Environmental Factors for *Holothuria scabra* Sea Cucumber Cultivation

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CURRENT CONDITION

- *Holothuria scabra* which is also known as gosok sea cucumber or sandfish has high economic value and is commercially exploited in tropical areas including Indonesian waters.
- Indonesia is known as one of the main producers of sandfish products from capture fisheries.
- Sandfish have high economic value because they are food ingredients that have various health benefits.
- Its nutritional content and health benefits cause the high demand for sandfish.
- *H. scabra* is a commodity that is mostly exported, especially in dry form.
- Many sandfish be found in sandy areas or a mixture of sand and mud at a depth of 1 - 40 m and are also found in shallow waters where seagrass is abundant.
- Sandfish have long been used by the people of the Kei islands, generally they are taken for sale.
- Taking sandfish is done at low tide in the intertidal zone or by diving in deep waters. Taking sandfish is carried out without paying attention to the sandfish breeding season, so that it greatly affects the survival and preservation of sandfish.
- With a good economic value and high enough market demand it has led to intensive *H. scabra* fishing efforts and even resulting in overfishing.

THE SOLUTION

- Cultivation activities are needed to overcome existing problems with the main objective of restoring natural populations, conservation and production.
- Sandfish cultivation is an alternative to anticipate the continuity of production due to overfishing.
- Maintenance environmental factors are important factors to consider in sandfish cultivation.
- A suitable location really supports the success of sandfish cultivation.

THE PURPOSE

- To identify the main habitat and indicators in determining suitable locations for sandfish cultivation.
**METHODOLOGY**

- **Time and Place**
  - The research was conducted from May 2020 to October 2020, in Watuar village, Kei Besar island, Southeast Maluku.
  - Observation and data collection were carried out at low tide in the seagrass ecosystem in the intertidal zone of the Watuar village waters.

- **Variable and Measurement Methods**
  - The parameters measured in determining the characteristics of the habitat for *H. scabra* cultivation were **depth**, **condition of seagrass vegetation cover**, **particle size of the bottom substrate**, and **water quality parameters**.

- **Data Analysis**
  - The data were then analyzed with reference to location conditions suitable for cultivation of *H. scabra* in the sea (Firdaus, M, 2019).
| No | Parameter                      | Measurement results                                                                                                                                                                                                 | Expected conditions (Firdaus, M, 2019)                                                                 |
|----|--------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------|
| 1  | Geographical conditions        | The waters are somewhat protected from currents and extreme waves, have good water circulation.                                                                                                                     | Waters protected from extreme currents and waves. They can be bays, lagoons or sheltered straits. Has good water circulation. |
| 2  | Type of ecosystem              | The condition of the seagrass is healthy, side by side with the mangrove ecosystem on the coast and coral reefs.                                                                                                    | Healthy seagrass beds, especially those adjacent to mangrove and coral reef ecosystems, are safe from anthropogenic stresses due to human activities and are protected from fresh water intrusion from rivers or groundwater. |
| 3  | Vegetation conditions          | Dominated by *Enhalus acoroides* seagrass, with a mixture of other seagrass species such as *Cymodocea rotundata*, *Cymodocea serrulata*, *Thalassia hemprecchii* with moderate density. | It is dominated by *Enhalus acoroides* seagrass, with other seagrass species such as *Cymodocea rotundata*, *Cymodocea serrulata*, *Thalassia hemprecchii* and *Syringodium* sp. with moderate density. |
| 4  | Water depth (low tide)         | The water depth is in the range of 35 cm (at the lowest tide) and a maximum of 190 cm (at the highest tide).                                                                                                      | The water depth is in the range of 50 cm (at the lowest tide) and a maximum of 200 cm (at the highest tide). |
| 5  | Substrate conditions           | Muddy sand grains (between 100 - 300 µm) with the dominance of substrate particles sized 100 µm are 96.7%. Has an abundance of benthic microbiota as sandfish feed.                                                      | Muddy sand grains (between 100 - 300 µm) with high nutrient content and organic matter, especially carbon (C). Has an abundance of benthic microbiota as sandfish feed. |
| 6  | Water quality                  | The salinity is stable throughout the year in the range of 30-35 ppt, 30-36 ppt, dissolved oxygen > 6 mg / L, pH 7-8, temperature 25-30°C, not polluted by garbage and waste from anthropogenic activities. | Stable year-round salinity in the range of 30-35 ppt, dissolved oxygen > 5 mg / L, pH 8-9, temperature 26-30°C, mesotrophic waters, not polluted by garbage and waste from anthropogenic activities |
| No | Parameter                          | Measurement results                                                                                     | Expected conditions (Firdaus, M, 2019) |
|----|------------------------------------|--------------------------------------------------------------------------------------------------------|----------------------------------------|
| 7  | Climatic conditions                | Rainfall is relatively low throughout the year, not a cyclone / storm prone location.                  | Rainfall is relatively low throughout the year, not a cyclone / storm prone location. |
| 8  | Predators and competitors          | Low abundance of competitors and predators, observed crab species, and gastropods.                      | The low abundance of competitors and predators, especially crab, carnivorous fish, shrimp, carnivorous molluscs, starfish, isopods and amphipods. |
| 9  | Accessibility                      | It is easily accessible to cultivators and allows the transportation of materials and materials for cultivation and marketing activities. | It is easily accessible to cultivators and allows the transportation of materials and materials for cultivation and marketing activities. |
| 10 | Social aspect                      | Safe and has permission from the village government                                                    | Safe from theft, preferably cultivated land so that it has concessions or permits from the local government / community |
Conclusion

• The location of the seagrass beds in the village of Watuar is suitable to be developed as a sandfish cultivation.
• Location with three main indicators, namely the water depth of 35 cm (at the lowest tide) and 195 cm (at the highest tide), the condition of the seagrass vegetation cover is classified as moderate and the substrate the bottom of the water is muddy sand with a particle size of 100 µm of 96.7%.

Thank you