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The sea cucumber fishery in Palawan, Philippines

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Introduction

Sea cucumbers are among the commonly harvested marine invertebrates in coastal areas of Palawan, Philippines. Its fishery is generally small scale but is a valuable source of livelihood among coastal dwellers (Schoppe 2000). Sea cucumbers are locally called *balat* or *balatan* and are primarily traded as *trepang, beche-de-mer* or *hai-shen* - terms for dried sea cucumbers (Akamine 2005). *Trepang* is mainly consumed as food and as ingredient of various health and wellness products (Bordbar et al. 2011).

Over the years, the demand for sea cucumbers in the world market has been increasing and such fueled the massive exploitation of this resource across the globe including the Philippines (Uthicke 2004; Conand 2006; Purcell 2010; Pakoa and Bertram 2013; Conand et al. 2014). Despite being artisanal in nature, *trepang* is the ninth major fishery export of the Philippines and about 20% of landings come from Palawan (DA-BFAR 2014; Brown et al. 2010). However, the natural population of sea cucumbers in Palawan is threatened by overharvesting due to lack of regulations. Assessments in commonly gleaned areas revealed low population estimates of sea cucumbers. Gatherers also perceived that their catch at present is only a small portion of what they used to collect in the past. Statistics likewise showed that the country's *trepang* production is a "boom and bust" type (Choo 2008). After its peak in 1985 with exports reaching 3,500 MT, the country's production showed a declining trend (Akamine 2005).

Given the importance of sea cucumber fishery in supporting the livelihood of coastal communities, it is imperative to manage and make this fishery sustainable. This paper presents the nature of sea cucumber fishery in Palawan, Philippines with information on gathering practices, commonly traded species and secondary accounts on wild populations. Current issues on sea cucumber fishery are also presented here along with recommended doable management measures.

Nature of Sea cucumber fishery

The sea cucumber fishery in Palawan is mainly artisanal and catch are processed into *trepang* for commercial export. Sea cucumbers are seldom consumed by local residents and are not considered as staple food, although a few other local consumers eat the products raw or pickled.

Gathering of sea cucumbers is commonly performed in shallow seagrass beds, reef flats and coral reefs through handpicking and skin diving. Handpicking is done mainly by women and children in shallow seagrass beds and reef flats, while skin diving is employed solely by men in coral reefs. Gathering is a year-round activity but its peak is between March and June. During these months, spring tide occurs in the afternoon and fishers go in fleet to gather sea cucumbers. They have observed that sea cucumbers particularly the *Stichopus* species crawl out of reef crevices at night, thus they prefer to gather when low tide occurs at night. Late March until early June is also the school break of children, allowing them to help their mothers handpick sea cucumbers and other marine resources.

Most of the gatherers sell their catch to processors who are also middlemen. Upon delivery, the processor grades the catch according to species, size and freshness. *Stichopus* species are processed first as they tend to melt when exposed on air, while other species are soaked in water and processed later. Processing is traditional and involves several steps from grading and sorting, gutting, cooking or boiling, smoking and sun drying (Figure 1). Cooking time varies according to species. *Stichopus* species are boiled under medium fire for

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about 2 hours with frequent stirring, for too much heat may cause their body to burst. Other species like *Actinopyga, Bohadschia*, *Holothuria* and *Pearsonothuria* are cooked altogether for a relatively longer time, sometimes up to 4 hours. After cooking, sea cucumbers are placed in an improvised smoking chamber for 2 to 3 days until the body is almost dry. And to achieve the "stone-dry" quality, sea cucumbers are further dried under the sun for 3 to 5 days until the desired quality is achieved.

At least 36 species under Family Holothuriidae, Stichopodidae and Phyllophoridae are regularly harvested and processed into *trepang* in Palawan (Table 1). The prices vary largely among species, size and quality of the dried products. Among the high-valued species are *Holothuria fuscogilva, H. scabra, H. whitmaei, Stichopus* species and *Thelenota* species, which are sold up to about US$ 106 kl^{-1}. The buying price of all species had tremendously increased by almost 400% compared to the price reported by Schoppe (2000) and Akamine (2005). For example a kilo of *H. scabra*, which was sold at US$ 25 in 2000, increased to US$ 40 in 2005 and is now being sold at US$ 112. Additional species such as the *Neocucumis proteus* or *bola-bola* and another species identified only by its local name "*yellow beauty*" were added to the list of exploited sea cucumbers for *trepang* production in Palawan.

Figure 2 shows the province's sea cucumber production compared with the country's total production. Overall, the country's production showed a downward trend from 1,300

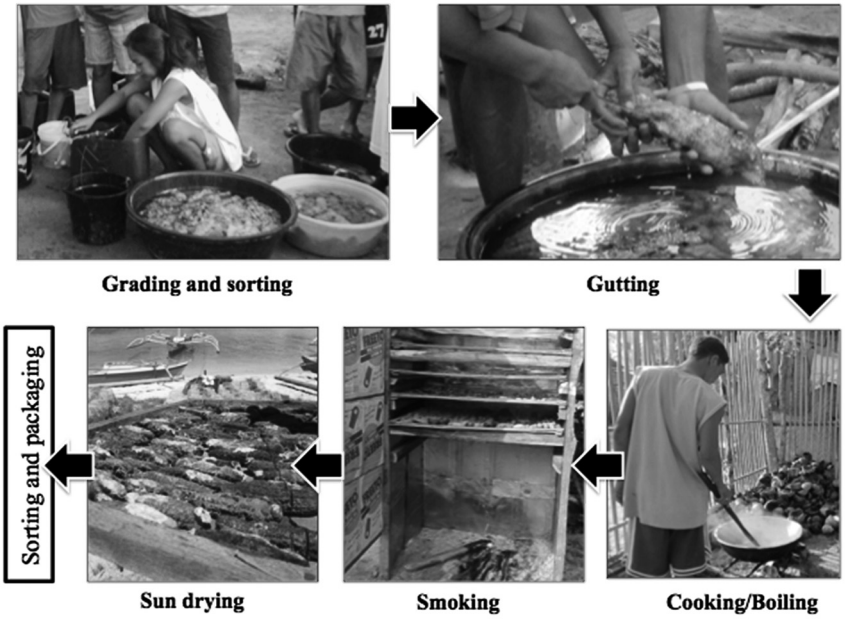

Fig. 1. Steps in processing the sea cucumbers into *trepang*.

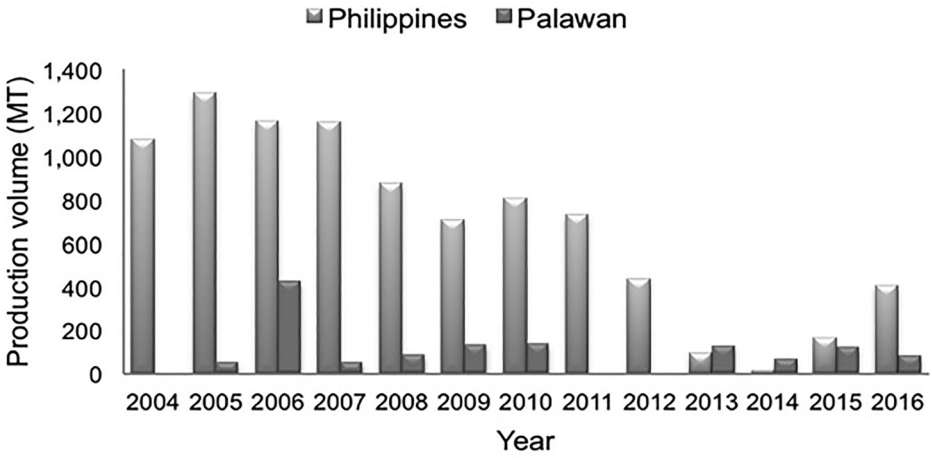

Fig. 2. Production volume (MT) of dried sea cucumbers in the Philippines (blue bars) and in Palawan Province (red bars) (Sources: PSA website www.psa.gov.ph, data from Bureau of Fisheries and Aquatic Resources-Palawan Provincial Office (BFAR-PFO unpub., and Caabay 2018).

Table 1. Buying price for *trepang* by traders in Puerto Princesa City, Palawan, Philippines.

Scientific Name	Local name	Price per kl (USD)							
		Reject	XXS	XS	S	M	L	XL	All Sizes
Order Aspidochirotida Family Holothuriidae									
1.Actinopyga echinites	Khaki/Hudhod	0.93	11.19	16.78	26.10	37.29	42.89		
2.Actinopyga lecanora	Boli/Munang/Monang	7.46		18.65	46.61	55.94	65.26		
3.Actinopyga mauritiana(?)	Bacungan	18.65		37.29	55.94	74.58	83.91		
4.Actinopyga sp.	Choco brown	0.75			7.46		16.78		
5.Bohadschia argus	Matang-itik	0.93			11.19	22.37	37.29		
6.Bohadschia marmorata	Lawayan/Tadek/Tagukan/hangad-langit	0.93			3.73	16.78	25.17		
7.Bohadschia ocellata[1]	Leopard				18.65		37.29		
8.Bohadschia vitiensis	Lawayan-taba				18.65		37.29		
9.Holothuria atra	Balat-uwak,Blackbeauty	0.56			3.73		6.53		
10.Holothuria cavans[1]									
11.Holothuria coluber	Black powder								3.73
12.Holothuria edulis	Hotdog,lipstikan	0.93			10.26		18.65		
13.Holothuria flavomaculata[2]									
14.Holothuria fuscocinerea	Labuyo	0.56			5.59		18.65		
15.Holothuria fuscogilva	Susuan				37.29	65.26	93.23	121.20	
16.Holothuria fuscopunctata	Sapatos								6.15
17.Holothuria hilla1									
18.Holothuria leucospilota	Patola								18.65
19.Holothuria notabilis[1]									
20.Holothuria pervicax[1]									
21.Holothuria scabra	Kurtido/kiskisan/putian	18.65		37.29	46.61	83.91	93.23	111.87	
22.Holothuria whitmaei[1]	Susuan	18.65		37.29	46.61	83.91	93.23	102.55	
23.Pearsonothuria graeffei	Flower/mani-mani								13.05
FamilyStichopodidae									
24.Stichopus sp..*(black)*[2]	Hanginan						55.94		
25.Stichopus chloronotus	Tres cantos						55.94		
26.Stichopus herrmanni	Hanginan						55.94		
27.Stichopus horrens	Hanginan			22.37	37.29	46.61	74.58	83.91	
28.Stichopus monotuberculatus	Hanginan			22.37	37.29	46.61	74.58	83.91	
29.Stichopus noctivagus[1]	Hanginan			22.37	37.29	46.61	74.58	83.91	
30.Stichopus quadrifasciatus[1]	Hanginan			22.37	37.29	46.61	74.58	83.91	
31.Stichopus rubermaculosus	Hanginan			22.37	37.29	46.61	74.58	83.91	
32.Stichopus vastus	Hanginan						55.94		
33.Thelenota ananas	Talipan	4.66			27.97	46.61	65.26	74.58	
34.Thelenota anax	Legs				7.46	17.71			
35.Thelenota rubralineata[2]	Hanginan/Pinya-pinya				18.65			65.26	
Order Dendrochirotida Family Phyllophoridae									
36.Neocucumis proteus[3]	Bola-bola				65.26	83.91	93.23		
37.Unidentifiedsp.3[3]	Yellowbeauty				24.24		37.29		

[1] Jontila et al. 2014; [2] Jontila et al. 2017, unpub; [3] Caabay 2018

1 USD = PhP 53.6314

MT in 2005 to barely 10 MT in 2014. There must have been some inconsistencies on the province's recorded production in 2013 and 2014 as values were higher than those of the country' s production. Also, there were no records of sea cucumber production in Palawan in 2004, 2011 and 2012. The illegally traded products were also unaccounted particularly in the southern part of the province. According to gatherers in Quezon, Palawan, a trader from Malaysia visits their area and other municipalities in the south aboard a boat twice a year to buy live sandfish (*Holothuria scabra*) and dried sea cucumber products. Gatherers have begun to establish pens where sandfish that they collected from the wild are held and reserved for said buyer. Clearly, production of fresh or live sea cucumbers are not yet accounted by the government as there were no records of such in the statistics.

Information on wild populations

Assessments of sea cucumber in the wild showed low population estimates particularly in areas where collection is rampant. For example, sea cucumber populations in the municipalities of Bataraza, Quezon and Roxas were recorded to be 25 to 40 ind.ha^{-1} only even if these areas are the known producers of *trepang* in the province. Other sites like Arrecife Island, Brooke's Pt., Rasa Island in Narra, and El Nido had higher estimates (about 133 and 235 ind.ha^{-1}) since collection in these sites are either restricted or limited (Jontila et al. 2012, Pitong 2013, Dolorosa et al. 2017). Other sites in the country that are open to exploitation also had low sea cucumber populations, like Bolinao and Anda in Pangasinan with densities between 0.3 to 9 ind.ha^{-1} only (Olavides et al. 2010).

Most of the productive sites in the province are the island communities and reefs away from the shore. The traditional gleaning sites like seagrass beds in Johnson Island and Green Island in Roxas, Palawan were almost devoid of commercially important sea cucumbers (Jontila et al. unpub). Compared with coral reefs and reef flats, sea cucumbers in seagrass beds are the most prone to depletion for they are very accessible to gatherers.

Management initiatives and challenges

To date, the only legal instrument that regulates sea cucumber harvest and trade is the Administrative Circular (AC) No. 248 which was issued by the Bureau of Fisheries and Aquatic Resources (BFAR) in 2013. AC 248 imposes a minimum size limit of 5 cm on traded dried sea cucumbers. It also requires gatherers to secure wildlife collectors' permit. Traders are required to secure a transport permit. To date however, no study reviewed the effectivity of this regulation.

Since the sea cucumber fishery forms a vital source of livelihood among marginal fishers, the Palawan Council for Sustainable Development Staff (PCSDS) facilitated a review of the current status of its fishery in the province. Based on the results, some doable management measures were presented to the Scientific Advisory Panel (SAP) of the Palawan Council for Sustainable Development (PCSD) for adoption. Among the recommendations given include adoption of size limit on dried products, a ban on the gathering of endangered sea cucumbers, establishment of closed season or rotational closure and reserves, establishment of monitoring system for production and trade, licensing and registration systems for gatherers and traders. The conduct of information campaigns among coastal communities particularly the gatherers on the economic and ecological importance of sea cucumbers is also recommended.

The establishment of a hatchery for selected species (e.g sandfish *Holothuria scabra*) may also be considered to produce juveniles for grow-out culture using a low cost, ocean-based nursery system technology. Sea ranching has been proven successful in producing export grade *trepang* and in enhancing the natural stocks of nearby sites as demonstrated by the University of the Philippines - Marine Science Institute (UPMSI) in Bolinao, Pangasinan. With available juveniles, re-stocking can be done in depleted seagrass beds in order to revive the population. However, caution must be taken so as not to mix the stocks and conserve the genetic diversity of local populations.

At present, gathering of sea cucumbers remains open and unregulated. But with the institutionalization of the proposed management measures and cooperation of Local Government Units (LGUs), it is hope that sea cucumber fishery will be managed and sustained.

Conclusion

This paper presents the nature and status of the sea cucumber fishery in Palawan, Philippines. The fishery is artisanal in nature, collection methods are labor-intensive, and processing is traditional. Fishery records suggest that sea cucumber production in the country has been decreasing. In contrast, trading prices of the resource had increased several folds which could further put pressure on the resource. It is also apparent that existing legal and management measures to protect and manage the sea cucumber resources in the country need to be reviewed.

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