

## **Community-based sea cucumber farming as a livelihood alternative for fisher folks in Kalpitiya, Sri Lanka**

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### **Abstract**

This study evaluates the economic feasibility of community-based sea cucumber farming that can be successfully adopted as an alternative to sea cucumber capture fisheries. An increasing number of households in the north-western coastal areas has evidenced endangered in their livelihoods as sea cucumber catches are declining. Acceptable livelihood alternatives such as sea cucumber culture has a good potential to become a popular policy to uplift the socio-economic status of small-scale fishers and to reduce fishing pressure on over exploited fisheries. Nineteen families from the St. Anthony Co-operative Fisheries Society in Palakudawa area of the North western province, were aware on sea cucumber farming and out of these three were selected as beneficiaries. 20 m X 15 m size pen enclosure was prepared in collaboration with community people in the lagoon. 300 hatchery-reared juveniles obtained from NARA Regional Research Center, were stocked (size  $26.26 \pm 0.67$  g) in to this pen (stocking density 1 juvenile per m<sup>2</sup>). Average growth, daily growth rate and salinity has been recorded and calculated monthly. Average growth of sea cucumbers for the four month culture period was  $42.66 \pm 1.01$ ,  $75.57 \pm 1.94$ ,  $106.75 \pm 0.14$  and  $103.14 \pm 2.39$  in grams. The daily growth rate was 0.53 g, 1.23 g, 1.04 g and -0.12 g. Maximum weight attained during the each month from July to October 71.0 g, 132.0g, 179.0 g and 180.0 g respectively. Estimated net revenue to the fishery society through this pilot project was about Rs162,000.00 at the end of 8-10 month culture period. Introducing low cost materials to facilities develop and increasing extent of the farming site is recommended to further enhance income of the practices. However, this is the first ever community-based sea cucumber farming by using hatchery-reared juveniles.

**Keywords:** Sea cucumbers, community-based farming, pen enclosure, livelihoods

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### **Introduction**

Many species of sea cucumbers are edible and during the last few decades, the fishing pressure over this marine resource has been increased due to increasing demand for dried sea cucumbers (*beche-de-mer*) in the Asian markets (Conad, 2004, Bell *et al* 2008, L.-M. von Essen *et al* 2013 ). This has led to severe over exploitation of some commercially important species in many parts of the Indo-Pacific region including Sri Lanka. The decline of some valuable species and entry of new sea cucumber species to

the fishery were reported, particularly in the vicinity of Kalpitiya off the northwest coast, where the number of targeted species has increased from 8 to 16 during 1990 to 2012 (Dissanayaka and Stefanson 2010). Further more, due to a progressive decline of catches, an increasing number of households in coastal communities have difficulties in meeting their livelihoods by relying on fishing only. The promising market situation of dried *H. scabra*, and the familiarity of coastal communities throughout the North and North western province with sea cucumber fishery, bodes well for the consideration of sea cucumber mariculture in alternative livelihood projects (Ajith Kumara *et al* 2013).

### **Materials and Methods**

The present study was carried out in Puttlam lagoon in Palakudawa area, North Western province, a region where several coastal communities are engaged in artisanal fisheries for crabs, shrimps and small pelagic fish species. The suitable places for sea cucumbers culture were assessed under the rapid site selection procedure. Participatory Rural Appraisal (PRA) method was done to identify fisher-folks. Nineteen families from the St. Anthony Co-operative Fisheries Society in Palakudawa area, North Western province, were aware on sea cucumber farming and out of these, three were selected as beneficiaries.

They were given net materials and other facilities to make 20 m X 15 m size pen enclosure. 300 no's hatchery-reared juveniles were stocked (size  $26.26 \pm 0.67$  g) in to this pen (stocking density 1 juvenile per square meter area). All the expenses were born by the project. Monitoring programme has been carried out once a month providing further technical know-how to community. On a monthly basis two third of the samples obtained from the pen had the total length and weight to the nearest 0.5 cm and 0.1 g respectively and salinity was also recorded. Average growth and daily growth rate has been calculated. This study was started June 2014 and still carried on.

### **Results**

Average growth and maximum growth for first 4 months of culture period is shown in fig.1. The maximum and minimum growth rate was observed as 1.23 and -0.12 respectively while maximum weight attained, was recorded as 181 g during the four month culture period (figure 1).

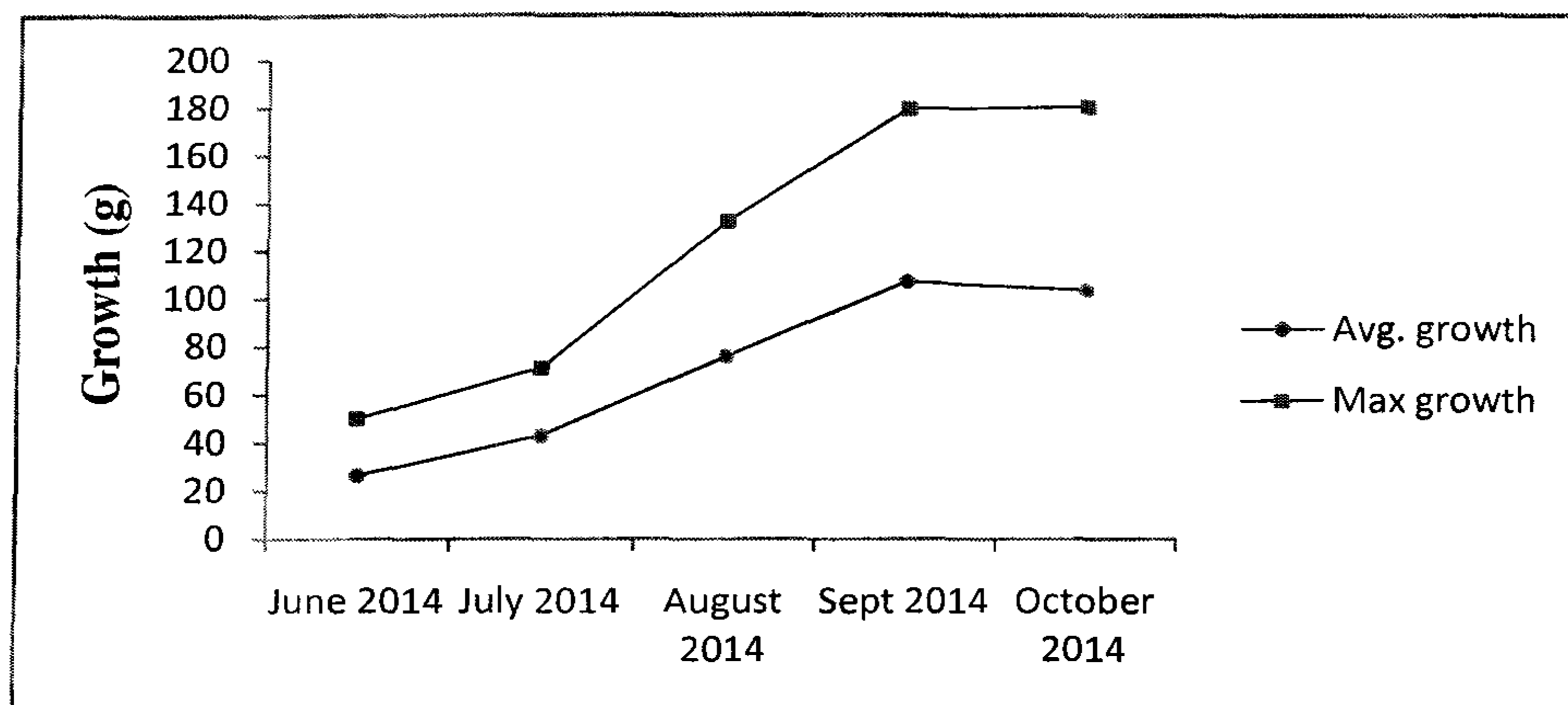


Figure.1. Average growth and maximum growth during the study period

Table 1: shows that the cost benefit analysis of this activity. Estimated net revenue to the fishery society through this pilot project was about Rs162,000.00 at the end of 8-10 month culture period.

Table. 1. Income expenditure analysis of sea cucumber community-based aquaculture project.

Variables	Comments
<b>Expenditure:</b>	
Net materials	Rs 19,000.00
Wooden poles and ropes	Rs 5000.00
Small-meshed net	Rs 4000.00
Polythene bags	Rs 2000.00
Juveniles	(300 nos * Rs 40) Rs 12,000.00
<b>Total Expenditure</b>	<b>Rs 42,000.00</b>
<b>Income:</b>	
Grow out farming (stocking density)	1 juvenile per square meter (10 g weight)
Total no. of stocking	300
Survival rate (assume)	~ 85%

Variables	Comments
Final harvest	255
Weight of sea cucumber at final harvest	650- 800 g (8-10 month after stocking)
Total production	$255 * 750 / 1000 = 191.25$ kg = 0.64 kg/ m <sup>2</sup>
Total return	Unit price ( 1 piece (fresh) ~ Rs 800.00 Rs 204,000.00
Net Revenue	Rs 162,000.00

### **Discussion**

The optimum salinity required for sea cucumber farming is 28- 32 ppt. Salinity remained constant 38 ppt during the first 3 months of the culture period and average growth gradually increased. With beginning of the Northeast monsoon raining in early October, salinity dropped down up to 26 ppt while water temperature also decreased remarkably. Due to re-adaptation against drastically changes of environmental factors sea cucumbers may spend more energy that resulted to slow growth in October than previous month. And also with the body growth, part of the energy use for development of gonado somatic tissues that may also cause to slow growth rate.

Sea cucumbers were not fed during the culture cycle as they depend on naturally available food inside the pen and this was a major advantage for the society as they need not to spend any money for sea cucumber feeds.

This is the first ever community-based sea cucumber farming using hatchery-reared juveniles in Sri Lanka. According to this preliminary observations there is possibility to enhance income of fishing community by expanding the extent of culture facility but further research are needed to make commercial implementation of this activity.

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