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THE WIND DRIFTS OFF THE WEST COAST OF INDIA AND THEIR INFLUENCE ON THE OIL SARDINE FISHERY*

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ABSTRACT

The wind drifts off the west coast of India during the winter season have been examined in terms of barometric pressure differences along the coastline. Changes in the oil sardine landings seem to be related to the long-term changes of the wind drifts. The data prior to the rapid growth of the fishing industry indicate that the north-east monsoon season which helps in the development or strengthening of the northerly drifts in the waters off the coast appears to be favourable for the fishery.

INTRODUCTION

THE situation of the surface currents is one of the important factors which influence the migration of the pelagic shoals of fishes in the sea. The oil sardine fishery and the wind-driven currents of the west coast of India during winter season constitute an interesting study of this kind.

Due to the influence of wind on the sea surface, an evidence for the surface currents could be obtained from the wind conditions. And it is possible to deduce the wind conditions over a long and straight coastal strip (like the west coast of India), from a knowledge of the barometric pressures observed at the coast. The pressure data could be readily obtained from the meteorological stations situated along the coast. Thus, the pressure data (reduced to the mean sea level) can be used to represent the general conditions of wind generated drift currents and hence be related with the conditions of the fishery.

MATERIALS AND METHODS

The monthly mean values of station level pressures for the months of November and December at Bombay and Cochin for 0230 hrs G.M.T. for the years 1925 through 1968 are obtained from the records of the India Meteorological Department. The monthly pressures at each station were reduced to mean sea level. The mean of these values for two months is determined for each station and for each year. The

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difference of these average pressures between Bombay and Cochin during this period (November and December) is considered to represent the strength of the winter monsoon of the corresponding year over the west coast.

The published data of oil sardine landings (Nair and Chidambaram, 1951) over the west coast of India for the years 1925 through 1949 are utilised. The annual catches of oil sardine for the years 1950 through 1968 are obtained from Bulletin No. 13 of the Central Marine Fisheries Research Institute.

The trends in both the winter monsoon intensities and the oil sardine landings are determined following the method of seven-ordinate iterated averages (Kendall, 1946). These secular variations are then compared.

Discussion of the Results

The winter monsoon winds, though they are variable and relatively weak, are essentially offshore winds, as far as the Indian west coast is concerned. These winds produce, in the surface waters off the coast, currents which would flow westward to north-westward. In view of the north-west through south-east orientation of the coastline in its southern part, the currents thus generated by winds will have components running parallel and up the coastline. These drift currents are complimentary to the north heading surface currents which are generally encountered far off from the shelf during the north-east monsoon season (Murty, 1967). These off-shelf currents originate from south of Ceylon where they are west bound. These west bound currents must be responsible to bring the pelagic sardine fishes to the Indian waters. Thus, the complimentary drift currents off the west coast of India produce favourable conditions for the pelagic fishes to migrate to the shallow coastal waters.

The stronger the winter monsoon air flow, the stronger would be the wind-generated currents and therefore the conditions would be more favourable for migration of the pelagic fish towards the coast.

It is well known that the catches of oil sardine over the west coast are intense during the winter season of the year. The relationship between the oil sardine catches and the winter wind drifts is illustrated in Fig. 1. The pressure differences (ΔP) which stand for the wind drifts are represented in tenths of millibars along the abscissa. The oil sardine landings in thousands of metric tonnes are represented on a logarithmic scale along the ordinate. The years are represented by the corresponding numbers within the diagram. Excepting a few cases, the relation between the oil sardine landings and the wind drifts seems to be more or less exponential for the years upto 1956, an increase in the drifts bringing about a logarithmic increase of the catches. The data from 1957 onwards may be highly influenced by the rapid technological developments of the methods of fish catch due to the impact of growing fishery industry. The analysis thus reveals the importance of the study of drift currents along the west coast of India during the winter season for the catches of the migratory sardine fish shoals.

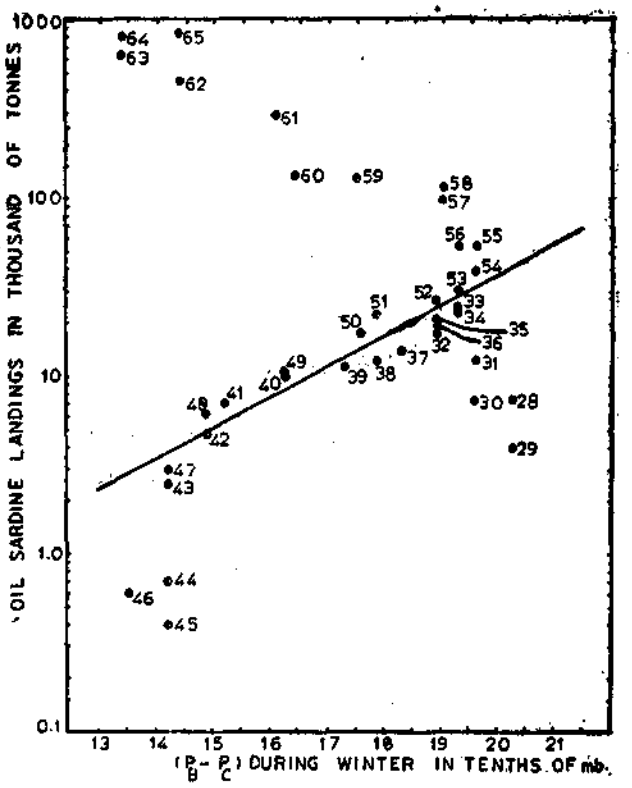

Fig. 1. Relationship of oil sardine landings and wind drifts.

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