Pelagic Fishery Resources of Sri Lanka and its Present Level of Exploitation with Special Reference to Off-Shore and Deep-Sea Waters

By

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Introduction

Pelagic resources around Sri Lanka may be categorised into three major groups :—

(1) The small pelagic varieties such as the Sprats (Halmessa), Sardines (Salaya, Soodaya), and Herrings (Hurulla).

(2) The medium size pelagic species such as the Mackerel (Kumbala and Bolla), Barracuda (Jeela), Seer/Spanish Mackerel (Thora), Frigate mackerel (Alagoduwa), Mackerel tuna (Atawalla) and the Skipjack (Balaya).

(3) The large size fishes such as the Yellowfin tuna (Kelawalla), Bigeye Tuna (Asgedi kelawalla), Marlins (Koppora and Gappara), Sail fish (Thalapath), Sharks (Mora) and Rays (Maduwa).

Of these the first group is almost entirely an inshore type of resource with a very narrow belt of concentrated distribution which is within 15 fathoms depth. The second group is more widely distributed with the mackerel, seer fish, frigate mackerel and mackerel tuna mainly concentrated in the in-shore waters whereas the skipjack, some spanish mackerel and mackerel tuna have a more extended distribution covering the off-shore range as well. The third group of varieties show presence in the in-shore waters during their early stages in life but move into the depths of the off-shore range as they grow older and bigger. These large tunas have ocean wide distribution extending from Africa to Indonesia and southwards to about 15°S below the equator.

The Palk Bay and the Pedro bank areas are generally shallow even beyond the traditionally fished area and are not rich in tuna or tuna-like fishes but rich in the first group and the mackerels. The Gulf of Mannar is relatively much enriched with the smaller, medium and the larger pelagic varieties. This is very exceptional compared to all other areas around the island.

In terms of productivity, off-shore range should not be compared with the coastal or in-shore range because the in-shore range is more productive as a general rule because of environmental characteristics. Even in evaluating economic viabilities, the possibilities of investment in the in-shore area should not be weighed against possibilities in the off-shore and deep-sea areas. There is room for improvement of fishery for small pelagic species by improving the craft and gear for higher degree of fishing efficiency and by increasing operational days and quality of fish.

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Exploited Resources

The existing fisheries for pelagic species covers mainly the in-shore range and to a very small degree the inner fringes of the off-shore range, as such the present production level is estimated as follows :—

Herrings, sardines and sprats	35,000 – 40,000 tons/annum
Indian mackerel, flying fish, squid, spanish mackerel etc.	4,000 – 5,000 ,,
Frigate mackerel, mackerel tuna	5,000 – 7,000 ,,
Skipjack	10,000 – 12,000 ,,
Yellowfin (young)	4,000 ,,
Yellowfin (old) bigeye tuna	200 ,,
Sharks (pelagic)	3,000 ,,
Spear fish and marlins	1,000 ,,

The deep-sea pelagic resources are generally made up of three components : the surface, sub-surface and the deep swimming. The creation of these components are determined by sea conditions and the biology of the fish particularly the behavioural changes with age. Therefore fishing methods and fishing areas must be changed according to changes in the sea conditions and the life of fish, in order to achieve best performance. Further most of these varieties are schooling or aggregating types of fish and are generally mixed aggregates of varieties mainly according to their size. As a result it is almost always a mixed fishery rather than a fishery for any one specific variety of pelagic fish. In view of the characteristics of the main pelagic varieties in the off-shore and deep-sea areas, their resources cannot be considered as only being restricted to the 200-mile economic zone around Sri Lanka or there about. In fact almost all the major pelagic species in the range under consideration are highly migratory and are part of the main population in the central Indian Ocean. Many of these varieties fished off Sri Lanka, India and the Maldive Islands may be from common stocks. Which means the resource may be available to more than one nation and the fish moves or spreads across the boundaries of national jurisdiction to make themselves available for exploitation by more than one nation at the same time or in some cases at different times.

Therefore the pelagic resources in the deep-sea and off-shore area cannot be judged entirely by the catches made by any one type of fishing gear because no one type of gear in use at present is a perfect sampling equipment for all pelagic varieties at different depth during different periods. What we are basically concerned with, at this meeting, is the " availability " of the resources for exploitation by Sri Lanka and is determined by the vulnerability of various pelagic species to the fishing methods used in catching them. That is, the proportion of the total population which is within practical means of capture and which can be captured without causing difficulties for the remainder of the population to rebuild a stable resource level for continued exploitation.

Seasonal Pattern

The seasonal variation in the availability of off-shore and deep-sea pelagic species are most significant in comparison to other fisheries. This, as mentioned before, is because of changes in the environmental conditions as illustrated by Figure I and due to vertical and horizontal migration with age, spawning and feeding habits. When the fish are at the surface they may be caught by pole and line and trolling methods, the sub-surface components have to be caught by gill nets and the deep swimming components have to be caught by the long line method. This means these different methods have to be

used during different periods in order to realise a good catch rate on a year round basis. The southwest monsoon season is the best period for drift-net fishing and the inter-monsoon and north-east monsoon seasons are good for pole and line and long line fisheries.

Most of these pelagic species add young ones to their population mainly during the south-west monsoon and their life in the deep-sea and off-shore range extends up to 3 to 5 years, depending on the varieties. The exploitation has to be based on this.

Annual Pattern

In deep-sea and off-shore pelagic fisheries there will be annual variation in the availability of fish for commercial exploitation. The annual fluctuation is influenced by the following factors :—

(1) The success of the south-west monsoon;
(2) The quantity of young fish entering the exploitable population;
(3) The degree of exploitation of the younger fish;
(4) The meteorology and oceanographic conditions affecting the number of fishing days;
(5) Identification of ever changing areas of fish concentration—Fronts.

As a result, the annual production may vary by $\pm$ 30%. This percentage can be reduced by the expansion of the fishery to cover the entire off-shore range.

Potential

On the basis of observations and estimations of the existing fisheries and the results of experimental fishing conducted in the deep-sea and off-shore ranges, the following figures may be considered as potential in the deep-sea and off-shore ranges, available for exploitation.

Spanish mackerel	1,000 Tons/annum
Indian mackerel, flying fish, squid, etc.	3,000 " "
Frigate mackerel	—
Mackerel tuna	1,000 " "
Skipjack	15,000 " "
Yellowfin (young)	1,000 " "
Yellowfin (old), bigeye tuna	2,000 " "
Sharks	5,000 " "
Spear fish and marlins	1,000 " "

The tapping of the above potential depends on the development of modern technique of pole and line fishing, application of tuna long line and shark long line, increasing the number of units of drift-nets and the introduction of a bait fishery for the long line and pole and line fishery.

The resources for exploitation by pole and line and drift-net mainly concentrated within 60 miles from shore around the island. The possibility of organising steady bait supply to the pole and line method has been successfully tried out and operation of this method between September and April is strongly recommended. The driftnet fishery will be successful between June and September. During the above said periods each of the above-mentioned methods will yield approximately 800–1,000 kgs. per day respectively. The catches will consist of 35% yellowfin, 61.5% skipjack, 3.5% for other species for the pole and live fishery and 18% yellowfin, 38% skipjack, 10% bonito, 34% shark for the drift net method long line fishery will have to be expanded to exploit the larger tunas and sharks Efficient operating with this method of fishing should yield about one ton of fish per day including tunas (50%), sharks (35%), marlins and others (15%). Shark

long lining may give better catch of sharks using cheaper bait fish. In addition it will be necessary to commence regular patrolling within the economic zone to prevent poaching by distant nations which are actively conducting tuna long line operations in the vicinity.

The success of any venture to exploit any one or more of the above-mentioned varieties in the off-shore and near oceanic ranges depends on—

(1) Arrangement of suitable combinations of fishing methods;

(2) Having very suitable design and lay-out of vessel for the operations;

(3) Radio communication between vessels;

(4) Greater endurance at sea;

(5) Skill of fishermen employed and encouragement given for their active participation.

Vessels for exploiting the Resources

A special mention has been made on this aspect in this paper in order to emphasize the need for very careful consideration of this main investment component which is not only a very important one but one which cannot easily be discarded or modified, if found unsuitable. The size and specification of the fishing vessel is basically determined by considering the following factors :—

(1) Location of the fishing ground;

(2) The meteorological and oceanographic conditions;

(3) Behaviour of the fish;

(4) The type of fishing method or methods to be used;

(5) Catch rate and endurance.

DISCUSSION

The question was posed on the availability of live bait for pole and line and of dead bait for long line fishing. The author explained that there are sufficient resources of live bait around the island which is in excess of the requirement for the estimated stocks of skipjack available for pole and line fishing. As a result of the survey carried out during the past 4 years, it has been possible to determine the distribution of live bait resources in different areas, seasons. etc. In most of the western countries, each pole and line boat catches its own requirements of live bait, while in Eastern countries, like Japan, there is an independent live bait fishery. The feasibility of establishing a live bait fishery independent of the pole and line fishery in Sri Lanka was also emphasised. The species available for use as live bait included not only the traditional red bait but several other species. Suitab.e species also available for use as bait in long line fishing operation.

On the question o the size of boat that would be best for operating in our waters, the author pointed out that it would be best if boats are built to operate both pole and line as well as gill nets. He indicated that 45–60 ft. boats would be ideal size and for long lining 80-footers will be the answer. In the case of pole and line boats, he expected them to be provided with inbuilt bait tanks with a pump to circulate water. This would reduce the mortality of the live bait which would permit some of the less hardy small pelagic fish abundant in our coastal waters to be successfully used as live bait.

On being asked why, the Nichiro Co. boats which had carried out trial fishing operations from Galle a few years back, failed in their operations, the author explained that there were 3 reasons :

(1) The failure of the sick held drift net as a bait catching device ;

(2) The time spent for live bait fishing was 60% of the time spent at sea, thus giving little time to scouting and pole and line operations ;

(3) The boats were large and heavy expenditure was incurred as wages of the Japanese crew.