TUNA FISHERIES IN SRI LANKA: AN UPDATE

Maldeniya, R. and D. Amarasooriya[1]

ABSTRACT

Tuna fisheries in Sri Lanka are developing rapidly, with an ever-increasing offshore fishing fleet making more and more longer trips to offshore waters. Over 3,000 boats are now engaged in tuna fishing, among them about 1,700 boats of 32-60 ft in length operating in the offshore areas. The bigger boats with navigational and communication facilities are now venturing into international waters. Fishing effort extended through multi-day operations has increased from 11 % in 1994 to 57 % in 1996. Gillnets and longlines account for more than 95 % of the total fishing effort. The total production of large pelagic fish is in the range of 100,000-110,000 t, of which about 55,000-60,000 t is from offshore waters. The continuous expansion of the offshore fishing fleet and the extended area of operation has contributed to this increase. The average catch rate of the tuna fishing fleet operating in coastal waters is about 100 kg/fishing day, whereas for the offshore boats some variation of catch rates has been observed between fishing vessels of different sizes and operating in different offshore areas. The average catch rate for the offshore boats of 34-40 ft is about 250 kg/fishing day, but the boats of over40 ft which operate outside the EEZ have reported catch rates of 435 kg/fishing day. The annual average catch rates estimated for the industrial longline fleet have shown a decreasing trend in the past years. All species of tuna together contribute about 50 % of the catch of large pelagics from both coastal and offshore fishing. Among the tuna species, skipjack dominate both in coastal and offshore catches.

RÉSUMÉ

La pêche thonière au Sri Lanka subit actuellement des changements rapides dans son développement avec une pêche de plus en plus importante des flottes de pêche hauturière qui font des marées de plus en plus longues et qui vont de plus en plus loin des zones côtières. Plus de 3.000 bateaux sont aujourd'hui engagés dans la pêche thonière. Parmi eux, on compte 1.700 bateaux de 32-60 pieds de long qui opèrent dans les eaux au large. Les plus grands bateaux dotés d'équipements modernes de navigation et de communication tentent maintenant leur chance dans les eaux internationales. L'effort de pêche qui s'étend sur des opérations de plusieurs jours a augmenté de 11 % en 1994 à 57 % en 1996. La pêche au filet maillant et à la palangre constituent plus de 95 % de l'effort total de pêche. La production totale des grands pélagiques est de l'ordre de 100.000 à 110.000 t, dont 55.000 à 60.000 t proviennent de la pêche du large. L'expansion continue de la flotte de pêche au large et l'élargissement des zones de pêche expliquent l'accroissement de ces rendements. Le taux moyen des captures de la flottille opérant dans les eaux côtières est d'environ 100 kg/jour. A noter cependant que parmi les bateaux qui pêchent au large il existe des variations notables des taux de capture, dépendant de la taille des bateaux et des endroits où ils pêchent. Les prises moyennes d'un bateau de 34-40 pieds est d'environ 250 kg par jour mais les bateaux de plus de 40 pieds qui pêchent hors de la zone exclusive peuvent atteindre des moyennes de prises allant jusqu'à 435 kg par jour. On estime par ailleurs que les taux de capture annuels des palangriers industriels ont baissé au cours des dernières années. Toutes les espèces de thonidés confondues contribuent pour environ 50 % aux prises de grands pélagiques effectuées par des unités de pêche au large. Parmi les thons, le listao domine aussi bien près des côtes que plus au large.

Introduction

Sri Lanka is one of the oldest and most important tuna-producing island nations in the Indian Ocean. Over the past years, tuna fishing has undergone many development changes. Some of these changes in the early 1960s were the result of imported developments, *e.g.* motorization and introduction of new boats and synthetic netting materials, and took place in the whole of the Sri Lankan fishery. Before the 1980s fishing for tunas was limited to the coastal waters within 40km of shore, where the boats could make single-day fishing trips. As the production of fish resources from the coastal sector reached optimal levels, many attempts were made to expand the fishing range more towards the offshore areas to exploit tuna and other large pelagic resources. Although there had been many attempts to develop offshore fisheries since the mid-1960s, the most effective phase of fleet development began in the early 1980s under the North West Coast Fisheries Development Project, with the introduction of 80 34 ft boats from Abu Dhabi to conduct multi-day fishing operations in offshore waters. Since then multi-day offshore fishing has developed rapidly. Bigger and bigger boats with advanced navigation, communication and crew facilities are now involved in the fishery. With these developments the total volume of production of tuna and other large pelagic fish increased from 55,245t in 1990 to 120,594t in 1996.

Under the Government policy of encouraging foreign investments, the Ministry of Fisheries and Aquatic Resources Development has permitted foreign fishing vessels and joint ventures between Sri Lanka and foreign companies to land the tuna caught by their longliners. In order to protect local tuna fishing, these longliners have not been permitted to conduct fishing operations within the EEZ of Sri Lanka. Since 1990 the Ministry has granted permission to 44 vessels belonging to 10 companies to operate under licence. The number of boats operated increased progressively, and a maximum of about 40 boats made landings during 1994-1995. At present only 8 boats, belonging to one company, are operating.

The tuna fisheries and their development changes have been well documented in the past (Sivasubramanium, 1965, 1985; Joseph,1985). Since the Expert Consultation on Indian Ocean Tuna in 1986, the Sri Lankan tuna fishery has been reviewed

[1] National Aquatic Resources Research and Development Agency (NARA); Crow Island, Mattakkuliya, Colombo 15, Sri Lanka

by Joseph & Moyiadeen (1987), Dayaratne & Maldeniya (1988), Dayaratne & De Silva (1991), Dayaratne (1993), and Dayaratne & Maldeniya (1995). This paper examines the current trends of the tuna fisheries in Sri Lanka.

Sources of information

The analysis for this study is based on the information gathered through the following sampling programmes conduct by the National Aquatic Resources Research and Development Agency (NARA):

1. Sampling programme for the large pelagic fisheries;
2. Logbook-based catch/effort recording system;
3. Monitoring programme of the ringnet fishery on the south coast and the longline fishery on the north-west coast.

Fishing cra ft and gear

The tuna fishery in Sri Lanka can be broadly classified into a coastal fishery and an offshore/deep-sea fishery. At present a fleet of around 3,100 inboard motor (IBM) vessels in the size range of 28-60 ft, some 300 to 400 18-22 ft boats with outboard motors (OBM), and a few mechanised traditional vessels are engaged in fishing operations. Of these, around 1,700 IBM boats larger than 32 ft in length are conducting multi-day fishing in the offshore and deep-sea areas within the EEZ of Sri Lanka and in adjacent international waters. The size of the offshore fleet has progressively increased over the years from 1,546 vessels at the beginning of 1995 to 1,760 vessels in 1997, an average increase of 75 vessels every year. The age profile of the offshore fleet is summarised in Table 1.

Over 87 % of the offshore boats have been constructed since 1990. The largest number of boats was constructed during 1994-1995. A summary record of the fishing fleet operating in the offshore deep-sea areas of Sri Lanka is given in Table 2. Coastal fishing is carried out by small IBM boats less than 32 ft in length, and seasonally by OBM boats and traditional vessels.

Sri Lanka's offshore fishery targeting tuna and other large pelagic species is an extension of the coastal fishery for the same resources. As a result, the main fishing gear used is similar to that used in the coastal zone, *i.e.* dri ft gillnets and dri ft longlines (for shark). In most instances both nets and longlines are set in a single fishing operation. Trolling lines or handlines operate incidentally when sailing, mainly on calm days.

The variation in the amount of fishing gear by size category of boats operating in the offshore areas is given in Table 3. Fishing for tuna with longlines is still not popular among the offshore fishermen, but some boats in the northwest, south and east operate tuna longlines seasonally in coastal waters with a limited number of hooks (50-100) . A few multi-day boats initially started longlining for tuna, targeting deep-swimming large yellowfin and bigeye tuna, but for various reasons fishing was discontinued. Small coastal tuna varieties such as frigate tuna, kawakawa and bullet tuna are exploited with medium-mesh driftnets, troll lines and ringnets. Ringnets have been used on the south coast since the early 1980s, and their use has now spread to the southwest, northwest and east coasts of the island.

Fishing effort

The fishing effort exerted for tuna and other large pelagic species by vessels of different categories is given in Table 4. The 3.5 GT (28-32 ft) day boats contributed over 87 % of the fishing effort in 1994, but gradually declined to 41 % in 1996, while the fishing effort exerted through multi-day operations increased from 11 % of the total in 1994 to 57 % in 1996.

The distribution of effort by different fishing gears in the tuna fisheries in 1996 is summarised in Table 5.

Gillnets, used alone or in combination with other gears, are the main fishing gear used in tuna fisheries, contributed more than 95 % of the fishing effort. In the South, southeast and East gillnets are used mostly alone, while in the West and the south-west they are used in combination with longlines. Relatively higher effort is exerted through recently-developed ringnets in the South. Fishing with troll lines is limited to the South.

Trip duration

The percentage distribution of fishing trips with different fishing days is summarised in Table 6. Less than 10 % of the trips made by boats operating from the West and south-west are day trips, and more than 75 % of the trips made by the boats in these two areas are of more than 4 fishing days per trip. On the East coast fishing is still confined to day fishing operations in coastal waters. There is a tendency for multi-day boats to make more and more longer trips. Bigger boats make more longer trips with more fishing days, and most of them operate in international waters. The average number of days per fishing trip by multi-day boats of different size categories is summarised in Table 7. There is a tendency to increase the duration of the fishing trips.

Production trends

The estimates available at the Ministry of Fisheries and Aquatic Resources Development on tuna and other large pelagic fish production during the past years are summarised in Table 8. Production of large pelagic fish from both coastal and offshore waters followed an increasing trend over the past years. The coastal production peaked in 1994-95 and has stabilised since then between 65,000 t and 70,000t. The trend in offshore production has continued to increase, from about 12,000 t in 1990 to 62,000 t in 1997.

The estimates of production of large pelagic fish made by NARA based on the sampling programme and logbook surveys are given in Table 9.

Production estimates made by NARA during 1990 and 1991 were higher than those produced by the Ministry of Fisheries, but since 1992 the production estimates by NARA have been lower. It is clear that the estimates for coastal fish production made by NARA are lower than those made by the Ministry. The lack of sampling in the northern areas and/or inadequate sampling of coastal fisheries in all areas may have affected the estimates of production. The offshore boats sometimes are reluctant to report or expose their whole catch, mainly due to the fear of such information falling into the unwanted hands or those of competitors. This holds true when high catches are obtained from new fishing grounds. Therefore, the actual values of offshore production should also be higher

than the present estimates. Thus, the total annual production of tuna and other large pelagics in Sri Lanka would have been in the region of 100,000 t – 110,000 t in the 1995-1996 period.

Catch rates

The average catch rate of the tuna fishing fleet operating in coastal waters is around 100 kg/fishing day, whereas in the offshore fishery it is around 250 kg/fishing day. However, different vessel categories operating in different areas show some variation (Table 10). The catch rates reported for 32-34 ft multi-day boats have less dispersion than those for the 34-40 ft boats operating in all areas, but the catch rates reported for larger boats (over 40ft) were significantly higher than those of multi-day boats of less than 40ft. The highest catch rates for all vessel categories were reported from the west and southwest.

Catch rates of industrial longline vessels

Based on the information provided by the two fishing companies on an *ad hoc* basis, the average catch rates of tuna longliners were estimated (Table 11). These longliners have operated outside the Sri Lankan EEZ.

A decline in catch rates has been observed in 1997 from 1996. In both years yellowfin tuna contributed the highest proportion to the catch rate, followed by bigeye tuna.

Species composition

The percentage composition of the catches by species in the coastal and offshore fisheries for large pelagics is given in Table 12. All species of tunas together contribute around 50 % by weight to the total catch of large pelagic fish landed from coastal and offshore areas. Among tuna species, skipjack dominates in both areas, followed by yellowfin in the offshore area. The contribution of small tuna species (frigate tuna, kawakawa and bullet tuna) is significantly high in coastal waters, while the contribution of sharks is high in the offshore catches. Billfish and seerfish also represent a significant percentage of the catch of large pelagic fishes in coastal waters.

Discussion

The tuna fishing fleets in Sri Lanka now exploit the entire EEZ and adjacent waters outside the EEZ. The estimated landings of tuna and other large pelagics reached about 130,000 t in 1997, 48 % of which came from offshore fishing, which is about 60 % of the total national production of marine fish. The continuous expansion of the offshore fishing fleet and the extended area of operation are probably the reasons for this increase. Bigger boats with better navigation, communication and crew facilities are mainly responsible for conducting operations in the waters outside the EEZ.

Declines in catch rates have been observed for 28-32 ft boats operating in coastal waters during recent years, but no changes have been observed in the catch rates of 32->40 ft boats operating in offshore waters within the EEZ of Sri Lanka (Dayaratne & Maldeniya, 1993). Significantly high catch rates were reported for the bigger boats operating outside the EEZ. Although the use of combinations of gear such as gillnets and longlines increased, the production of sharks has fallen considerably in recent years from the levels reported in the 1980s and early 1990s, while total tuna production has continued to increase (Dayaratne & Maldeniya, 1993).

Tuna varieties dominate the large pelagic catch in both coastal and offshore areas, with skipjack contributing significantly. The catch of small tunas has increased during recent years due to the development of ringnet fishing, mainly in the southern coastal areas. The contribution of sharks and billfish has continued to decline.

The National Fisheries Development Plan for 1996-2000 places more emphasis on the development of offshore fisheries, particularly the fishery for large pelagic species. The Government encourages the expansion of the offshore fishing fleet by supporting ready access to financing and improved facilities and services to shi ft the fishing effort more toward offshore fishing. In parallel, under the Fisheries Sector Development Project funded by the Asian Development Bank, infrastructure such as fishing harbours, anchorages, ice-making plants and roads has been developed, and a Resource Survey has been carried out in the offshore waters of the EEZ. The Resource Survey concluded that the surface fishery in the offshore area has already reached its economic maximum, and indicated about 6,700 t of potential yield at depths of 50-150m to develop the tuna longline fishery. It is suggested that a total of around 160 boats would be needed to develop this fishery. However, the catch rates reported by the industrial fleet have shown a declining trend in recent years, indicating a need for a cautious approach in fleet development.

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Table 1. Age profile of the offshore fishing fleet

Year	80-81	82-83	84-85	86-87	88-89	90-91	92-93	94-95	96-97
% of fleet	1.2	1.2	3.1	2.4	4.3	7.8	28.6	40.8	10.6

Table 2. Summary of fishing fleet operating in offshore/deep-sea waters

Boat size (ft)	% of fleet	% of boats with SSB radio	% of boats with satellite navigation	% of boats with line/net hauler
27-32	6.3	5.3	7.9	0.0
33-38	83.1	17.1	60.0	5.7
39-44	5.9	32.0	47.9	20.8
45-50	2.5	100.0	100.0	67.5
51-56	2.0	83.3	100.0	41.6
57-62	0.4	100.0	100.0	100.0

Table 3. Variation in average amount of fishing gear by size of boat operating in the offshore waters.

Boat size (ft)	Av. no. of gillnet panels	Av. no. of longline bundles
27-32	32.0	16.4
33-38	43.0	57.3
39-44	41.8	111.4
45-50	50.3	137.5
51-56	47.0	167.5
57-62	54.0	210.0

Table 4. Estimated total annual fishing effort of the tuna fisheries, in boat nights by vessel type

Vessel type	1994	%	1995	%	1996	%
Mechanised traditional	1595	1.3	384	0.8	384	0.8
FRP OBM	1728	0.3	480	1.0	480	1.0
3.5 GT day boats	121906	87.1	25368	55.3	19392	41.3
Multi-day	28095	11.2	19624	42.8	26642	56.8

Table 1. Percentage distribution of effort by different fishing gears in the tuna fisheries in 1996

Fishing gear	Area				
	West	South-west	South	South-east	East
Gillnet	12.1	22.4	30.4	31.1	100
Gillnet + longline	87.9	77.6	33.1	59.6	
Troll line			6.5	9.3	
Ringnet			30.0		

Table 5. Percentages of fishing trips with different fishing days made by tuna fishing boats in 1996.

Fishing days per trip	Sub-areas				
	West	South-west	South	South-east	East
1	8	9	71	83	100
2-3	13	13	5	4	
4-5	25	21	12	10	
6-7	25	36	9	10	
8-9	16	12	2	2	
>10	13	10	1	1	
Total number of trips	735	597	1083	561	673

Table 6. Percentage variation of trip duration by size class of boat

Year	< 35 ft size class boats		> 35 ft size class boats	
	Av. trip duration	Av. sea days	Av. trip duration	Av. sea days
1995	5.7	4.3	7.6	5.3
1996	6.5	5.1	8.5	5.8

Table 7. Production (t) of tuna and other large pelagic fish in Sri Lanka

Fishing area	1990	1991	1992	1993	1994	1995	1996	1997
Coastal	43,579	59,640	62,177	64,408	67,570	70,250	63,594	68,200
Offshore	11,666	15,080	22,000	33,000	37,500	60,000	57,000	62,000
Total	55,245	74,720	84,177	97,408	105,070	130,250	120,594	130,200

Table 8. Estimates of production (t) of large pelagic fish from NARA sampling programme and logbook survey

Fishing area	1990	1991	1992	1993	1994	1995	1996
Coastal						34,120	30,783
Offshore						44,166	55,365
Total	65,805	94,418	77,751	79,943	75,042	78,286	86,148

Table 9. Estimated average catch rates (kg/fishing day) for different vessels operated in different areas in 1996.

Vessel type	Area				
	West	South-west	South	South-east	East
17-22 ft OBM		100.6		23.3	
3.5 GT 28-32 ft day	181.3	100.6	90.5	98.3	110.5
32-34 ft multi-day	238.5	250.4	204.4	169.2	
34-40 ft multi-day	256.2	296.0	218.3	118.5	
>40 ft multi-day	431.7	439.8			

Table 10. Estimated average catch rates of tuna longliners operating outside the EEZ of Sri Lanka

Year	No. of trips	Catch per trip (kg)					
		YFT	BET	SWO	BIL	SHR	Total
1996	27	7,547	7,054	1,569	4,035	656	20,861
1997	75	5,514	4,528	634	850	96	11,622

Table 11. Species composition of the large pelagic fish landed from coastal and offshore fishing in 1996.

Species	Coastal		Offshore	
	NARA sampling programme		Logbook survey	
	Production	%	Production	%
Skipjack	6034	19.6	16721	30.2
Yellowfin	2797	9.1	9994	18.1
Kawakawa	1415	4.6	847	1.5
Frigate tuna	3876	12.6	1243	2.3
Bullet tuna	904	2.9	15	0.03
Other tuna	313	1.0	311	0.6
Total tuna	15,339	49.8	29131	52.6
Billfish	6429	20.9	7173	13.0
Shark	787	2.6	15112	27.3
Seerfish	1091	3.5	240	0.4
Other	7143	23.2	3710	6.7
Total	30798		55366	