TUNA RESEARCH AND DATA COLLECTION ACTIVITIES IN SRI LANKA

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ABSTRACT

The Department of Fisheries and Aquatic Resources (DFAR) carries out the collection of national fishery statistics. The research work presently conducted by the Marine Biological Resources Division (MBRD) of the National Aquatic Resources Research and Development Agency (NARA) includes continuous monitoring of commercial tuna fisheries for the collection of data needed for the assessment of fish stocks and detailed biological studies of the major tuna species. Experiments have been carried out with fish aggregating devices to exploit the under-utilised large pelagic species from coastal waters. NARA has completed a two-year offshore resources survey utilizing three local multi-day fishing boats. The survey concluded that the offshore gillnet fishery has already achieved a maximum economic profit and that a further increase in the gillnet fleet should be prevented. Future expansion should be in tuna longlining that targets large yellowfin and bigeye tuna. The potential yield of all fish caught by tuna longline within the EEZ was estimated at around 6,700 t. and this indicates a necessity for a cautious approach in fleet development.

In 1994, NARA strengthened its system and extended the sampling programme towards the East coast through an FAO/TCP project. A fishing logbook system was introduced to the offshore multi-day fishing fleet since 1995. A total of 350 logbooks have been distributed amongst volunteer offshore multi-day boats during 1995 to 1997. Since 1990 the Government of Sri Lanka has provided landing facilities for about 44 foreign longliners. Although it is obligatory to provide fishing information to the Government, collection of data was not successful during the past years. The data collection system of DOFAR was designed 20-25 years ago. Therefore, improvements to the ongoing system to suit the present fisheries have been proposed. Some of the proposals have already been initiated with the assistance of NARA. A fishery census was conducted to gather accurate information on actual number of vessels in operation, which was a constraint in estimating total fish production in the past.

RÉSUMÉ

Le suivi constante des pêcheries thonières commerciales pour la collecte des données nécessaires à l'évaluation des stocks et aux études biologiques détaillées de la plupart des espèce de thonidés sont une des activités de recherche actuellement conduites par la division des ressources biologiques marines (MBRD) du centre de recherche et développement des ressources aquatiques (NARA). Des expérience ont été effectuées avec des dispositifs de concentration de poissons (DCP) pour exploiter les espèces de grands pélagiques sous exploitées dans les zones côtières. NARA a terminé une campagne de recherche de deux ans au large des côtes, utilisant pour cela trois bateaux de pêche locaux capables de passer plusieurs jours en mer. Cette étude a démontrée que la pêche au large au filet maillant a dores et déjà atteint le seuil maximum de rendement économique et que, par conséquent, il faut éviter toute l'augmentation de la flotte dans ce secteur. L'élargissement futur devrait se faire au niveau de la pêche palangrière qui cible plutôt les gros albacores et les thons obèses. Le rendement potentiel de toutes les captures de poissons faites par les palangriers dans la ZEE est estimé à 6.700 t. Ceci indique la nécessité d'une approche prudente de l'agrandissement de la flotte de pêche.

La collecte des statistiques nationales des pêches est menée par le département des ressources aquatiques et des pêche (DFAR). Le MBRD du centre de NARA gère parallèlement une banque de données qui recueille les données à caractère biologiques sur les thons, les autres espèces dominantes de grands pélagiques et en même temps les données sur les captures et l'effort de pêche des grandes pélagiques pour l'évaluation des stocks de poissons. En 1994 NARA a renforcé son système et entendu son programme d'échantillonnage jusqu'à la côte Est par le truchement d'un projet FAO/PCT. Un système de livres de bord a été mis en place depuis 1995 pour la flottille hauthurière. Au total 350 livres de bord ont été distribués parmi les unités de pêche volontaires durant la période allant de 1995 à 1997. Depuis 1990 le gouvernement du Sri Lanka procure des facilités et de services pour le débarquement des poissons à environ 44 palangriers étrangers. Bien qu'il soit obligatoire de fournir au gouvernement toutes les information relatives à la pêche, la collecte de donnée n'a pas été un succès au cours de ces dernières années. Le système de collecte de données du DOFAR a été crée il y a pus de vingt ans. Par conséquent, il a été proposé qu'une amélioration du système actuel soit envisagé pour faire face à la situation actuelle de la pêcherie. Quelques propositions dans ce sens ont déjà été faites par NARA. Un recensement a été entrepris pour rassembler des informations précises sur le nombre exact des bateaux de pêche actuellement opérationnels, facteur qui, par le passé s'est avéré être un réel obstacle pour estimer la production totale de poisson.

Introduction

The demand for enhanced research inputs increased with the development of fisheries after the introduction of motorization, new fishing craft and synthetic netting materials in the early 1950s. The setting up of the Fisheries Research Division in the Ministry of Fisheries in 1950 and the National Aquatic Resources Research and Development Agency (NARA) in 1981 were aimed at meeting this increased demand for fisheries research.

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The Fisheries Research Division from the early 1960s has carried out research on tuna resources and tuna fishing in Sri Lanka continuously until the creation of NARA in 1981. Several research programmes, including the monitoring of commercial tuna fisheries, studies on the biology and stock assessment of tuna species, exploratory fishing for tuna and bait for tuna fishing were some of the research activities carried out in the past. All these are well documented.

Expansion and development of local tuna fisheries towards offshore and deep-sea areas have received high priority over the recent years. The Government encouraged the expansion of offshore fleet by supporting ready access to financing, improved facilities and services to shift the fishing effort offshore. As a result fleet size has progressively increased and more and more of the bigger boats (>40 ft) have entered the industry. Some of them venture outside the Exclusive Economic Zone (EEZ) of Sri Lanka. The safety standards of these boats are not adequate and navigational equipment is found on only a few boats. Thus, fishing is conducted without due regard to any international regulations on safety or marine traffic. In addition, offshore fisheries depend on migratory stocks of tuna, sharks and billfish. The magnitude of these resources is uncertain. They are also subjected to exploitation by other coastal and industrial fishing nations. The development of offshore and deep-sea fishing has not been paralleled by equivalent research on the productivity of offshore resources in the waters around Sri Lanka.

In Sri Lanka, management and conservation of fishery resources are among the fishery policy objectives and the legal and the institutional framework to achieve this objective is already in place. As scientific knowledge on resources is a prerequisite for management, research and monitoring of fisheries are given high priority. The present policy is for the management of coastal fisheries and sustainable development of offshore and deep-sea fisheries. The status of research and data collection on the tuna fishery in Sri Lanka was reviewed at the Sixth Expert Consultation on Indian Ocean Tunas. This paper provides a brief update of more recent information on the research and data collection carried out by NARA and the Department of Fisheries and Aquatic Resources Development (DFAR).

Research activities

NARA has continuously conducted research on tuna over the past years, with more emphasis on the collection of biological information such as length-frequency and catch-and-effort data needed for assessment of fish stocks. More detailed biological studies have also been carried out on age and growth, feeding, reproductive biology and the migration patterns of tuna species. Initial experiments with fish aggregation devices (FADs) were carried out in 1981 to study the possibility of exploiting tuna and other under-utilised large pelagic fish such as dolphin fish (*Coryphaena hippurus*) and rainbow runners (*Elegatis bipinnulata*). New experiments were carried out in 1993 with designs of FADs more suitable for local conditions on the shelf and slope off the southern and the southwestern coasts. Though these FADs did not last long, the initial observations were satisfactory.

A programme for collection of morphometric data of yellowfin tuna was launched more recently to identify existence of any morphological variation among yellowfin tuna caught in the waters around Sri Lanka.

Large Pelagic Fish Resources Survey

As the knowledge on the resources in the offshore region is not adequate for future development and management of offshore fisheries, NARA has conducted an offshore large pelagic fish resources survey with financial assistance from the Sri Lanka Fisheries Sector Development Project of the Asian Development Bank (ADB). The survey was conducted from September 1995 to October 1997 (Joseph *et al*., 1997). The main objective of this survey was to study the distribution, abundance, migration and seasonal variation of the major tuna and other large pelagic species in the surface waters and at depths of 50-150m etc., which are required for the rational development of the offshore fishery in Sri Lanka. The survey covered the offshore waters off the northwest, west, southwest, south, southeast and east coasts at a range of about 50-320 km from shore. Two local experts were involved in carrying out the survey and an expatriate Stock Assessment Specialist assisted in data analysis.

The survey was conducted with three commercially operating fishing boats of less than three years of age and 12.2, 15.1, 16.8m in length. Each vessel was deployed for two fishing trips a month and eight fishing operations for gillnet and for four longline operations in each fishing trip. Each vessel used 40 pieces of drift gillnets of 6" mesh, 60 bundles of tuna longline and troll lines.

A temperature profile system (Sippican expendable bathythermograph) was installed on the two larger vessels to correlate the distribution and abundance of tuna with variations in temperature profiles. A pilot project to establish a monitoring mechanism to track the survey vessels was also field tested with the long-term objective of establishing a monitoring, control and surveillance system for the Sri Lanka's 200 mile EEZ.

The survey concluded that the offshore gillnet fishery is carried out by about 1,700 boats catching an estimated 55,000t. Having achieved a maximum economic profit already, a further increase in the gillnet fleet should be prevented. Expansion should be in tuna longlining, which targets large yellowfin and bigeye tuna. The potential yield of all fish caught by tuna longline within the EEZ was estimated at around 6,700 t. This indicates a cautious approach in fleet development.

Data collection

Data collection by DFAR

Island-wide collection of fishery statistics in an organised manner commenced in late 1940s, with the deployment of 12 permanent fisheries inspectors in 20 fishery districts. The original statistical collection system has undergone several modifications since then. The present system of stratified sampling of landings was designed by FAO in the early 1970s (Banerji, 1976) when the fishing industry was simpler and barely extended beyond the continental shelf. Several changes have taken place in recent years and the local fisheries now extend beyond the EEZ. Over 25,000 fishing craft are now operating, including multi-day boats that remain at sea sometimes for 20-25 days. However, the sampling system has not kept pace with changes in the fishery and estimates were made with limited samples. Further, the collection of data has been relegated to a minor task among the many responsibilities of the field officers.

Under the present DFAR sampling scheme, data collection covers some tuna boats but there is no comprehensive data collection on tuna fisheries. Catch statistics by species is provided only for the coastal fishery. Except for the catch data for yellowfin and skipjack, the catches of all other tuna varieties and billfish are grouped together as "other blood fish". Catch data by type of vessel or gear are not available.

Data collection by the National Aquatic Resources Research and Development Agency (NARA)

Since the inception of NARA in 1981, the research staff of the Marine Biological Resources Division (MBRD) has been actively engaged in the collection of tuna catch and effort statistics. Limited sampling was conducted at a few landing centres in the northwest, west, southwest and southern areas. In 1987, NARA was able to establish a comprehensive sampling programme with technical and financial assistance from the IPTP (Foster, 1987). In 1994, this sampling programme was further strengthened and expanded to the east coast through the FAO/TCP Project (Williams, 1995). A team of 12 samplers were placed at the major fish landing centres in the west, southwest, south, southeast, east and northeast to collect data on catch, effort by craft/gear combination and length measurements for all tuna species, billfish and seerfish in the large pelagic catch. The FAO/TCP at NARA also provided a database and reporting system for these data. Data collection on the east coast was abundant since 1995 due to civil disturbances. The data collected by the samplers are brought to the NARA head office at the end of each month. The research officers in charge of the sampling programme screen these data before they are entered into the computer database.

Data collection through logbooks.

Collection of detailed information on fishing such as fishing grounds, daily catches, sampling by gear, quantity of gear used, economics etc. from offshore boats at the point of landing has become increasingly difficult. Sometime catches are unloaded in stages. Furthermore, the current data collection system requires a high input of manpower and in the long run it is likely to be expensive.

The Project Implementation Unit (PIU) of the Fisheries Sector Development Project and NARA, together with the Marine Fisheries Management Project implemented by DFAR has commenced a programme to introduce a fishing logbook system to the offshore multi-day fishing fleet to gather detailed information on fishing operations and economic performance which would enable establishment of a cost effective and sound database. These would provide the key data for development of a basic plan for sustainable development and management of offshore fisheries.

A few fishing logbooks were initially successfully field tested in 1994. A total of 350 logbooks were distributed among volunteer offshore multi-day boats operating from 12 major landing sites during 1995 to 1997. The offshore multi-day fishing fleet operating for large pelagic fishing consist of about 1,700 boats. Logbooks have been distributed to about 20 % of the total fishing fleet targeting large pelagics in the offshore areas. The percentage of non-responses is about 25 %.

Data on the industrial fishing fleet

The Government of Sri Lanka provides landing facilities for foreign longline fishing vessels. Since 1990, about 44 vessels belonging to 10 companies have been given permits to land their tuna catches at the Colombo-Modara fishery harbour. Although it is obligatory for the owners in the fishing fleet to provide fishing information to the Government of Sri Lanka, collection of such data was not successful during the past years. Since 1996, two fishing companies have provided logsheets on an *ad-hoc* basis. These include information on daily catch by species, fishing effort (No. of hooks) and the bait used. These data could be used to estimate catch rates of the longline fishing conducted outside the EEZ of Sri Lanka. The logsheet data do not provide sufficient information on the by-catch. However, they have recorded landings of somewhat greater amounts of previously non-reported species such as escolar (*Lepidocybium flavobrunneum*).

Refined DFAR fisheries statistics system

As there was no link between the Statistical Unit of DFAR and NARA, information collected by NARA was not utilised by the DFAR to provide better national statistics. The sampling systems of the DFAR and NARA partially overlap. In view of the above, the DFAR, through the UNDP/FAO Marine Fisheries Management Project, with the collaborative assistance of NARA, has initiated several improvements to revise the ongoing system of statistics collection and methodology used for analysis. Steps have been taken to integrate the different systems in stages to avoid repetition and achieve maximum benefits. The lack of accurate information on actual numbers of vessels in operation is identified as one of the major constraints in estimating national production. A fishery census was conducted (after 10 years) to gather information on the number of vessels operating in each fishery, before the new sampling system was designed. A further proposal was made to update the fishery census every two years. One Fisheries Inspector (FI) from each District Fisheries Extension Office (DFEO) area has been proposed to be entirely dedicated to the task of data

collection with the NARA staff, to increase the number of sampling sites and to improve the quality of data collection in each DFEO area. This was pilot tested at two selected DFEO areas (Negombo and Galle) during the past two years and it is planned to extend this to all 14 DFEO areas. The ARTFISH programme developed by the FAO has been tested for development of a database.

Legal framework for improving fisheries statistics

The Fisheries and Aquatic Resources Act (FAR Act) No. 2 of 1996 has been supplemented by various regulations to facilitate enforcement of its provisions. Fishing Operation Regulations impose a mandatory obligation on any operator of a fishing craft to provide all statistical information on fish and aquatic resources landed in any place or carried on board a fishing craft in the Sri Lankan waters, to any officer authorized by the Director of Fisheries and Aquatic Resources.

Exporters and importers are also bound to furnish all statistical information to the relevant officers in respect to such exports or imports.

Landing of Fish Regulations, 1977, imposes a mandatory obligation on the owner of a vessel to provide data relating to the catch and such other information to the Director, immediately after each fishing trip.

References

Banerji, S. K. 1976. Fisheries Statistical system in Sri Lanka. IOP/TECH/76/10. Food and Agriculture organisation of the United Nations (FAO), UNDP programme.

Forster, R. 1878. Tuna sampling Programme conducted by IPTP in Sri Lanka. Paper presented at the IPTP workshop on small tuna seerfish and billfish in the Indian Ocean. December 1987, Colombo, Sri Lanka.

Joseph, L., P.Dayaratne and M. Sanders 1997. Report on offshore large pelagic resources survey 1995-1997. National Aquatic Resources and Development Agency (NARA), Crow Island, Mattakkuliya, Colombo 15. Survey Conducted by NARA under the Fisheries Sector Project funded by Asian Development Bank Loan No. 1201-SRI (SF): Fisheries Sector Project.

Williams, H. 1995. Field Document 1: Review of sampling strategies, data needs and estimation procedures for monitoring the Sri Lankan fishery for large pelagic species. Report prepared for the Government of Sri Lanka by the Food and Agriculture organisation of the United Nations. FAO/TCP/2251.