CHARACTERISTICS OF CAPTURE FISHERY RESOURCES, THEIR ASSESSMENT AND MANAGEMENT

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ABSTRACT

Fishery resources are dynamic and renewable. Dynamism demands constant monitoring of the resources. Maintenance of renewability is the primary concern of the research on and management of fishery resources. Variability in the availability of capture fishery resources is multidimensional with variety of species, having wider size and different sex compositions in each species over space and time; the dimension of which is not encountered in any other known resources. In addition, fishery resource is beyond the visual horizon making the comprehension of their quality and quantity a difficult task. Besides there are two groups of factors namely fishery independent factors such as current, temperature and salinity and fishery. dependent factors such as types of fishing, namely trawling, gill netting etc. with different mesh sizes and intensity of fishing indicating the number of units of each type of fishing. Hence assessment of capture fishery resources remains a puzzle even to-day. However, attempts have been made to develop suitable mathematical and statistical models for assessing them and for offering suggestions for judicious management of the resources. This paper indicates in brief the important charac- teristics of the capture fisheries, their assessment and mana- gement with particular reference to India.

Capture and culture fisheries : In capture fisheries human in- tervention comes only at the time of havest whereas in culture fisheries of marketable size fish, human involvement is very high throughout from production of seed to harvesting. Moreover, in culture fisheries most of the fishery independent factors are controllable. Hence the effect of these factors are well understood in culture fisheries and by proper manipulation of these factors, the productivity of a given water body can be

maximised. In capture fisheries the impact of fishery independent factors are not easily assessable and the carrying capacity of the water body remains limited. Mixture of many species of different size groups and their differential availability to the fishery due to fishery independent as well as dependent factors makes forecasting a difficult task in culture fisheries. However, attempts are made to assess capture fishery resources through many stock assessment models suited to the conditions obtaining in different regions of the world.

Tropical and temperate fisheries : Tropical fishery resources differ from their counter parts in temperate waters in many aspects. A large number of species with short life span, fast growth and spawning all year round makes tropical resource distinct from temperate resource. Aging a fish is relatively more difficult in tropics. Hence assessment of a resource and the impact of ffort on it becomes all the more difficult in the tropics. India is no exception to it.

Unit of measurement : Assessment of a resource requires a suitable unit of measurement. For example to assess yield from crops in the field the requirements are yield per unit area and the total area of the crop. Yield can be expressed in terms of measure and weight and the area in terms of either hectare or acre. However, conversion of one measurement to the other, in other words from hectare to acre, does not pose a problem. But this is not the case in capture fisheries. Many gears operate without having any specified target species and catch-per-unit effort of one is not easily convertable to that of other. Standardi- sation of effort remains a problem. In the context of multi- species operated upon by multigear as obtaining in India, one, can imagine the dimension of the problem of assessing the widely distributed dynamic stocks. Data on catch and effort, information on biology and environment, and suitable stock assessment models are the basic requirements to study the exploited fish stocks.

Data base : In marine sector, the Central Marine Fisheries Research Institute, Cochin is the nodal Institute in India in marine fisheries Research. Based on its vast experience in collection of marine fish catch statistics over four decades and the expertise available at the Institute, the CMFRI has developed a sound sampling design for assessing exploited marine fish stocks in India. This design is a stratified multistage random sampling scheme where the stratification is two dimensional over space and time (Anon, 1983). This design is now recommended by International agencies like F.A.O. to other developed and develop- ing countries. Using this sampling design, a synchronised data

collecting sysem is developed at the Institute to collect data on catch,effort & biological and environmental aspects. Through this programme more than 99% of the marine fish landings in India is covered.

Stock assessment : To assess the potential resources available for exploitation, different models have been used. Under micro analytical model, Beverton and Holt model requires information on natural and fishing mortality and growth. To overcome the problem of aging of a fish, length frequency data are used In order to get a reliable estimate of total mortality, a method of estimating it has been indicated (Alagaraja, 1984). Since the fishery in India is multispecies exploited by multigear, species specific or gear specific approach is extremely difficult and the Beverton and Holt model may not be able to answer some of the problems on total resource assessment. For this purpose, realising the shortfalls of existing macro analytic models, Relative response model (Alagaraja, 1984) has been proposed taking note of the present plateau level reached by almost all major exploited groups. Assessment of *Parapenaeopsis stylifera* and *Metapenaeous dobsoni* resources off Sakthikulangara and Cochin has been done (Alagaraja *et al.* 1986) using the method mentioned above on estimation of total mortality and applying Beverton and Holt model. Using relative response model, the prawn resources in the North east region at present exploited by large trawlers have been assessed and indicating that about 100 large trawlers may be permitted to exploit these resources so that the fishery is viable and the stocks are not affected (Report on Multipurpose Vesselsd MSS).

Potential resources : As per the present indications, it is pointed out that the potential exploitable resources in the inshore waters upto about 50 m depth are to the tune of 2.0 million tonnes and beyond 50 m depth, the estimate is 1.0 million tonnes (Alagaraja 1987). Already the landings from the inshore waters have been estimated at 1.7 million tonnes, close to the potential of 2.0 million tonnes. It is hence suggested that present level of effort in this zone need not be increased at any cost and the present level of effort may be rationalised so that the stocks are not put under stress and strain. In addition it is also suggested that cod-end mesh size of small trawls should not be less than 30 mm. At present the cod-end mesh size varies from 8 to 20 mm. This reduction in mesh size has led to an economic and size overfishing. So far there is no indication of recruitment overfishing thanks to the very high fecundity of most of the commercially important groups. If the mesh

regulation is enforced, recruitment overfishing can easily be avoided and fish stocks will not face extinction due to fishery dependent factors. Hence, to increase the marine fish landings it is but natural to look to areas beyond 50 m depth. This venture is cost intensive. Hence mapping the grounds and judicious planning of exploitation of these 1.0 million under and unexploited resources is the need of the hour.

Conclusion : Till sixties fishing in India remained passive in the sense, fish approached the shores and gear were used to catch them like shore seines catching the shore approaching pelagic species. In late seventies the picture changed and the fishing has become active and aggressive, purse-seines chasing the stocks and catching them enmass and trawls sweeping the inshore bottom. These gear chase and catch fish day in and day out. Even during monsoon which was non fishing season earlier has become active fishing season in some pockets of the marine zone. This tendency may spread to other areas also once new methods of fishing are used overcoming the problem posed by the weather. It is high tune that regulatory measures are brought in the fishing sector so as to save the valuable renewable resources from extinction and to reap maximum sustainable yields. Otherwise fishery in India may face the pathtic situation where the forestry has reached.

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REFERENCES

Anon. 1983. Proceedings of the Workshop on Acquisition and dissemination of data on marine living resources of Indian Seas. *Mar. Fish. Infor. Serv. T & E Ser.,* No. 46: 1982.

Alagaraja, K. 1984. Simple methods for estimation of parameters for assessing exploited fish stocks. *Indian J. Fish.*31(2):177-208

Alagaraja, K., M.J. George, K. Narayana Kurup and C. Suseelan. 1986. Yield per recruit analysis on *Parapenaeopsis stylifera* and *Metapenaeus dobsoni* from Kerala State., *India. J. Appl. 2: Ichthyology* 2: 1-11

Alagaraja, K. 1987. A brief appraisal of marine fisheries in India. National Symposium on Research and Development in Marine Fisheries Mandapam Camp. 16-18 Sept. 1987 Central Marine Fisheries Research Institute, Cochin 682 031.