Status of the Beach Seine Fishery in the Hambantota District during 1995-97

P. A. T. FERNANDO¹ & P. R. T. CUMARANATUNGA²

¹ National Aquatic Resources Research and Development Agency, Crow Island, Colombo 15, Sri Lanka
² Department of Fisheries Biology, University of Ruhuna, Matara, Sri Lanka

Abstract

KEY WORDS: BEACH SEINES; ANNUAL EFFORT; MEAN ANNUAL CATCH RATE; ANNUAL PRODUCTION.

Beach seine fishery is one of the oldest fishing methods practiced in Sri Lanka. In the recent past several modifications were observed in the structure of the net and the material used in the construction of nets. Beach seine nets made of nylon material were also reported at 4 operating sites out of 17 beach seine landing centers in the Hambantota district. However, traditional beach seine nets made of coir and kuralon were the common nets used in the area.

Fishing season extends from September to April of the following year. However, beach seining at Mawella was carried out throughout the year. The estimated average annual effort for the entire study area was about 4250 operations. The mean annual catch rate at Mawella, Kalametiya and Welipatanwila were estimated as 81.8, 290.7, and 167.3 kg/operation respectively. The mean annual catch rate for the entire study area was estimated as 157.3 kg/operation. The beach seines recorded an estimated annual production of 662MT in the Hambantota district.

Stoleophorous sp. has made the major contribution to the beach seine catches and it was about 31.7% of the total beach seine production. Leiognathus sp. Carangids and Trichuras sp. have produced 11.5%, 9.5% and 8.5% respectively while Amblygaster sirm and other Sardinella sp. have produced 5.5% and 4.9% respectively. A. sirm was found during the months of November, February, March and July. The size range of A. sirm caught by beach seine during February-March period was in the range of 5-12cm (total length). Contribution by Rastrelliger sp. and Sphyreana sp. were 2.9% and 2.6% by each category. Average income of a beach seine operation at Mawella, Kalametiya and Welipatanwila were Rs. 3330/=, 10250/= and 6222/= per operation respectively.
Introduction

Beach seine fishery is one of the oldest and had been one of the most important fisheries in Sri Lanka. During 1950's this fishery has produced 13,000MT annually contributing 40% to the country's fish production (Canagaratnam and Medcof, 1956) and during 1983-85 period it has come down to 5-10% (Atapattu and Dayaratne, 1992). Beach seine fish production in Sri Lanka has however remained more or less the same and it has been around 13,000MT during the period from 1956 to 1985 (Karunasinghe, 1987). Although, this was only a small proportion to the country's total fish production, in north-western part of the country, this fishery alone has contributed 1200MT, contributing 65% to the total small pelagic fish production in the area (Fernando, 1996). In the recent past the beach seine gear has undergone structural modifications with nylon materials replacing the traditional coir netting. Several methods of operations have also been reported recently (Fernando, 1996).

However, in the southern region, some beaches are rocky and not suitable for trawling or beach seining (Binduhewa, 1990). Therefore, beach seining in southern coastline was limited to a few locations. Consequently several beach seines are concentrated within this limited locations and a rotational sharing system was adopted. Atapattu and Dayaratne (1992) gave a description of the rotational sharing system practiced in the southern coastal area. Kulatunga and Edirisinghe (1995), Fernando (1996), Kurukulasuriya (1996) and Vinobaba et al (1997) carried out recent studies on beach seine fishery.

Materials and methods

Study area and study period

The study area covered a coastline of about 100km from Kudawella to the border of the Yala National Park in the Hambantota district. Beach seine fishery was monitored at three sites namely Mawella, Kalametiya and Welipatanwila. This study was started on April 1995 and carried out for two consecutive fishing seasons of 1995-96 and 1996-97. A map of the study area is given in the Fig. 1.
Data collection

Initially a frame survey was carried out to identify the fish landing centers, craft and gear variations and the fishing seasons. Regular biweekly field visits were made to sampling sites. During this period beach seine fishery information such as catch, effort, species composition, time of fishing, length frequency data of economically important species, income and expenditure and gear information were collected.

Data analysis

The study area was initially divided into three sub areas and catch, effort and production estimates were made for each area, which were consequently pooled for the whole area. The mean catch/haul was considered as the catch per unit effort for each single sampling site for a particular month. This value was then multiplied by the number of hauls operated in the sub area for a particular day to get the total catch for the day. The monthly production in this sub area was estimated by multiplying the total catch per day by the number of fishing days for the month. Monthly effort, catch rate and the production were estimated separately for the three sub areas and were subsequently pooled to estimate the total values in the study area.

Results

In the Hambantota district, there were 108-beach seine crafts reported from the 17 beach seine landing centers. In each landing center, about 5-8 beach seines were registered and operated one at a time. Most of these landing centers were located among human habitations while 3 centers, Palatupana, Uraniya and Pattiyawaraya were inhabited only during the fishing season. Beach seine fishermen from Tangalle, Mawella, Kudawella, Ambalantota and Hambantota migrated to these areas during the fishing season.

Beach seining in southern coastal area was carried out only up to a shorter distance (0.5-1km) from the shore. Large beach seine canoes were the only craft type used in the beach seine operations. Traditional beach seine nets made of coir and kuralon were the common gear used. However, beach seines made of nylon materials were also observed from Kalamatiya, Palatupana, and Tangalle landing centers. Wings of these nets were made of 15cm and 18cm stretched meshed nylon netting. However, the mesh size gradually reduced towards the body of the net. Cod ends were made of 10mm/12 ply
Fig. 1: Map of study area indicating the major beach seine landing sites and sampling sites
netting and some times an outer net with mesh sizes vary from 9cm to 15cm were also used out side the cod end.

Beach seine fishing season in the study area extended from September - April of the following year. However, beach seining at Mawella was carried out throughout the year. Highest effort in the study area was recorded during October 1995 and December 1996 and they were 715 and 720 operations per month respectively. The annual estimated effort for the entire study area was about 3714 and 2816 operations during the two fishing seasons (Fig. 2 and Table 1).

Fig.2: Monthly variation of the catch rate and the effort of beach seines operated at the Hambantota District
The average estimated annual catch rate at Mawella, Kalametiya and Welipatanwila were 81.8, 290.7, and 167.3 kg/operation respectively. Catch rates at Kalamatiya were relatively high compared to the other areas. The average annual catch rate for the entire study area was estimated as 157 kg/operation (Fig. 2 and Table 2). Annually, beach seine has contributed an estimated production of 630 MT and 542 MT to the total fish production in the Hambantota district during 1995-96 and 1996-97 seasons, giving an average annual production of 585MT (Table 1).

Monthly variation in the species composition of beach seine catches is shown in Fig. 3. When species composition is considered Stoleophorous sp., have made the major contribution to the beach seine catches in the study areas. Their contribution was about 31.7% to the total production. Leiognathus sp., Carangids and Trichuras sp, have produced 11.5%, 9.5% and 4.9% respectively. A. sirm, other Sardinella sp., Rastrelliger sp. And Sphyreana sp. Have produced 5.5%, 4.9%, 2.9% and 2.6% respectively.

Stolephorus sp. Was mainly found from November to April and Carangids from September to December. Leiognathus sp. Were found throughout the year while Trichurus sp. Were found from July to October. A. sirm were mainly found from October to June in the Mawella landing center and February to April in other two centers. However, during February - March period undersized A. sirm fingerlings of 5-12cm length range are caught by beach seines. Length frequency distribution of this species corresponds to the beach seine catches is shown in Fig. 4.

Average value of a beach seine catch landed at Mawella, Kalametiya and Welipatanwila were Rs. 3330/=, 10250/= and 6222/= per operation respectively. Income sharing method varied among the beach seine fishermen in the area. However, generally accepted method was to share half the income among the beach seine owners and the other half among the workers.

Discussion

Beaches along the southern coast are rocky or with uneven sea bottoms and less suitable for trawling and seining (Binduhewa, 1990). Beach seine operations were therefore, confined to areas where seining is possible and consequently there had been a competition over these locations. To overcome this competition a different sharing system known as rotational sharing system was developed. Most of the beach seine sites in the Hambantota district followed the rotational sharing system with minor changes.
Geography of the beach and the sea bottom has influenced the fishery and fishing seasons.

**Fig.3:** Monthly variation of the species composition of beach seine operated at Hambantota district during 1995 to 1997 period

**Fig.4:** Length frequency distribution *A. sirm* caught by beach seines at Hambantota district during 1995 to 1997 period
As the Mawella beach seine-landing center is located in a sheltered bay, it is protected from both southwest and northeast monsoons. According to the fishermen interviewed this location is disturbed only when there are winds and currents towards a northward direction. Therefore, beach seine operations at Mawella were carried out through the year.

The catches at Mawella and Welipatanwila were comparatively lower (81.8, 167.3kg/operation) than that of at Kalamatiya. Average annual catch rate at Kalamatiya (290kg/operation) was almost the same as catch rates recorded for the northwestern region, which was estimated as 270kg/operation during 1994 - 96 period (Fernando, 1996). Higher catch rates observed at Kalamatiya could be attributed to the gear modification in the Kalamatiya landing site. Most of the nets used in this landing center were made of nylon material. At the same time fresh water discharges also occur at this site from the nearby Kalametiya river making this a location of high nutrient content. However, there were instances where very high catch rates (as high as 15,000, 7,000 and 3,000kg/operation) were recorded from the other landing centers of the study area. This could by attributed to the schooling behavior of the fish caught.

Canagaratnam and Medcof (1956) have reported a much higher catch rate of 660 kg/operation based on a single observation at Tangalle during 1953. Karunasinghe (1987) studied the beach seine operation on the west & south west coasts and reported average catch rates of 177 and 366 kg/operation. A study on beach seines carried out along the south-west coast of Sri Lanka have revealed an average catch rate of 45 kg/operation during 1991-93 period (Dayaratne & Sivakumaran, 1994). Catch rates observed for the beach seines operated at Manmunnai North, Batticaloa was about 250kg/operation (Vinobaba et al 1997). These comparisons indicate that the catch rates observed in the present study is comparable with the catch rates recorded for the other areas of Sri Lanka during recent times.

The beach seine production in the southern coastal area was estimated at 585MT. This was about 42% of the total small pelagic fish production in the area. However, the major proportion of the small pelagic fish production in the Puttalam district has come from the beach seine. It was about 973MT and it represent 66% of the total fish production in the area (Fernando, 1996).
Table 1: Beach seine effort and production at Hambantota district during 1995 to 1997 period

| Month, Year | May 95 | Jun 95 | Jul 95 | Aug 95 | Sep 95 | Oct 95 | Nov 95 | Dec 95 | Jan 96 | Feb 96 | Mar 96 | Apr 96 | May 96 | Jun 96 | Jul 96 | Aug 96 | Sep 96 | Oct 96 | Nov 96 | Dec 96 | Jan 97 | Feb 97 | Mar 97 | Apr 97 |
|-------------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|
| Effort for the study area (operations/month) | 15 | 15 | 15 | 15 | 510 | 725 | 540 | 425 | 210 | 460 | 380 | 400 | 30 | 15 | 45 | 6 | 325 | 515 | 435 | 320 | 550 | 315 | 160 |
| Annual effort | 3714 |
| Average annual effort | 3765 |
| Total production for the study area (MT) | 0.19 | 0.45 | 0.54 | 0.59 | 58.5 | 128.3 | 21.9 | 22.1 | 18.4 | 78.9 | 131.1 | 104.3 | 5.5 | 0.9 | 2.4 | 0.06 | 82.7 | 98.8 | 238.5 | 58.1 | 75.9 | 98.2 | 4.9 | 8.12 |
| Annual production (MT) | 608.8 |
| Average annual effort (MT) | 662.4 |
Table 2: CPUE of the beach seine fishery at Hambantota district during 1995 to 1997 period

| CPUE in kg/Operation (95 - 96 Fishing season) | CPUE in kg/operation (96 - 97 Fishing season) | CPUE for the site
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>---------------------------------------------</td>
<td>---------------------------------------------</td>
<td>------------------</td>
</tr>
<tr>
<td>CPUET at Mawella</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>CPUET at Kalametiya</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Mean CPUET for the study area</td>
<td>12.8</td>
<td>30.0</td>
</tr>
<tr>
<td>Mean CPUET for the area – for the fishing season</td>
<td>152.41</td>
<td>163.47</td>
</tr>
<tr>
<td>Mean Annual CPUE</td>
<td>157.3J</td>
<td></td>
</tr>
</tbody>
</table>

* *= Fishing not carried out
Species composition of the beach seine catches were comprised mostly of *Stolephorus* sp, *Leiognathus* sp., *Carangids*, *Trichurus* sp., *Amblygaster sirm*, other *Sardinella* sp., and *Rastrelliger kanagurta* (Canagaratnam and Medcof, 1956). Among sardines, *S. albella*, *S. gibbosa* have dominated the catches in this area. Although these species have been reported by Canagaratnam and Medcof (1956) from the west, Karunasinghe (1986) has stated that these species are poorly represented in the catches from Moratuwa (in the west). According to Dayaratne and Sivakumaran (1994), beach seine catch composition in the south-west has been dominated by *Stolephorus* sp., *Leiognathus* sp and in certain months represented by juvenile *A. sirm*. A significant catch of undersized *A. sirm* (13.2%) was obtained by beach seines operated in the northwestern region. (Fernando, 1996). During the present study a beach seine catch of *A. sirm*, representing 5.5% was recorded. Most of these were comprised of small juveniles size range of 5-12 cm in length.

**Acknowledgements**

This study was financially supported by the SAREC project (Swedish Agency for Research Corporation with Developing Countries). The author wish to thank Mr. U. Thannage, Mr. D. M. De Mel and other research assistants of MBRD for their corporation in the field. Thanks also extended to Mrs. D.H.S.L. Wimalasiri, Mr. U.W.S. Adikari, and Mrs. W.C.S. Perera for the computer assistance given during the preparation of the paper.

**Reference**


