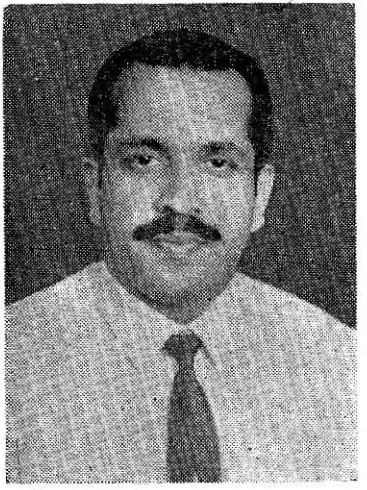
THE IMPRESSIONS OF THE F. A. O. CONFERENCE ON FISH FINDING



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Being a recepient of the NORAD research fellowship for 1969/70, I was sent to Norway for practical training of one year in the methods and techniques applied to acoustic surveys, and biological and hydrographical sampling. On the recommendation of the Institute of Marine Research, Bergen, Norway, my participation for the F. A. O. technical conference on fish finding, purse seining and aimed trawling was approved by Norwegian Agency for International Development and was accepted by the Food and Agriculture Organization of the United Nations. Accordingly, I reached Reykjavik, capital of Iceland on the 24th May and returned to Bergen on the 30th May 1970. There were 350 delegates representing 34 nations. They were represented in the following order : Iceland (150), United Kingdom (27), Norway (25), United States of America (15), Germany (13), Spain (12), Canada (10) and in addition there were participants from many other nations and from World Organizations. The delegates included scientists, technologists, acoustic experts, oceanographers, ship builders, administrators, representatives of Governments, fleet captains, electronic engineers and consultants, representatives of various firms, members of canning and freezing plants and co-operative societies and fisheries organizations.

This was the third F.A.O. sponsored meeting on fish finding; the first and second meetings were held at Hamburg in 1957 and at London in 1963 respectively. In recent years, much has been written about the distribution, abundance and movements of fish and their reaction to different fishing gears. Methods of locating and identifying the various fish species have also been improved considerably in recent times through more efficient echo sounders, sonars and net sounding equipments. These developments have led to many advances in gear and operational methods used in purse seining and trawling and in vessel designs.

During the last twenty years, aeroplanes have gained increasing importance for locating the surface fish and for giving a direct guidance to the skippers during the purse seine operations to such an extent that some important fisheries depend entirely on them. The "Icelandic search and information service", using aerial scouting, began in the late 1920's and became a regular service by 1939. It was indicated at the conference that the "fish spotter pilot" must have a thorough knowledge of the fishery and the fishing operation and that the pilot and the skipper must work as a team. The control of the entire fishing operation is largely done by the plane. It was found that the surface schools can be detected with the naked eye down to about 15 m depth and fish species can often be distinguished by their colour. Besides, plankton layers (food for fishes), current systems and boundaries between water masses are also clearly detectable from the air. This has been successfully demonstrated by the anchovetta and sardine fleets of Chile and Peru. The fishing operation at Chile for anchovetta as controlled by the "fish spotter pilot" was explained by colour slides, the salient features of which are summarised below :

The spotter pilot is the person who suggests or determines the area for the fishing fleet to operate. After his reconnaissance flight he gave a written report on the areas covered and how much fish and what species he has observed. He discusses the next day's operations with the fleet manager. The captain of each vessel determines the sailing time which is based on Pilot's report. The aeroplane gets airborne early morning and meets the fleet as scheduled. The search for the fish concentrations is the first task the pilot undertakes. Once the fish is located the pilot immediately instructs the fleet to reach the actual location. Competition with other fishing vessels makes them to develop more effective tactics. It was stated by the delegate who presented the slides that codes have been invented to pass on messages. He however, confessed that these do not work very well. Once the net is closed or pursed, the pilot advises whether he should split the catch into two bunts or not. It was further stated that shoals of anchovetta are usually located by the colour of the water. Under normal conditions, the colour of the water becomes purple when the fishes are 15 m deep. On other occassions depending upon light, water condition and plankton occurrence, the colour of water changes considerably; and when shoals are lower down, it becomes difficult to detect. Further, it was revealed that the water masses which have a higher concentration of plankton also have a greater occurrence of anchovetta. Birds like pelicans are also reliable guides to indicate the presence of anchovetta.

Visual spotting from the air has played an important part in the greater Menhaden fleets of the United States and the California sardine fishery and today, it is greatly used by the seiners. Fishing operations in a similar manner were carried out for mackerel, horse mackerel and bonito in Chile. On the basis of experience gained in commercial operations, the use of aeroplanes or helicopters is recommended for the surface fish surveys and related research programmes in conjunction with research vessels. The main advantages of the aeroplane are the greater speed and the greater range; the helicopter on the other hand is useful when detailed observations are to be

made, for it can even be operated from the research vessel. New technology of remote sensing will in due course play a major role in detection and identification of the pelagic fish stocks. The U.S. Bureau of Commercial Fisheries fully made use of low flying and visual observations by high altitude photography, multispectral scanners and lasers. It is interesting to note that they have observed fish schools from aircraft at night using low-light-level sensors to detect fish from their bioluminescence.

Some environmental parameters especially temperature can be used to determine areas of greater occurrence of given species. Thus, the use of bathythermograph by fishermen is on a rapid increase. Newly developed equipment together with net sonde sounding which is connected to a cable between the trawl and the trawler allows the water temperature at the trawl net to be continuously recorded during fishing. It is expected that the usefulness of this technique will considerably increase and the temperature telemetry will develop into a standard method for mid-water and bottom trawling. Experiences gathered by many countries have clearly indicated that the water temperature serves as an indicator for fish distribution and abundance.

The papers relating to acoustic/fishing surveys carried out in the West African coastal waters and in the Peruvian "Eruka" programme were of special interest to myself. During these surveys, it was pointed out that special attention was given to fish detection and the estimation of fish abundance by acoustic methods.

The proposed UNDP project in India on pelagic fish resources by combining acoustic surveys with fishing operations will attempt to identify the shoals of mackerel and oil sardine. Their distribution, abundance and migration will thus become known. Target strength measurements on individual species, as practiced and successfully demonstrated in Norway and elsewhere by using echo integrators in research vessels will be of great value. The benefit of this type of survey to the fishing industry is obvious as the information will certainly provide a basis for predicting locations and there is no doubt that this project will prove to be extremely helpful in planning future fishery programmes in India.

For purse seining and trawling the search-light-type sonar with tiltable transducer are in common use. Other sonars such as the electronic sector scanning, continous transmission frequency sonar, variable depth towed sonar and side-looking sonar are now being used for research purposes but some of these may come into operation for fishing in the near future. Although sonar is predominantly used for detection in near surface and pelagic fish schools, it can also be applied on sufficiently large bottom schools and to detect obstacles. Even though the sonar is chiefly used with purse seining, it is now being used for mid-water trawling also. A wide range of sonar types are available for all fishing requirements. The latest development is the addition of sonar to net sonde equipment. Interesting development in this field is the sector scanning sonar developed in England. Another worth mentioning advance is the "comb stylus" which is an interesting invention in echo sounding developed in Japan.

The section on purse seining and trawling had the maximum number of

papers for discussion. As is well known, the purse seining and trawling by smaller and larger vessels now account for 2/3rd of the World's total fish catch. An evaluation of the present day technique on purse seining/trawling was made and the improvements that could be made in the standard gear discussed. It was pointed out that even though seven synthetic types of fibres are available, the ideal meterial for making trawl net is not available yet. It was emphasised that the important requirements for large trawl nets are high breaking strength, relatively high extensibility and elasticity and small twine diameter and high abrasion resistance which can be best complied with netting yarns made up of polyamide continuous filament. Without this net material, some important developments in trawl fishing does not seem possible: (1) the heavy bottom trawls for modern stern trawlers and (2) mid-water trawls of large dimensions.