters.

### Primary and secondary production

The rate of primary production on the east coast is estimated at 0.63 gC m<sup>-2</sup> d<sup>-1</sup> in the shelf and 0.19 gC m<sup>-2</sup> d<sup>-1</sup> outside the shelf. On the west coast, within 50 m depth, the mean value is assessed as 1.24 gC m<sup>-2</sup> y<sup>-1</sup> and for the rest of the shelf as 0.45 gC m<sup>-2</sup> d<sup>-1</sup>. For the oligotrophic region outside the shelf, it is estimated as 0.19 gC m<sup>-2</sup> d<sup>-1</sup>. On the west coast, the maximum production of phytoplankton takes place during the southwest monsoon (June-September). Another peak of lesser magnitude is recorded between December and January. The zooplankton production shows two peaks in June and October.

