Assessment of the Sustainability Status of *Stichopus naso* (Family: Stichopodidae) in the Northern Coastal Waters of Sri Lanka

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INTRODUCTION

The sea cucumber fishery in Sri Lanka has expanded in response to growing international demand, generating significant income through Bêche-de-mer exports. However, increased fishing pressure has led to local depletion and fisheries collapse in several areas. In Jaffna, the harvesting of *Stichopus naso* using SCUBA diving began in 2019, following the collapse of the sea cucumber fishery in Mullaitivu coastal waters. The fishery is seasonal, operating from May to October.

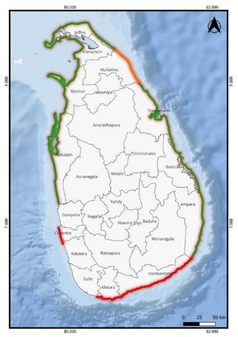


Figure 1: Coastal areas where the sea cucumber fishery operates in shallow waters. Red – areas where the fishery took place in the past; Green – areas where the fishery is currently active; Orange - Area closed to sea cucumber fishing.

Figure 2: Processing of the S. naso catch at collection centres. A - The catch; B – Boiling; C - Adding salt; D – Sun-drying.

OBJECTIVES

- ✓ To assess the sustainability of the fishery and the resource of *Stichopus naso* at the Jaffna fishing grounds in Northern Sri Lanka.
- ✓ To provide management recommendations for a sustainable fishery for the *Stichopus naso* resource at the Jaffna fishing grounds in Northern Sri Lanka.

METHODOLOGY

A fishery-dependent survey was conducted using logbook records from 2019 to 2021 in the Jaffna coastal area based on data from the sea cucumber collection centres to support the achievement of the study objectives.

Study area

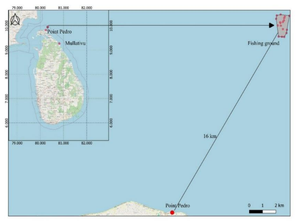
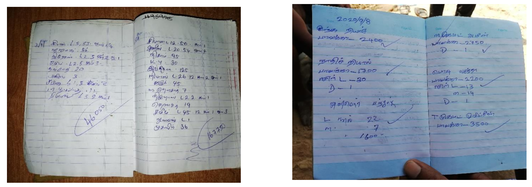


Figure 3: The location of the fishing ground for Stichopus naso in Northern Sri Lanka in 2019.

Figure 4: Stichopus naso from the Jaffna fishing ground.

Data collection (Logbook records)



Data analysis

- ➢ The DeLury depletion model was used through the *CEDA Version 3.0* software package.

We used

- ➢ M = 0.298 year^{-1}
- ➢ Constant recruitment model
- ➢ Least squares error model
- ➢ Sensitivity analysis (for M and data aggregations)
- ➢ Projection of the population for the next fishing season

RESULTS

The catch and effort distribution over the fishing season in each year

Table 1. The variations in the Catch, mean Effort and mean CPUE during the study period (SD = standard deviation).

Year	Total Catch (number of individuals)	Mean effort (boats/day) ± SD	Mean CPUE (number of individuals/boat/day) ± SD
2019	6,334,983	26 ± 22.88	3070 ± 724.11
2020	3,821,110	15 ± 10.87	3126 ± 771.96
2021	18,050,790	49 ± 31.47	2850 ± 478.95

The stock status of *S. naso* in the Jaffna fishing ground

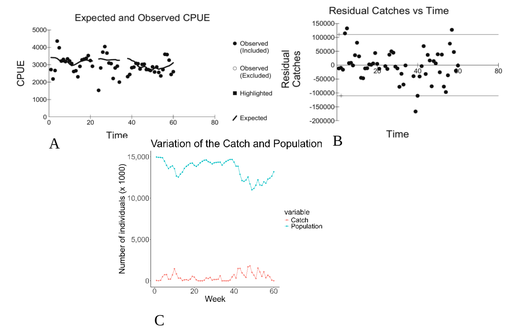


Figure 5: The results of the catch and effort data analysis of S. naso with the CEDA software package version 3.0.

Sensitivity analysis and projections for the population in the next fishing season

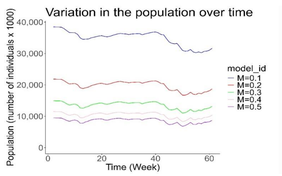


Figure 5: Sensitivity of the model output for different M values.

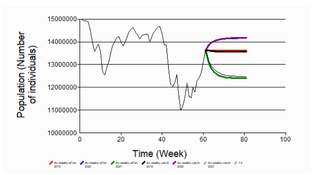


Figure 6: Projection of the population for different catch and effort scenarios.

CONCLUSIONS

- ➢ About 9% of the initial population had been removed from the Jaffna fishing ground from 2019 to 2021.
- ➢ A significant decline in population size was observed in 2021, likely as a response to the elevated fishing pressure.
- ➢ The highest mean effort and the lowest CPUE were recorded in 2021.
- ➢ The projection results indicated a further decline in population if the fishing pressure in 2021 would further continue.
- ➢ The model estimation of the population size is highly sensitive to M.

RECOMMENDATIONS

- ✓ A '**precautionary management approach**' is proposed for the *S. naso* resource in the Jaffna fishing ground.
- ✓ An **annual TAC** of 3,821,110 individuals, matching the catch of 2020, is proposed for the next three years.
- ✓ **Individual quotas** should be allocated, considering the **mean catch of each collector from 2019 to 2024.**
- ✓ The existing **effort control measures** should be maintained.
- ✓ Prompt action should be taken to undertake a **fishery-independent survey** for a robust stock assessment.
- ✓ The **management strategies should be redefined** accordingly.

ACKNOWLEDGEMENTS

Data collection was funded by the Ministry of Finance, Sri Lanka, and carried out by NARA.