Management of Sea Cucumber Resources at the Sasi Egek Location, Malaumkarta Village, Sorong Regency, South West Papua Province

Selvi Tebaiy[1*], Daniel Felle[1], Sampari S. Suruan[1], Fitriyah Irmawati E. Saleh[1], Hans A. Pasak[2]

[1]Jurusan Perikanan, Fakultas Perikanan dan Ilmu Kelautan, UNIPA, Jalan Gunung Salju, Amban, Manokwari, 98314, Indonesia
[2]Yayasan Konservasi Alam Nusantara (YKAN) Papua Barat
*Corresponding: s.tebay@unipa.ac.id

Disubmit: Juni 2023, Direvisi: 30 Juli 2024, Diterima: 30 Agustus 2024

ABSTRAK

Sampai saat ini, masyarakat di kampung Malaumkarta masih menjalankan praktik budaya pengelolaan sumberdaya secara komunal yang disebut dengan Sasi *Egek*. Salah satu biota yang dikelola dengan sistem sasi *egek* adalah teripang. Penelitian ini dilakukan selama 34 hari yaitu dari bulan Januari sampai Februari 2023, yang berlokasi di Kampung Malaumkarta, Distrik Makbon, Kabupaten Sorong, Provinsi Papua Barat Daya. Penelitian ini menggunakan metode observasi langsung dengan teknik Manta Tow (*Virtual Sensus*) yaitu metode dengan teknik menarik garis transek sepanjang 100 meter dan melakukan pengamatan pada area yang di lintasi oleh transek untuk mengidentifikasi setiap biota teripang yang ditemukan disepanjang garis transek. Data jenis teripang yang ditemukan dan diidentifikasi pada lokasi penelitian dianalisis secara deskriptif untuk mengetahui data jenis dan jumlah, data kepadatan dan keanearagaman teripang di lokasi peneitian. Berdasarkan pengamatan teripang di lokasi sasi *egek* Malaumkarta, ditemukan sebanyak 12 individu teripang dari total keseluruhan semua jenis yang teridentifikasi. Jenis teripang yang paling banyak ditemukan adalah *Holothuria nobilis* yaitu sebanyak 9 individu. Total kepadatan relatif teripang secara keseluruhan diperoleh sebesar 0.024 ind/m^2 atau 24 ind/ha. Teripang dari hasil sasi egek kemudian di tampung dan di pasarkan ke pembeli di Kota Sorong. Keuntungan dari hasil penjualan teripang berkisar antara 80-100 juta rupiah. Pengelolaan sumberdaya teripang pada saat periode buka sasi *egek,* perlu untuk ditetapkan batasan ukuran panjang tubuh biota teripang yang boleh di panen, perlu dilakukan pencatatan data teripang secara terus-menerus untuk ukuran panjang dan berat teripang, data jenis dan jumlah serta nilai ekonomis, sehingga dapat menjadi bahan evaluasi pada periode buka sasi *egek* berikutnya.

Kata kunci: *Holothuria nobilis, Egek, Malaumkarta*

ABSTRACT

Until now, the people in Malaumkarta village still carry out the cultural practice of communal resource management called Sasi Egek. One of the biota managed using the sasi egek system is sea cucumbers.This research was conducted for 34 days, from January to February 2023, located in Malaumkarta Village, Makbon District, Sorong Regency, South west Papua Province. This research uses a direct observation method with the Manta Tow (Virtual Census) technique, namely a method that involves drawing a 100 meter transect line and making observations in the area crossed by the transect to identify every sea cucumber biota found along the transect line. Data on the types of sea cucumbers found and identified at the research location were analyzed descriptively to

determine data on types and quantities, data on the density and diversity of sea cucumbers at the research location. Based on observations of sea cucumbers at the sasi egek location in Malaumkarta, 12 individual sea cucumbers were found out of the total of all types identified. The most common type of sea cucumber is *Holothuria nobilis* as many as 9 individuals. The total relative density of sea cucumbers as a whole was obtained at 0.024 ind/m^2 or 24 ind/ha. The sea cucumbers from the sasi egek are then collected and marketed to buyers in Sorong City. Profits from selling sea cucumbers range from 80-100 million rupiah. Management of sea cucumber resources during the sasi egek opening period, it is necessary to set a limit on the body length of sea cucumber biota that can be harvested, it is necessary to record sea cucumber data continuously for the length and weight of sea cucumbers, data on type and quantity and economic value, so that it can become evaluation material in the next egek opening period.

Keywords: *Holothuria nobilis, Egek, Malaumkarta*

INTRODUCTION

Sea cucumbers can also be called gamat. Gamat or sea cucumber because their shape resembles a cucumber, with the characteristics of a soft body, cylindrical body shape, has circular muscles and extends from the mouth to the anus, while taxonomic sea cucumbers are a class of the Holothuroidea family which consists of 1,250 species spreading across 200 genera. The body shape of sea cucumbers is like a tube and has soft flesh. The morphological parts of sea cucumbers have various colors consisting of black, gray, brownish, rosy, yellowish and white (white), while the body shape of sea cucumbers varies greatly and has a diameter of between 25 to 35 cm and weighs up to 250 - 350 grams. At the end of the sea cucumber there is a mouth which is usually called the anus, where in the anus of the sea cucumber there are tantacles that have branches, patterns or spots. Sea cucumbers can be found in coral reef ecosystem, seagrass beds (around shallow waters), starting from the intertidal zone to zones at a depth of < 40 meters. Apart from that, sea cucumbers can also be found in all coastal marine waters, from shallow waters to the deepsea with fine sandy substrate conditions (Africa, 2022).

Sea cucumber resources are one of the important fishery export commodities, because they have a fairly high selling price (Setyastuti *et al*., 2019), thus encouraging quite intensive use of sea cucumbers by coastal communities in various regions in Indonesia, as a result the condition of sea cucumber resources in Indonesia tends to be low. experienced a decline (Darsono, 2003; Wiadnyana *et al*., 20018; Tahe, 2013), until now Sea cucumbers in Indonesia do not yet have protected status, however there is a possibility of being included in the CITES Appendix list. Therefore, it is necessary to strengthen data related to the condition of the sea cucumber population. In the world there are more than 1,400 species of sea cucumber and around 66 species of them are sea cucumbers which are categorized as marine animals that are often traded. In Indonesia there are 350 species of sea cucumber and 54 of them are the group of sea cucumbers that are traded (Mahu, 2020).

Marine resource utilization activities such as sea cucumber are caused by food and economic needs, especially for communities in coastal areas whose lives depend on the natural resources around them, so in terms of management, the involvement and active role of coastal communities is very important to maintain the sustainability of natural resource potential in coastal areas. Regarding community involvement in resource management, Anwar & Rustiadi (2000) stated that the party who best understands local resource management is the local community itself. Many coastal communities carry out sustainable resource management

activities and at the same time maintain sustainable food and economic security, which are based on local cultural values to prevent activities that have the potential to cause damage to coastal areas (Dewi, 2018; Anna, 2018). This has also been previously expressed by Cahyadi (2012), that coastal communities (traditional fishermen) generally have a resource management system that is adaptive to sea conditions and the types of marine biota they use.

The community involvement approach has long been known as community-based management (CBM) or also commonly called community-based resource management. *Based on Natural Resource Management* (CBNRM) (Arafat *et al*., 2022). Community-based management is defined as resource management (land, forests, wildlife, water and other natural resources) in which local communities play an active and responsible role in planning, implementing and benefiting from the results of natural resources in the environment they live in (Alains *et al*., 2009; Setiyono, 2016)

One of the traditional sea cucumber biota management approaches that is widely known by coastal communities, especially in the Maluku and Papua regions, is Sasi. Judge & Nurizka (2008) and Warawarin *et al*., (2017) regarding Sasi in the Maluku Province region, shows that the Sasi law provides meaning, among other things, the emergence of an attitude to prioritize the public interest and the community to get used to living an orderly life. Implementation of Sasi with an open-close system has a positive impact on the preservation of marine nature (Arafat *et al*., 2022). The same thing was done for the condition of sea cucumber fisheries resources in Malaumkarta village, Makbon District, Sorong Regency, Southwest Papua.

Malaumkarta Village is one of 15 villages in Makbon District, Sorong Regency, which is inhabited by indigenous people from the Moi Kelim tribe (Anna, 2018) and until now the people in Malaumkarta village still carry out the cultural practice of communal resource management called Sasi Egek, and one of the biota managed using the sasi egek system is sea cucumbers. Based on the information above, this research is focused with the aim of knowing the distribution of types and density of sea cucumbers (*Holoturiodae*) at the Sasi Egek location and how they are utilized and managed by the community in Malaumkarta Village, Makbon District, Sorong Regency, South west Papua.

RESEARCH METHODS

Time and Location

This research was carried out for 34 days (± 1 month), namely from January to February 2023, located in Malaumkarta Village, Makbon District, Sorong Regency, Southwest Papua Province.

Gambar 1. Peta Lokasi Penelitian

Data Collection Method

This research uses a direct observation method with the Manta Tow (Visual Census) technique, namely a method using a technique of drawing a 100 meters long transect line and making observations in the area crossed by the transect to identify every sea cucumber biota found along the transect line that has been laid, every sea cucumber. The type found was identified and its length measured. Data collection on sea cucumbers was carried out at 3 observation stations in the Malaumkarta sasi egek location when the sasi was

p-ISSN 2550-1232
e-ISSN 2550-0929

opened by the indigenous community. Observations were carried out from morning to afternoon, where each type of sea cucumber found was recorded in number and the type was identified with the help of identification.using the sea cucumber monitoring guidebook (Heryanto *et al*., 2004).

Data analysis

Data on the types of sea cucumbers that were found and identified at the research location were analyzed descriptively, in which each type of sea cucumber data was interpreted in morphological form based on type and size, number and distribution at the location Sasi Egek. Apart from data on type and quantity, data on the density and diversity of sea cucumber species were also calculated and interpreted.

Analysis of sea cucumber density data was calculated using a formula referring to Odum (1993) as follows:

$$\mathbf{D} = \frac{\mathbf{n}}{\mathbf{A}} \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots (\mathbf{1})$$

Information:

D : density of sea cucumbers
n : number of individuals
A : transect area

RESULTS AND DISCUSSION

Description of Types of Sea Cucumbers

Based on the results of identifying types of sea cucumbers at the Sasi Egek research location in the waters of Malaumkarta village, 3 types of sea cucumber biota were found, namely oil sea cucumbers (*Holothuria nobilis*), flower sea cucumber (*Pearsonothuria graeffei*), and thread sea cucumber (*Bohadschia argus*). The types and composition of sea cucumbers found are presented in Table 1.

Oil Sea Cucumber (*Holothuria nobilis*)

*Holuthuria nobilis*is a black sea cucumber belonging to the Holothuridae family, belonging to the order Holothuriida and class Holothuriidae. It inhabits waters up to 40 meters deep around coral reefs, as well as coral slopes and seagrass beds.

Flower Sea Cucumber (*Pearsonothuria graeffei*)

This sea cucumber is ivory yellow to brown with many black spots, its body is elongated on the stomach with transverse folds, tThere are 23-28 tentacles in the mouth, the front surface of the anus, no teeth or papillae, the dorsal surface looks rough (Conand *et al*., 2012).

Thread Sea Cucumber (*Bohadschia argus*)

This sea cucumber has a fat body, thick and soft flesh. Its body is decorated with round patterns at the base of each papilla. The position of the anus tends to be on the dorsal side, without teeth. The papillae are small and long, scattered over the dorsal surface. It prefers to live in rocky areas and has threads that will be released if it feels threatened.

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Table 1. Composition of Sea Cucumber Types

No.	Scientific name	Amount	Picture
1.	*Holothuria nobilis*	9	
2.	*Pearsonothuria graeffei*	2	
3.	*Bohadschia argus*	1	

Density of Sea Cucumber Types

Based on the sea cucumber observation area, which is 500 m^2 in the Malaumkarta sasi egek location, 12 individual sea cucumbers were found from the total of all types identified. The most common type of sea cucumber is *Holothuria nobilis* is many as 9 individuals, *Pearsonothuria graeffei*as many as 2 individuals and *Bohadschia argus*as much as 1 individual. If we look at the total relative density of sea cucumbers as a whole, it is found to be0.024 ind/m^2 or 24 ind/ha (Table 2). This total relative density can be said to mean that the abundance of sea cucumbers at the Sasi Egek Malaumkarta location is in the critical category (vulnerable to extinction), which Purcell *et al*., (2009) stated that a sea cucumber population density of less than 30 ind/ha is in the critical category, while a population density below 100 ind/ha is in the low category.

Several other regions in Indonesia also show sea cucumber population density values that are not much different from those found in this study, such as in the Bintan Islands which have a sea cucumber density value of 126 ind/ha (Junianto *et al*., 2014) and in the Konawe Islands which havemisea cucumber density reaches 400 ind/ha (Nirwana *et al*., 2016).

Selanno *et al*., (2014) reported around 8 types of sea cucumbers found in Suli Village with the number of types and density relatively low compared to other villages, Uneputty *et al*., (2017) also found around 8 species, 4 of which were similar to those proposed by Selanno et al., (2014).

Table 2. Relative Density of Sea Cucumbers

No.	Species name	Relative Density (Individual / m^2)
1.	*Holothurianobilis*	0.018
2.	*Pearsonothuria graeffei*	0.004
3.	*Bohadschia argus*	0.002
	Total	**0.024**

The high abundance of *H. nobilis* sea cucumbers is due to the fact that *H. nobilis* sea cucumbers are the most abundant sea cucumbers found in the egek sasi location, because they have high economic value, so this type of sea cucumber is more widely harvested by the community, compared to other types of sea cucumbers, so the implementation of sasi Egek activities for this type of sea cucumber is carried out in a sustainable manner by emphasizing the principle of protection for this type of sea cucumber by the local community. The egek system is applied to biota with high economic value such as lobsters, sea cucumbers and grastopod. The determination of sasi biota is almost the same in various regions in Maluku and Papua that apply the sasi system (Warawarin *et al*., 2017; Sjafrie & Setyastuti, 2020; Putri *et al*., 2020).

The type of *H. nobilis* is the sea cucumber most often taken by the public because it has high economic value, so its use or exploitation is carried out continuously. The same research was conducted by Baransano *et al*., (2019) in the Sasi and Non-Sasi areas in the waters of Numfor Island, the lowest abundance was found in the *H. nobilis* and *H. argus* types. These findings are actually different from those found in the Sasi Egek Malaumkarta location, where the has a higher density value, while the lowest abundance is only found in the *H. argus* type. This means that the abundance of sea cucumbers is strongly influenced by various factors, both high utilization and habitat condition factors (Baransano *et al*., 2019).

The condition of marine biota habitat is greatly influenced by water quality and can have a direct influence on the survival of marine biota, and can be a limiting factor in the distribution of marine biota (Hamuna *et al*., 2018; Tanjung *et al*., 2019), one of which is sea cucumber biota. Physical and chemical parameter conditions that are suitable for sea cucumber life include a water temperature range of between 20-31^{o}C, sea water pH ranging from 7.5-8.5, The salinity ranges between 34‰-35‰, this salinity is sufficient salinity for sea cucumbers to survive and grow optimally (Baransano *et al*., 2019; Sarumaha *et al*., 2024). The high and low density of sea cucumber species at the Egek Malaumkarta sasi location is greatly influenced by various factors such as the high use of sea cucumbers by the community around the sasi location and habitat condition factors. According to Yusron (2007), the types of sea cucumbers that fall into the main category are *H. scabra, H. atra, H. nobilis, H. edulis* and *T. nanas*. The abundance of sea cucumbers is also closely related to the type of aquatic substrate (Handayani *et al*., 2017). Seagrass ecosystems in waters with suitable basic substrate types are very supportive for the growth of sea cucumbers (Martoyo *et al*., 2007). Seagrass habitats can function as protection and food traps for sea cucumbers. In areas where seagrass and coral are the main habitat for sea cucumbers to protect themselves from sunlight (Sabariah *et al*., 2011).

Handayani *et al*., (2017) stated that sea cucumbers from the Holothuriidae and Stichopodidae tribes can adapt and occupy all kinds of basic types (substrates), such as mud, sandy mud, sand, muddy sand, gravel, rocky beaches, dead coral, rubble, and coral boulders. (boulders). Sea cucumbers are organisms that inhabit sandy substrates, are deposit feeders, that is, they eat anything found at the bottom of the waters such as detritus, sand particles, coral debris, diatoms, blue algae

filaments, red algae, sea urchin fragments, copepods, fish eggs, and several microorganisms (Baransano *et al*., 2019).

Utilization of Sea Cucumbers by the Community

Egek which was carried out collectively in Malaumkarta village attached to the church institution (managed under the church institution). Because of this, it is often referred to as Church Sasi. Utilization of targeted resources is carried out to fulfill general needs (public interest). However, apart from public interests, in the last two decades the egek proceeds obtained were used to fulfill church needs such as church construction (2003–2009), manse construction (2016-2017), spiritual tourism (2017) and zending fest (2019) (Arafat *et al*., 2022).

In Malaumkarta Village, people catch sea cucumbers using their bare hands and almost all sizes of sea cucumbers are taken. Although some people say that small sizes will not be taken, there is no definite definition as to how big the small size is. This also shows that the community has conservation awareness so as not to exploit resources to the smallest size. The treatment of sasi rules in Malaumkarta is slightly different from the Sasi rules in several regions, including Maluku, Raja Ampat and Kaimana, where the community has more specific rules on several things, such as not being allowed to pick sea cucumber biota with your hands, not being allowed to walk in seagrass areas (Putri *et al*., 2020), there is a limit on the size of sea cucumbers that are allowed to be harvested (more than 10-15 cm) (Solikhin, 2011; Sjafrie & Setyastuti, 2020; Putri *et al*., 2020).

The use of fisheries resources in Malaumkarta Village is understood as common property. People from outside Malaukarta village are allowed to enter (right to access) the egek area. In fact, it is also permissible to use (right to use) in egek areas such as crossing the area and fishing with the obligation not to violate egek rules such as taking biota or using egek fishing gear. This is also the case in Lilinta and Foley Villages, Regency. Raja Ampat where people can still enter the Sasi area to pass through and catch fish (Lestari & Satria, 2015; Putri *et al*., 2020).

The community takes sea cucumbers from sasi egek and then collects and manages the harvest. The sea cucumbers harvested from opening sasi egek are marketed to buyers in Sorong city. Profits from selling sea cucumbers range from 80-100 million rupiah. The same thing happened in Misool village harvested 1,338 sea cucumbers during the opening of sasi with a value of 50 million rupiah (Sabariah *et al*., 2021).

Management of Sea Cucumbers with the Sasi Model

Sea cucumbers are a fishery commodity that has high economic value, both in the domestic and international markets, but the density of sea cucumbers found is very low for several types that have important economic value, so it is necessary to protect and preserve sea cucumbers. Protection of sea cucumbers can be done by applying the principles of local wisdom of local communities through Sasi (Baransano *et al*., 2019).

Sasi comes from the word "sanction" which means prohibition. Sasi is a prohibition on the use of natural resources on land or at sea for a certain period of time which is intended for the economic interests of the community. Sasi can also be interpreted as a prohibition on taking and destroying certain natural resources within a certain period of time to preserve natural resources (Kusumadinata, 2015). In practice, there are two important terms in sasi, namely opening sasi and closing sasi. Opening sasi is done when the community is allowed to harvest or take a resource that is being sasi, while closing sasi is when the resource is prohibited from being harvested and will be protected again by sasi law (Etlegar, 2013). Sasi has been passed down from generation to generation based on stories

from parents and there are no written rules. Sasi is defined as a prohibition on taking certain natural resources as a conservation effort to maintain the quality and population of these natural resources. This prohibition also concerns the regulation of human relations with nature and between humans and the areas subject to the prohibition. Sasi has been in existence since the 1950 until now. The opening and closing of the sasi is carried out according to custom and is led by the landlord, who for generations has been the owner of the petuanan in the village or village (Lewerissa *et al*., 2023).

The implementation of sasi usually begins with notification to each village about the closing and opening times of the sasi, then it is announced so that the community gathers to listen to the sasi instructions, then traditional leaders gather in the village with the community to take part in the traditional sasi closing ceremony, then before carrying out the traditional prayer procession, The traditional leader took a white plate containing betel, areca nut, tobacco, coins, and symbolized by woven coconut leaves, then the first prayer was offered to God, because God created this world and to the ancestors who created customary law, because this law regulates sasi and all customary sanctions. The closing time for sasi is marked by an announcement from traditional leaders that if sasi has been established, it is prohibited to take marine products in this area, so that anyone who intentionally or unintentionally takes them will be subject to fines or sanctions as determined. Sasi closing is when the harvest has ended according to the specified time. Closing sasi is intended to encourage people to stop their activities in the sasi area because it disturbs the existence of sea cucumbers. Sasi caps can be said to be a form of maintenance for sea cucumbers until they reach a certain size and are ready to be harvested. During the sasi closing period, all communities continue to monitor all fishing activities that take place in the sasi area (Lewerissa *et al*., 2023).

The community has been exploiting sand sea cucumbers for a long time, but there is no scientific information regarding the existence of sasi, which is local wisdom as a traditional form of conservation. Lewerissa *et al*., (2023), Community based fisheries resource management carried out by the Government with program assistance mechanisms and monitoring of resource management developments, especially during the sasi egek opening period, requires a limit on the body length of sea cucumber biota that may be taken. Apart from that, it is necessary to continuously record sea cucumber data such as body length, weight, type and quantity as well as economic value so that it can be used as evaluation material in the next sasi egek opening period.

Community based fisheries resource management which is supported by the Government by providing recognition of the existence and rights to manage resources has shown that there is good management collaboration so that community-based resource management can be sustainable and have an impact on maintaining the sustainability and sustainability of resource diversity, especially sea cucumber fisheries, so that it continues to provide benefits to the community (Arafat *et al*., 2022).

The success of resource management, especially fisheries resources, by the community is due to having a good management system which is seen from the elements, including having clear management boundaries, having rules and sanctions, carrying out monitoring/supervision, having utilization rights and management authority so that it runs effectively. This has a positive impact on the condition of sea cucumber fisheries resources which shows good stock status in terms of population density, species diversity and body size distribution that is suitable for harvest.

Dewi (2018) and Anna (2018) stated that many coastal communities carry out sustainable resource

p-ISSN 2550-1232
e-ISSN 2550-0929

management activities based on local cultural values and prevent activities that have the potential to cause damage to coastal areas. Management by the community in Malaumkarta Village has fulfilled the elements of good management, is having clear management boundaries, there are rules and sanctions, monitoring and evaluation are carried out and there are management rights and governing institutions (Arafat *et al*., 2022).

Important Economic Value of Sea Cucumber

The Holothuria scabra sea cucumber or better known as the sand sea cucumber is a type of sea cucumber that has important economic value, this type of sea cucumber is often caught in nature to meet market demand. Sea cucumbers are marine biota that have important economic value in trade because they are widely used as food ingredients with quite high protein levels and are also used as medicines (Aziz, 1987), sand sea cucumbers (Holothuria scabra) are also widely used as functional food ingredients, medicines and cosmetics because they contain high quality nutrients and active compounds (Purcell, 2014).

According to Lewerissa *et al*., (2023), the price of sea cucumbers varies greatly based on type and size so that they are divided into large, medium and small categories, where determining the size category is based on the size or number of individuals that reach a weight of one kilogram dry. Although prices vary based on size, Holothuria scabra is the type that has the highest selling value with a price range of IDR 1,700,000-1,800,000;, for large sizes, medium sizes with a price range of IDR 1,200,000-1,500,000;, and sizes small ones which are usually called peanut-peanut sea cucumbers, is small beans have a price of IDR 400,000; and large nuts have a price of IDR 800,000;. The selling price of sea cucumbers in 2018 is higher compared to 2008, which was around Rp. 500,000-Rp. 750,000 (Lewerissa, 2017).

According to Pattinasarany & Manuputty (2018), there are 11 types of sea cucumbers that have important economic value and have been traded nationally and internationally, including Actinopyga echinites (1), A. lecanora (2), A.miliaris (3), Bohadschia marmorata (4), B. vitiensis (5), Holothuria atra (6), H. coluber (7), H. lessoni (8), H. scabra (9), Stichopuschloronotus (10), and S. horrens (11).

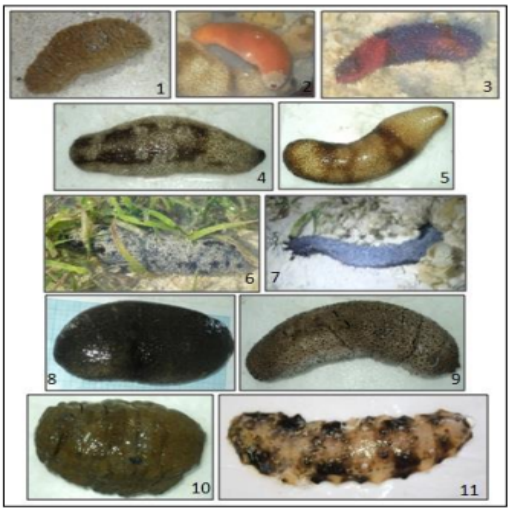

Figure 2. 11 Types of Sea Cucumbers that have Important Economic Value (Pattinasarany & Manuputty, 2018).

The main export markets for sand sea cucumbers (Holothuria scabra) internationally are the United Arab Emirates, China and Singapore. The selling price of sand sea cucumbers in Vietnam ranges from USD 33-47 per kg dry and USD 42-88 per kg dry in the Philippines. In New Caledonia, the price of dried sand sea cucumbers ranges from USD 60-110 per kg. In Guangzhou it ranges from USD 108-200 per kg dry. Mean while, selling prices in the Hong Kong retail market range from USD 115-1,668 per kg (Pattinasarany & Manuputty, 2018).

CONCLUSION

Based on this research, it can be concluded that 12 individual sea cucumbers were found from the total of all identified species. The most common type of sea cucumber is *Holothuria nobilis* is as many as 9 individuals. The total relative density of sea cucumbers as a whole was obtained at 0.024 ind/m^2 or 24 ind/ha. The community collects sea cucumbers from sasi egek and markets them to Sorong city. Profits from selling sea cucumbers range from 80-100 million rupiah. Management of sea cucumber resources during the sasi egek opening period has been going well, but it is necessary to set limits on the length of sea cucumber biota that can be harvested, it is necessary to continuously record sea cucumber data regarding the length and weight of sea cucumbers, data on types and quantities and selling prices sea cucumbers per type.

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