Market value of flower teatfish ("pentard"): A highly exploited Indian Ocean holothuroid

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Abstract

The large sea cucumber *Holothuria* sp. (type "pentard") is exploited extensively throughout the western Indian Ocean, yet little information exists on its market value at the distal end of the value chain. We collected data on prices and sizes of this species from 15 lots in 14 shops in Hong Kong and Guangzhou, China. This species was relatively common in the marketplace. Market values ranged from USD 44–273 kg^{-1} dried. Weight-to-length ratios were lower for pentard than white teatfish (*H. fuscogilva*), but only marginally so. Prices per piece increased dramatically as a function of product length, but the relationship was weak for price per kg. This market study verifies that pentard is highly valuable in Asian markets, and therefore is likely to be at high risk of overexploitation. Our results show that fishery income from harvests of pentard could be considerably higher in the long run by regulating catches to large-sized animals, using minimum legal size limits.

Introduction

Flower teatfish (*Holothuria* sp., type "pentard"), locally known as *pauni chui* in Zanzibar (FAO 2013) and *preema bathik attaya* in Sri Lanka (Dissanayake et al. 2010), is a large holothuroid apparently in the teatfish complex of species, in the subgenus *Microthele*. This putative species is still under taxonomic investigation (Muthiga and Conand 2014), and further studies are required to determine if it is a separate species or simply a variant of another teatfish species (*H. nobilis* or *H. fuscogilva*) (Conand 2008). Herewith called "pentard", as it is known in Seychelles, this animal is dark brown on the dorsal surface with mottled and irregular-shaped cream-coloured blotches with prominent teats on the lateral margins of the body (Conand 2008; Purcell et al. 2012). In contrast, the Indian Ocean black teatfish, *H. nobilis,* is black on the dorsal surface with white blotches and spots on the lower sides of the animal and around the teats, and white teatfish *H. fuscogilva* has a varied colour pattern, but is mostly whitish or beige with brown or grey blotches (Purcell et al. 2012). Pentard commonly inhabits sandy-bottom lagoon habitats at depths of 10–50 m (Conand 2008).

Pentard is reported to have a sparse distribution in the western Indian Ocean (Conand 2008), being reported from Seychelles, Comores Islands, Tanzania and Sri Lanka (Aumeeruddy and Conand 2007; Conand 2008; Dissanayake et al. 2010; Eriksson et al. 2010; FAO 2013; Muthiga and Conand 2014). This species is a sought-after target species in western Indian Ocean fisheries due to its high market price (Conand 2008; Eriksson et al. 2010; FAO 2013; Muthiga and Conand 2014), and is one of the main harvested species in Seychelles (Aumeeruddy and Conand 2007, 2008). The price offered to fishers can be similar to that of *Holothuria nobilis* and *H. fuscogilva* (Eriksson et al. 2010). In Seychelles, export prices in 2008 were USD 17–26 kg^{-1} (Aumeeruddy and Conand 2007). In some fisheries, pentard is collected by scuba diving, which could be a driving factor causing the depletion of this resource, along with its high value, poor knowledge about this species, and inadequate monitoring and enforcement of fishery regulations (Conand and Muthiga 2007).

In its dried form, pentard can be distinguished from white teatfish (*Holothuria fuscogilva*) by the numerous white spots and small blotches on a grey background (Fig. 1) (Aumeeruddy and Conand 2007). In contrast, dried white teatfish are mostly whitish in colour or whitish with some dark tan-grey spots. Dried pentard also have a more flattened body shape (see Fig. 1) when compared with white teatfish.

This study is the first published record of the value of pentard in key market hubs in China for internationally traded beche-de-mer. We aimed to determine whether market price varied as a function of the size of the products. The findings are instructive for fishers, traders and fishery managers.

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Figure 1. Dried pentard on sale in a) Hong Kong, and b) Guangzhou.

Methods

Data on market prices of pentard were collected at 14 stores in the dry seafood market in Sheung Wan district, Hong Kong and Yide Lu markets, Guangzhou, China similar to data collection methods by Purcell (2014). Access to the products in stores and language interpretation were facilitated by a Chinese member of the Australian Centre for International Agricultural Research. At the Hong Kong market, the unit weight was *catty* (604.79 g), whereas unit weight of products in Guangzhou was *jin* (500 g).[5] Prices were later converted from HKD and CNY to USD using international exchange rates at the date of sale. Stores in Guangzhou sold mainly in wholesale volumes, whereas stores in Hong Kong sold in retail volumes. Within stores, we selected one or two lots of dried sea cucumbers, which were in tubs, jars or large bags (Fig. 1). From each lot, four randomly sampled specimens were measured: specimen length to ±0.5 cm along the ventral surface with a ruler, and weight to ±1 g using an electronic balance.

The average product (body) lengths and weights of the four subsamples from each lot were used as the data for analyses. Linear regression was used to examine the relationship between average product length and price per unit weight or price per specimen. A two-tailed t-test was used to test for differences in the weight:length ratio between pentard and white teatfish (*H. fuscogilva*).

[5] *Catty* and *jin* are units of measurement in China.

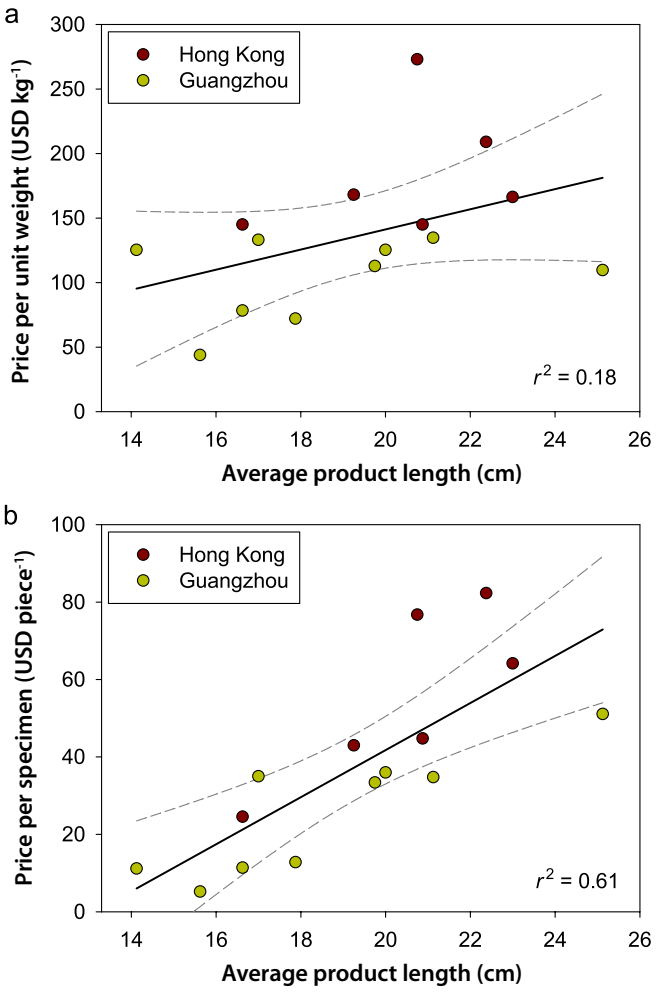

Figure 2. Scatterplots of a) average product length vs price per kilogram, and b) average product length vs price per piece. Data points are average product lengths from four subsampled specimens from lots within stores, and the corresponding prices of those lots. For b), price per piece is calculated from average product weight of the subsamples. Solid lines are the linear regressions; dashed lines represent the 95% confidence interval.

Results and discussion

Average lengths of dried pentard ranged from 14.1–25.1 cm among lots sampled, corresponding to average product weights of 89–466 g. The weight(g):length(cm) ratio for pentard was 12.9 ±0.5 s.e. (n = 60). By comparison, teatfish were heavier for their length, with the weight(g):length(cm) ratio averaging 14.1±0.3 (n = 289), but the ratios were marginally non-significantly different between the two species (t = 1.74, p = 0.082).

The market price for pentard ranged from USD 44–273 kg^{-1}. The average price for lots that we sampled was USD 136 kg^{-1}. As found previously for other species, prices tended to be higher in Hong Kong, which is more of a retail market (Purcell 2014).

Prices per unit weight increased somewhat with size of the specimens (Fig. 2a), but this trend was weak and statistically non-significant (p = 0.12). In contrast, the relationship between product length and price per specimen was stronger (p < 0.001), with length accounting for 61% of the variation in price per piece among samples (Fig. 2b). The relationship predicts that dried products of 14–16 cm will yield market prices of USD 5–17 per piece, whereas dried products of 22–24 cm will yield market prices of USD 54–66 per piece. The higher price range is due to the multiplicative effect of product weight.

Considering that dried pentard are 60–63% of the length of corresponding live animals (Aumeeruddy and Conand 2007), our study suggests that fresh animals of 23–26 cm will sell (in Chinese markets) for just USD 5–17 per piece when dried, whereas fresh animals of 36–39 cm can eventually command market prices of USD 54–66 per piece. This finding gives a strong reason for imposing minimum size limits for pentard in Indian Ocean fisheries, e.g. 30 cm fresh, 20 cm dried. The income from the fishery is likely to be significantly greater by protecting the animals from fishing until they are of a large size (assuming low natural mortality). Pentard was one of the exploited species unable to be assessed by the International Union for Conservation of Nature because it was "known only by common names and not yet described taxonomically" (Conand et al. 2014). In addition to resolving the taxonomic identity of pentard, resource management needs research on rates of growth and natural mortality to further winform decisions about appropriate minimum size limits.

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