REMOTE SENSING IN MARINE FISHERIES, ESPECIALLY FOR TUNAS

PROSPECTUS AND POSSIBILITIES :

Most of the species of tunas respond directly to the temperature variations and it may be stated that certain upper and lower limiting temperatures determine the limits of ranges of tunas in the oceans. Several investigations have been conducted to understand the relation between the variation in sea surface temperature and availability of tunas. The influence of temperature between limiting isotherms on the distribution of tuna is indirect and is through the availability of forage organisms, especially in areas such as oceanic fronts where marked horizontal temperature differences are observed. In the tropical areas, localised differences in the surface temperature also may point the areas of current boundaries, upwelling etc. where forage organisms for tunas accumulate.

Vertical distribution pattern of tunas and their aggregation have also been found to be associated with the vertical temperature distribution. Longline fishing method is suited best in the tropical waters where the depth of the mixed layer is usually deeper (100 m). The average depth of the thermocline over the equatorial area in the Indian Ocean is around 100 m below the surface and the associated complex nature of the ridges and troughs in this area help to explain the effective longline catch of bigeye tuna which is a deep layer swimmer in the equatorial waters north of 10° S. It is also observed that the thermocline ridges are the preferred places of albacore and bluefin tuna.

Aggregations of tunas are frequently observed in the vicinity of oceanic fronts which are the boundaries of watermasses. Fronts are the places of temperature discontinuities and at these places convergence usually takes place which results in the accumulation of plankton and in turn macro-organisms which are the preferred forage for tunas. The relation between upwelling and concentration of tunas is a complicated one and the linkage may be connected with several other factors.

Areas such as oceanic islands, sea mouths and continental slopes with high bottom topography are also good tuna fishing grounds as they affect the surface currents and internal waves giving rise to eddies, rise in thermocline level etc. Eddies could concentrate plankton and cyclonic eddies might increase its production. This may attract the macro-organisms which form the forage of tunas.

It may thus be concluded that the topographic features influence the hydrographic processes such as the internal waves on the slope areas, mixing around oceanic islands and sea mouths and these in turn affect the production of tuna forage and hence the concentration of tunas in such areas. ***Some of the oceanic features such as the ocean temperature, chlorophyll distribution, current boundaries, slicks and ocean fronts can be detected on the satellite imagery and there is an urgent need to scientifically plan the data acquisition on these parameters useful for understanding tuna environment on an ocean wide basis.*** *Once these features are mapped, seasonal availability of tunas can also be studied to understand the likely areas of concentration of tunas, especially skipjack and young yellow fin tunas.*

Remote sensing of sea surface temperature from multi channel infra-red and microwave satellite observations are necessary for understanding the distribution and quantification of tunas and other important pelagic fishes in the Exclusive Economic Zone of India.

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