SOUTH COAST (HAMBANTHOTA DISTRICT) FISHERY RESOURCE SURVEY 2009

2009

Assessment Report

Chank

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Back Ground

Chanks are belongs to the family Turbinellidae. *Turbinella pyrum*, commonly known as Chank shells, Sacred chank or Chank and sometimes referred to as conch shells are marine gastropodes in the family Turbinellidae belongs to the phylum Mollusca. About twenty species can be found in the family Turbinellidae, worldwide (Abbott and Dance, 1998).Since prehistoric periods human have exploited molluscan resources for multiple purposes such as currency,(eg:the gold ring cowry *Cypria annulus*), as horns, containers (large Gastropode shells are used as scoops in South East Asia and the Passific and the bail out the boats of native fishermen) or even as tools in some isolated Islands. Conch shells are sometimes used as decoration, as decorative planters, the name ñchankò for the shell of this species is derived from the word Shankha, the divine conch. The old generic name was Xancus.

Fig: 01 A Chank (*Turbinella pyrum*) shell

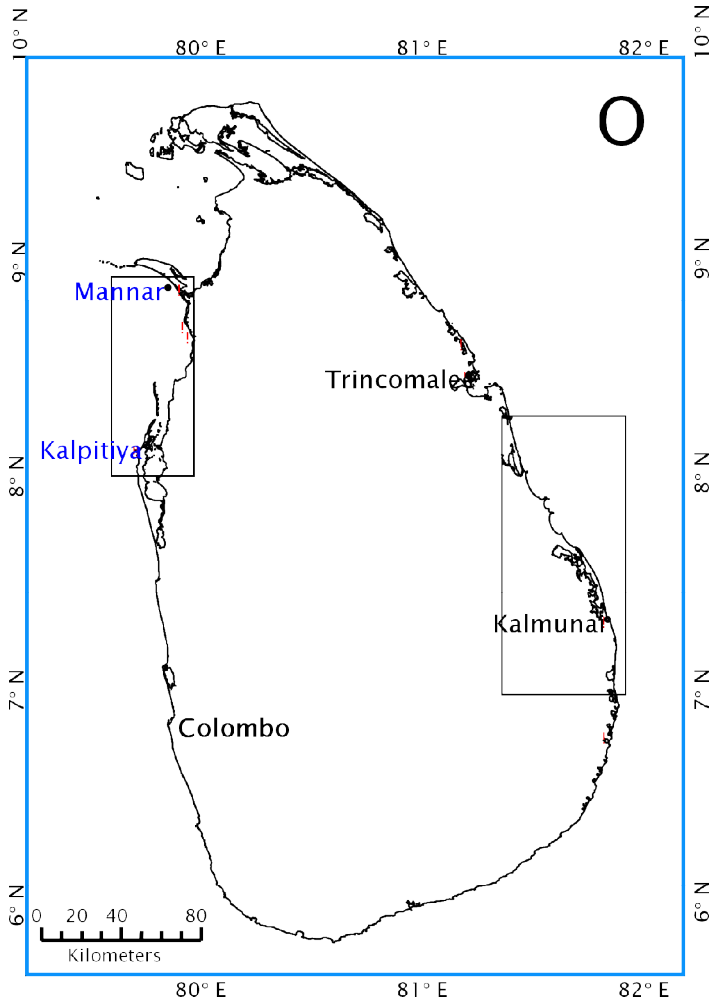
The economical value of shells of chank been started as ornament and also as religious background. Among women of Bengals chank shell ornaments are very popular. It is a symbol of married Hindu womenôs that they are wearing chank bangles. Bangles making workshops established in southern and central India. The shell has considerable significance in Hinduism and Buddhism. They cut off the tip of the spire and blown it as a ceremonial trumpet. Sometimes they decorated these shells with metals and precious stones.

In Sri Lanka

Sri Lanka is an Island surrounded by Indian Ocean situated between latitude of 78.2222 and longitude of 6.0000. It is rich with many varieties of biological resources. Chank is high valuable among them. Around Sri Lankan coastal area Southern coast is famous for Chank fishery. Chank fishery in Sri Lanka goes about 150 years. Since 1930s Sri Lanka is hot spot for Indian Chank fishery. Market of the Chank in Sri Lanka and India is looking to be a same species. But they may be two verities. One is heavier than other. It is known as *Turbinella pyrum* , *napus*. (Lamark, 1822) localy called as the Great Indian Chank. The other one is Turbinella pyrum (Linneaus, 1758) (Abbott and Dance, 1998) known as Indian Chank. Hambantota district is one of the major landing sites of the Chank fishery in Sri Lanka. It was started the year of 1997 (Rajasooriya, 1999). But in Hambantota district there is no significant Sea cucumber fishery. There are only few species of sea cucumbers and most of them are economically low valuable. Abundance of the existing Sea cucumber species also very low with comparing with the East coast and the North West coast of Sri Lanka. Therefore there is no encouragement on Sea cucumber fishery among fishing comunity.

Fishing Season

There are two fishing season per year in the Southern coast of Sri Lanka. One is starts at the mid October and ends with the mid November. The second one is from February to April. Within these two short periods sea is quit calm and visibility is high. So scuba diving activities are caring out during these periods.



Fishing method

No special fishing gear to catch Chanks as sea cucumbers. They are hand picking by scuba diving or skin diving. It is easy to catch though they are defenseless and slow moving organism. They do not escape or hiding when the diver came. They are sedentary organisms. 25 HP Fiber glass Reinforced (FRP) boats were used frequently and 15 HP FRP boats were used rarely.

The number of divers in a boat may vary from 2 to 3 and they are carrying 5 oxygen tanks per diver. Sometimes there are 4 to 5 divers per boat but this is not frequent. Fishing is restricted only day time as chank is diurnal organism.

The fishing crafts leave around 7.30 a.m. ï 8.00 a.m. and return around 2.30 p.m. ï 3.30 p.m. when it is carried out chank fishing at day time.

There are 245 boats engaging in this fishing activity in Hambanthota district. 187 boats out of 245 are registered under Kirinda fisheries division. There are some migratory fishermen from Trinkomalee and Batticaloa. Most of them using Kirinda harbor as their landing site. The fishing pressure on Chank fishery is increasing day by day as increasing local fishers as well as migratory fishers. Sometimes local people work for a contract basis for them. But in the past the condition was different. In the report of Jayakodi, 1998 says few locals were engaged in the chank fishers in these areas and mandate was held by totally migratory fishers. Localôs only rent out their boats and sometimes labors to the migratory fishermen. However, migrants are discouraged by the locals at present in the most of areas.

There is no evidence about the local processing of chanks. They only collect and selling the chank shells either to the dealer or exporter. Exporters also grading and packing all shells in to the polyethylene bags and export them. So the chank industry in Sri Lanka is only an export of raw shells of Chanks to the world market no any further processing practices or value addition within the country.

Fig.02 : Grading and Packing Chank shells in to the polyethylene bags

Study Objectives

In recent years, there has been some evidence of at least local depletion in Sri Lankan Chank fishery and a recognized urgent need for research on this fishery to formulate sustainable management measures. Rajasooriya (1999) described the depletion of catching efficiency of chanks in Hambantota district.

Followings are the export quantities of Chank shells during last 5 years. As there were no local consumption within the country we can assume total export quantity is equal to the total Chank production.

Year	Total Export Quantity (Kg)
2004	12,59,916
2005	11,07,810
2006	7,65,332
2007	9,53,380
2008	5,99,755
2009	5,97,595

Table 01.Export quantities of Chank shells from 2004 to 2009(Source Sri Lanka Custom department)

Unfortunately, there was very little information available to assess the status of Chank population of southern coast. In the absence of reliable long term fishery dependant data, a stock survey was the only viable method for determining the size and status of fish populations. Stock size and indications of stock status are two useful parameters on which to base robust management strategies. A survey would collect distribution and abundance data on both Sea cucumbers and Chanks not yet fished. So it was decided to carry out underwater visual survey for the sea cucumber and chank fisheries by having following objectives. This would basically provide the data for a first estimate of stock status, and be the baseline for future efficient monitoring of stock size.

1. Conduct a stock survey of the Chank and sea cucumber populations and their habitats in the Southern coast of Sri Lanka.
2. Provide information on stock status of commercial species.
3. Recommend management strategies for sustainable harvest of chanks.

METHODS

Survey type

As the fishing activities are basically carried out through diving (skin and scuba), it was decided to carry out **Underwater Visual Survey** (UVS) with the help of scuba divers both from commercial as well as scientists. According to the literature, underwater visual survey is the most suitable technique to assess the population who are having sedentary behavior.




Fig: 03. Field survey activities

Survey area

In Southern coast sea cucumber fishery is very low compared to Eastern and North Western coast of Sri Lanka. But the Chank fishery is significantly high. Scuba diving is restricted up to 30 m depth (shallow seas) around Sri Lanka due to technical problem. So the survey area was demarcated from Kumana to Tangalle up to the 30 m depth contour. Study area extended along shore distance 80 km from Kumana to Hambantota and 35km from Hambantota to Tangale (Figure 01). Therefore the total survey area was demarcated along the shore distance of 115km from Tangalle to Kumana.

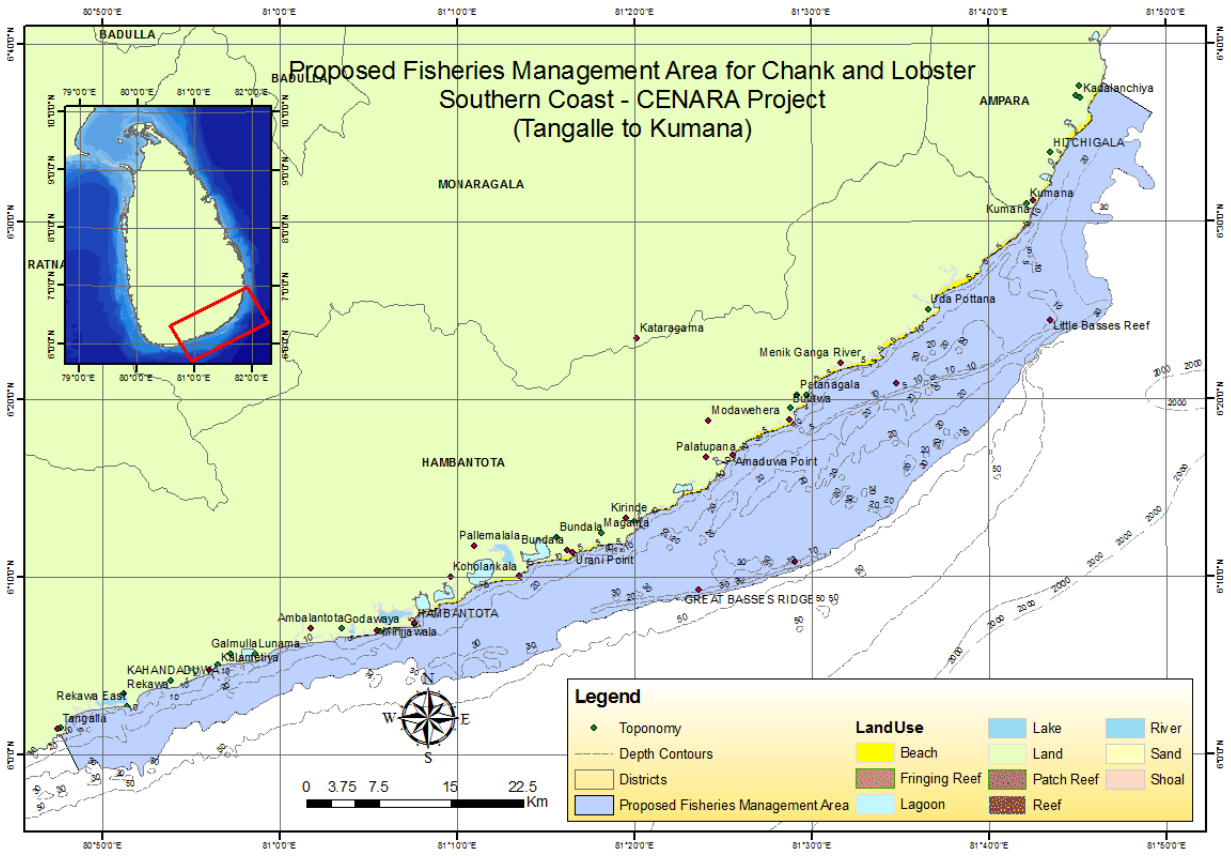


Figure: 04. Survey area of Chank resource in Southern coast (Tangalle to Kumana)

Strata	Area (sq km)
0-10	54.74
10-20	307.71
20-30	546.26
Reef	42.23
Total	908.72

Table: 02. Survey area according to the strata

Survey time

Frame survey was carried out from February to March 2009. Meanwhile real survey was started late February to mid March.

Survey design

A Geographic Information System (GIS) geodatabase was assembled from existing bathymetric and habitat data extracted by heads-up digitizing of scanned and georeferenced nautical charts. The coastline, reefs and shoals were digitized from Landsat & ETM+ satellite data.

As there are very little historical data as well as chank preferable habitats we decided to do random sampling method. We have to add 1km buffer zone from the land side due to security problem of the country within this period.

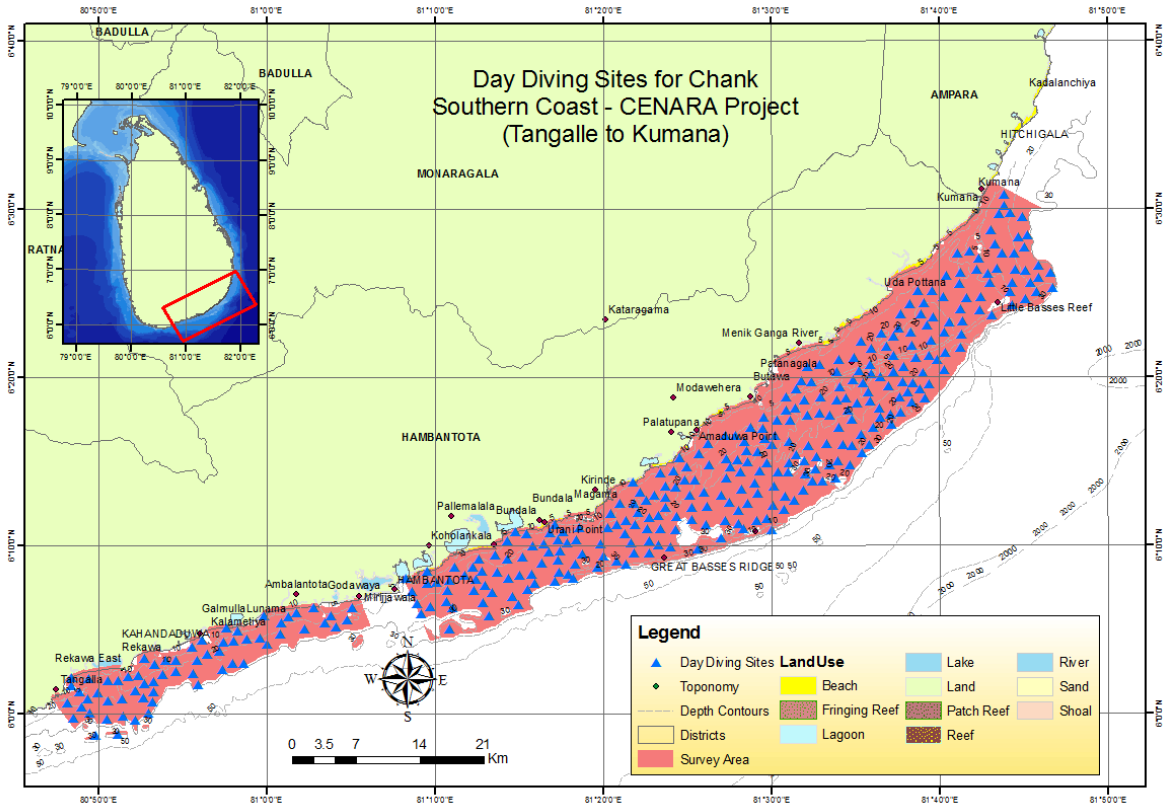


Figure: 05. Day diving sites for Chank survey in Southern coast

These are day diving sites of Chank survey. There are 350 diving sites altogether from Tangalle to Kumana. There is a little gap between the coordinates of Longitude 81^0 8'3" and Latitude 6^0 7'59''and the Longitude 81^0 5'29'' and Latitude 6^0 6' 44'' due to new International harbor construction activities in Hambantota. From Tangalle to Hambantota the total area was 162.81Km^2. And 63 sampling sites were putted there. From Hambantota to Kumana there were 287 sampling sites and the total area was 745.91km^2.

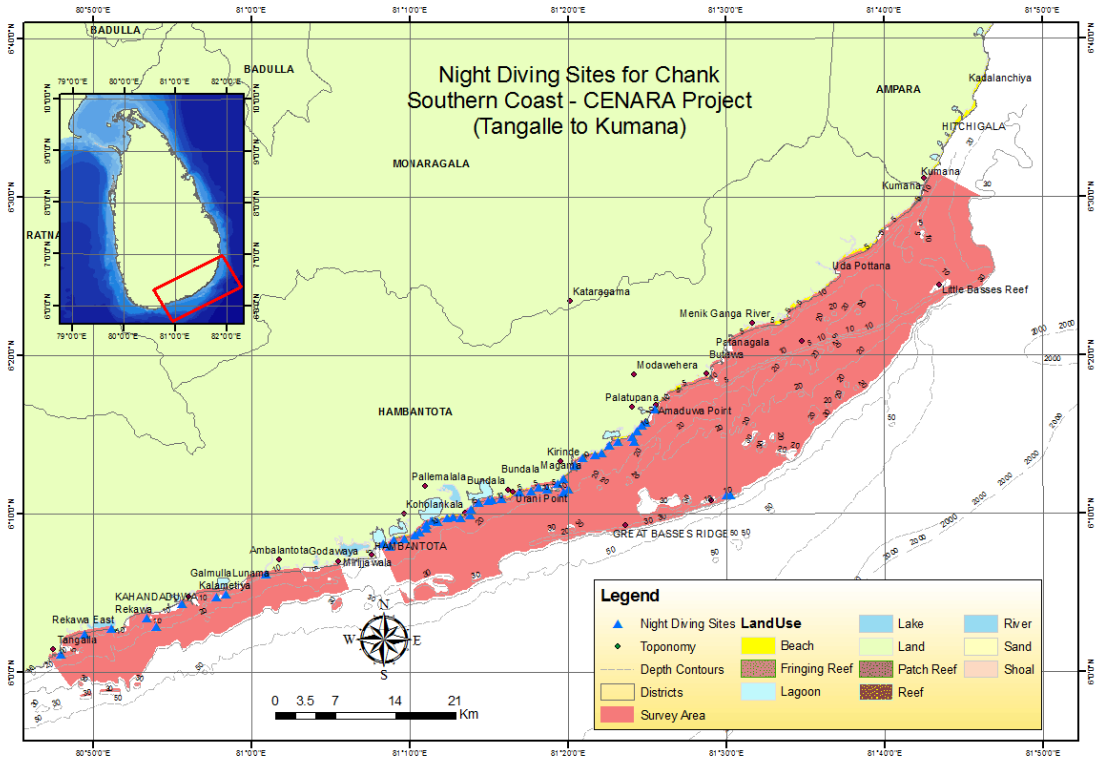


Fig : 06. Night diving sites for Southern coast survey

These are the night diving sites. Altogether there were 50 sampling points. It was as 9 sites from Tangalle to Hambantota and 41 sites for Hambantota to Kumana. We have to restrict the all diving sites within the 10m contour. Because divers no safe when they are doing deep diving at the night.

Field sampling

The survey employed rapid marine assessment techniques that have been employed in sea cucumber surveys in Torres Strait (Long *et al.*, 1996), Moreton Bay (Skewes *et al.*, 2002*a*), the Timor MOU Box (Skewes *et al.*, 1999) and Milne Bay Province, PNG (Skewes *et al.*, 2002*b*). Field work was undertaken by a team of divers operating from a dinghy and locating sample sites using portable Global Positioning System (GPS). At each site either a diver or divers swam along a 50 m transect and recorded resource and habitat information 2 m either side of the transect line. At each site, the substrate was described in terms of the percentage cover of sand, rubble, limestone platform, coral or terrestrial rock and mud. Other benthic taxa such as black coral and whip coral and the percentage cover of other conspicuous biota such as seagrass and algae were also recorded. Sea cucumbers and other benthic fauna of commercial or ecological interest

within the belt transect were collected and returned to the dinghy and measured and weighed back at the NARA base station.

Data Analysis

The data obtained from the field work were input into statistical and GIS software for analysis. Average abundance per hectare estimates were calculated from site counts using a stratified analysis that takes into account the heterogeneity of variance and the total area of the three depth interval strata: 0 ï 10; 10 ï 20; and 20 ï 30 m in the study area.

Area estimates for each depth class stratum were output from the GIS. Estimates of standing stock abundance were calculated as the product of average abundance and stratum area. Area estimates for each depth class stratum were output from the GIS. Estimates of standing stock abundance were calculated as the product of average abundance and stratum area.

Stock status

Determining stock status, generally expressed as the level of depletion compared to virgin levels, from a single abundance survey is difficult. However, we assessed both Chank and Sea cucumber species and categorized them in to one of several levels of stock status being: overexploited, where the population is severely depleted and densities are several times lower that virgin biomass levels; exploited, currently or previously fished but showing no evidence of severe depletion; unexploited, little or no fishing currently or in the recent past.

Calculation of indicative MSY and TAC

MSY was estimated based on new and developing version of the surplus production model that requires only the biomass estimate (usually assumed to represent virgin biomass B_0) and natural mortality (*M*) (Gulland, 1983) such that MSY = ½ *M*B0

To calculate the biomass parameter, *B*, for use in the models, we adopted the precautionary approach of using the bottom 20^{th} percentile of the probability distribution about the survey mean.

These estimates of MSY should only be used as an indicator of the potential annual yields that could be gained from this fishery given stable recruitment. The models have several

assumptions, the most important being that there is no spatial stock structure. Also, when populations are substantially below virgin biomass, recruitment may become depressed and the assumptions underlying the model are further breached. Depleted chank and sea cucumber populations risk dilution effects hampering recruitment at low stock levels. This effect is likely to occur for broadcast spawners at low abundances such that the fertilization success in the water column is much reduced due to the dilution of the gametes in the water column.

These factors mean it is likely that the optimal catch rate is substantially less than the lowest calculated MSYs for exploited populations. We therefore recommend TACs for exploited species that are half the lowest calculated MSY. Additionally, TACs are limited to no more than 10% of the model biomass. We also feel that TACs < 10 t would be impractical to enforce, prone to being exceeded and a risk of overexploitation.

All chanks found during the surveys were returned to the boat where they were individually weighed and measured for length and girth. These weighed data were used to calculate the population size and distribution pattern of the Chank in the Southern coast.

Results

There were three sea cucumber species and chanks were identified.

No	Scientific name	English name	Local name
1	*Holothuria atra*	Lolly fish	Narri attaya
2	*Holothuria edulis*	Pinkfish	Rathu attaya
3	*Holothuria* unidentified 5		Nari Nool
4	*Turbinella pyrum*	Chank	Sangu

Table: 03. Species (or varieties) of sea cucumbers and chanks observed during the surveys

ABUNDANDANCE AND BIOMASS ESTIMATES

No	Scientific name	Stratified mean per ha	L 90% CI individuals	Standing stock individuals	U 90% CI individuals
6	*Holothuria atra*	2.28	127,951	205,075	282,199
7	*Holothuria edulis*	13.06	876,172	1,176,071	1,475,970
15	*Holothuria* unidentified 5	2.47	44,631	222,105	399,579
19	*Turbinella pyrum*	8.94	558,618	805,080	1,051,542

Table: 04. Abundance Estimates for chanks and sea cucumbers

No	Scientific name	Stratified mean per ha	L 90% CI biomass (Kg)	Standing stock biomass (kg)	U 90% CI biomass (kg)
6	*Holothuria atra*	1.25	66,807	112,392	157,978
7	*Holothuria edulis*	2.20	147,298	198,102	248,907
15	*Holothuria* unidentified 5	0.41	0	36,925	78,850
19	Chank	3.12	197,665	281,152	364,639

Table: 05 Biomass estimates for chanks and sea cucumbers

TOTAL ALLOWABLE CATCH (TAC) ESTIMATES AND STATUS OF THE STOCKS

No	Scientific name	Standing stock B0 (T)	TAC (T)	Recommendations
6	*Holothuria atra*	112.39	5.619	Can not be fishing
7	*Holothuria edulis*	198.10	9.905	Can not be fishing
15	*Holothuria* unidentified 5	36.95	1.846	Can not be fishing
19	Chank	281.12	28	Can be fishing but need close monitoring

Table: 06 TAC estimates as Biomass and stock status as Biomass

No	Scientific name	Standing stock B0	TAC (induviduals)
6	*Holothuria atra*	205,075	10253.75
7	*Holothuria edulis*	1,176,071	58803.55
15	*Holothuria* unidentified 5	222,105	11105.25
19	Chank	805,080	805,08

Table: 07 TAC estimates as Abundance and stock status

All Sea cucumber species are low abundant and total allowable catch is less than 10 tons. Therefore there is no enough stocking density to start fishery on that. But the TAC of Chank is 14 tons. It can be harvest and be very careful to not exceed that level exactly.

Abundance of the Chanks and Seacucumber in the area was mapped as follows. Most abundant area was marked in purple colour.

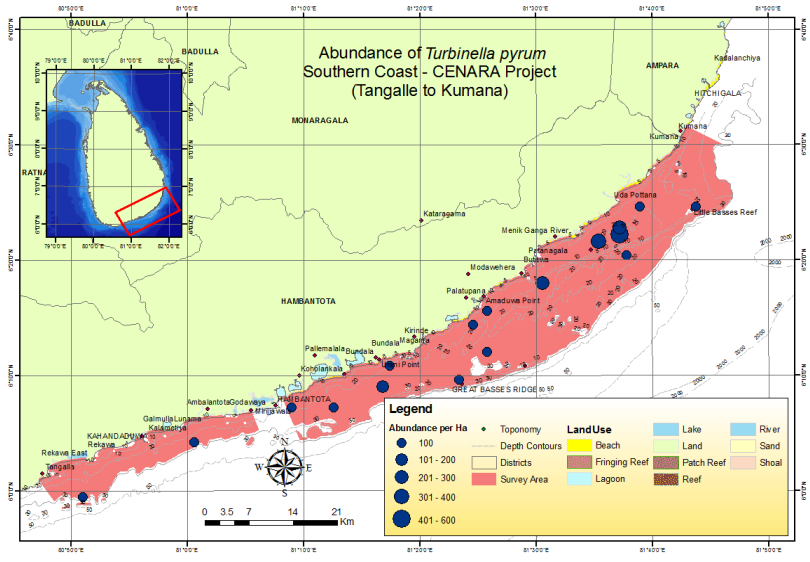


Fig.07: Most abundant places of Chanks in Southern coast

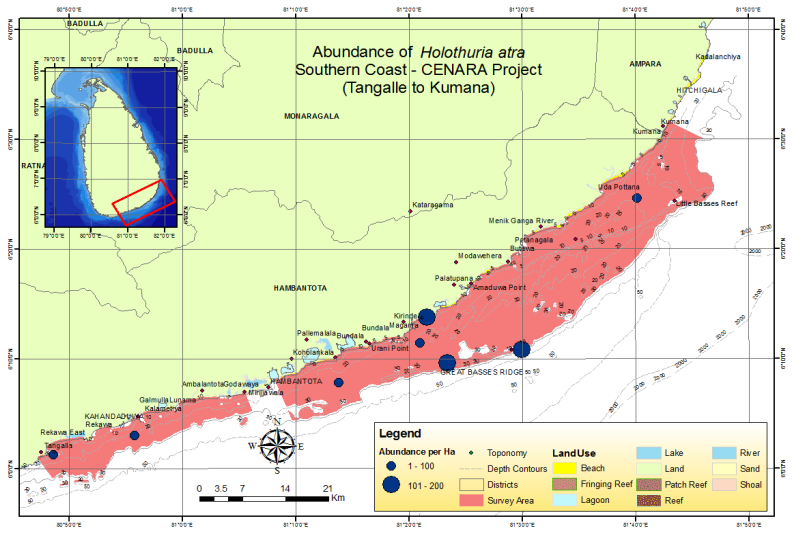


Fig.08: Most abundant places of *Holothuria atra* in Southern coast

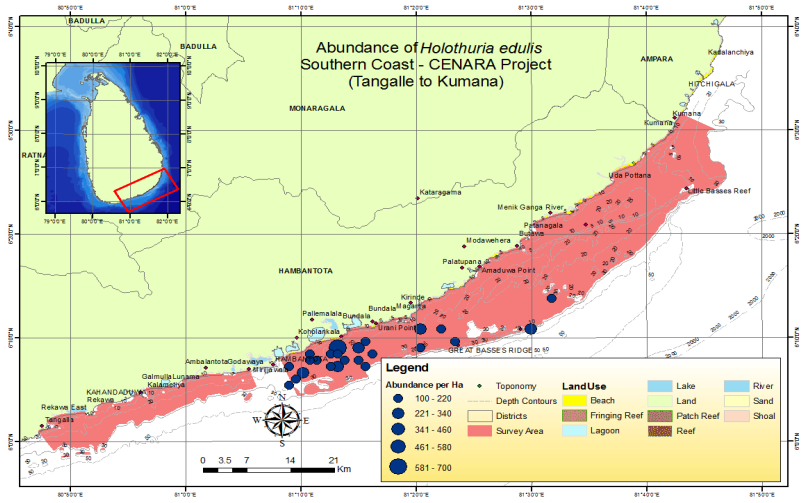


Fig.09: Most abundant places of *Holothuria edulis* in Southern coast

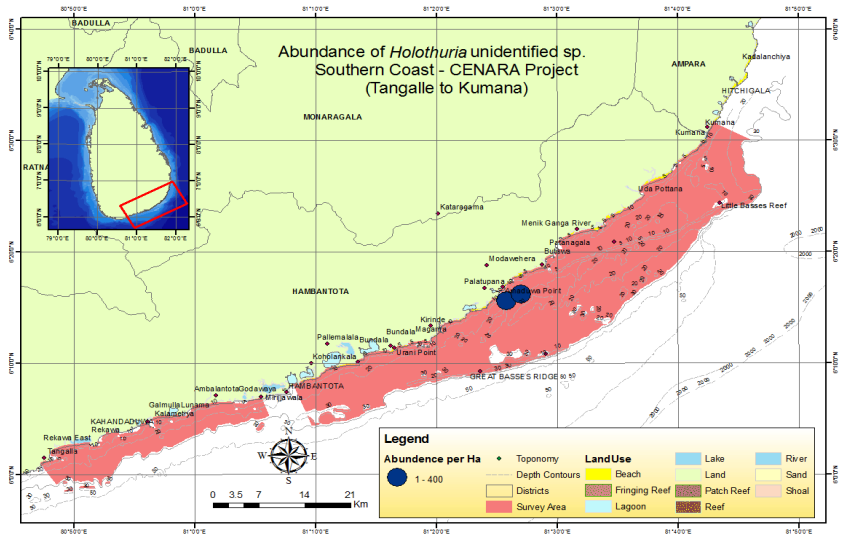


Fig.10: Most abundant places of *Holothuria* unidentified sp. in Southern coast

CONCLUSION

According to the survey results there are significance level of chank species in the Southern coast. In addition to that there are three sea cucumber species were recorded. But they are very small in quantity and commercially low valuable. With comparing with the East coast and North West coast there is significantly high abundance of chank species in the Southern coast. But the management is required very urgently to avoid collapse the fishery.

Recommendations

1. There is provision for further exploitation of chank resources in the Southern Sri Lanka but immediate management measures need to be enforced for the sustainable utilization of the resource.
2. Regular monitoring of the landing size (70 mm) is recommended and banning of undersized chanks is also recommended.
3. It is recommended to maintain the fishing effort at the existing level
4. It is recommended to limit the migratory fishermen in the area.
5. Regularly conducting surveys and need close monitoring of fishery dependent data.

6. Do not increasing existing number of permits without repeating the survey is recommended.

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