SUMMARY

This account deals with the results of investigations on primary production and related aspects conducted in the Indian Seas since 1957 and includes the regional and seasonal variations in the rate of production, factors controlling the same and the magnitude of potential fishery resources derived from it.

Data collected for various periods using oxygen and ^{14}C techniques from the Gulf of Mannar, Palk Bay, the south-west coast of India including Laccadive Sea together with other available data form the basis of these studies.

Intensive trials on standardisation and intercalibration have been carried out to make the ^{14}C data reliable and comparable. The results are presented along with the material and methods.

It is found that the shallow regions of the Gulf of Mannar and Palk Bay are very productive with an annual gross production of 443 and 561 gC/m^2, respectively.

On the west-coast the maximum production is towards the coast within 50 m depth and gradually decreases seawards. The mean value within 50 m is 1.24 gC/m^2/day with the highest rate during the south-west monsoon season.

The minimum is during the pre-monsoon when the mixed layer is deepest and moderately high rates are found during the post-monsoon. The daily rate of production for the rest of the shelf is 0.47 gC/m^2/day and for oligotrophic regions outside the shelf it is only 0.18 gC/m^2/day.

The annual gross production for the inshore regions on the west coast within 50 m is 455 gC/m^2 and for the rest of the shelf 170 gC/m^2. This would amount to an annual gross production of 50 x 10^6 tonnes of carbon for the inshore regions comprising 1,14,520 sq.km and 30 x 10^6 tonnes for 1,68,790 sq.km of the outer shelf regions.

The rates of primary production for the east coast are 0.63 gC/m^2/day on the shelf and 0.19 gC/m^2/day outside the shelf and annual estimated gross production is 25 x 10^6 tonnes of carbon for 1,11,150 sq.km of the shelf.

By comparison with areas where there is intensive exploitation and by tracing the carbon production through the different trophic levels using various ecological efficiency factors an estimate of a potential harvest of 3 million tonnes of fish has been derived for the Indian Seas which is about three times the present yield. The results of exploratory surveys indicate a potential yield of 2.4 million tonnes from both the coasts, leading

validity to the estimates from primary production data.

Similar calculations have been made for 51 x 10^6 sq. km of the Indian Ocean for which the Indian Ocean Expedition data are available. The annual net production is computed at 3.9 x 10^9 tonnes of carbon which is about one-fifth of the estimated world oceanic production, while the catch is only one-twentieth of the world production of marine fish. The shelf areas of the Indian Ocean alone account for 0.56 x 10^9 tonnes of carbon or about one-seventh of the total production in the Indian Ocean. The potential yield from the Indian Ocean at the present level of world fishing is about 11 million tonnes of fish. The Indian Seas could provide an annual sustainable yield of about one-fourth of the potential yield from the Indian Ocean as the productivity studies indicate.

In addition, the growth kinetics of the common phytoplankters in natural conditions and a green flagellate, Tetraselmis in culture have been presented.

The factors controlling production have been discussed. The availability of nutrients has been found to be the principal factor that determines the seasonal and regional variation of primary production in the Indian Seas.

The variations of the three phosphorus fractions - inorganic, organic and particulate P have been discussed in relation to the primary production in Gulf of Mannar off Mandapam. Though the rate of primary production is uniformly high, instantaneous concentration of inorganic P is low and without significant seasonal variation. But the total P, dissolved organic P and particulate P show definite seasonal variation. From primary production the rate of phosphate assimilation and regeneration have been deduced.

Total organic nitrogen values in the particulate matter converted into protein equivalents exhibit a significant correlation with primary production. However, it is found that apart from serving as a crude index of standing crop, the method does not seem to hold much promise due to the errors involved.

Four collaboration papers - one on the quantitative assessment of the potential resources of the Indian Ocean and adjoining seas, two on the primary productivity of some of the coral reefs in the Indian Seas and one on the ecology of a tidal pool are appended.

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