

Impacts of harvesting and post-harvesting processing methods on the quality and value of beche-de-mer in Fiji Islands

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Abstract

At least 18 commercial species of beche-de-mer are harvested in Fiji. The main target species are *Holothuria fuscogilva*, *H. whitmaei* and *H. scabra*, although *H. scabra* is currently banned from export in Fiji. This study examined the impacts of processing methods on the quality and value of beche-de-mer in Fiji Islands. The findings revealed that poor processing methods contributed significantly to the loss in value of dry beche-de-mer product. The knowledge and poor understanding of processing techniques by fishermen is a key factor linked to this loss in value. First boiling after harvest, improper cutting and/or gutting, smoke curing and harvesting of undersized species were identified as the main problem areas in processing leading to revenue losses. *H. fuscogilva*, *Stichopus herrmanni* and *S. chloronotus* were found to be the more difficult species to handle during post-capture and processing. Poor quality products traded by fishermen resulted in fishermen receiving 20–30% less than the maximum price offered for well-processed products. Knowledge of the reproductive biology of commercial sea cucumber species and their effective management is essential for future sustainability of beche-de-mer production in Fiji Islands.

Introduction

The beche-de-mer fishery is an important source of income for coastal communities in the Pacific (Polon 2001). In Fiji, the beche-de-mer fishery and its trade began when the sandalwood trade declined (Ward 1972). Sea cucumbers are generally consumed by Asian communities, as a delicacy and for their medicinal properties, and the dried form is called beche-de-mer (*iriko* in Japanese, *hai-som* in Chinese or *trepan* in Indonesian) (Bumrasarinpai 2006; Lo 2004).

From a total of 1,200 species known today, approximately 24–35 species are commercially exploited (Jun 2002; McElroy 1990; Conand 1989; Nair 2003). Of these exploited species, Asian markets target species from the genera *Holothuria* (Jun 2002), *Actinopyga*, *Bohadschia*, *Stichopus* and *Thelenota*. Holothurian species such as *H. scabra* (sandfish), *H. fuscogilva* (white teatfish) and *H. whitmaei* (black teatfish) are among the highest value species (Holland 1994), demanding high prices in Asian markets. Well-dried product of “A” grade receives a value of USD 70–190 per kilogram, depending on size and quality (McCormack 2005).

Beche-de-mer processing entails an uncomplicated sequence of actions to turn wet live sea cucumbers into a dry non-perishable commodity. Post-harvest steps incorporate a first boiling, slitting and gutting, second boiling, smoking, and ultimately sun drying (SPC 1994; Sachithananthan et al. 1985; Seeto 1994). Although these steps are uncomplicated, they require continuous attention to obtain a standard dry product that has a good shape, texture and form. If the steps are not properly followed, the ultimate grade of the product will be negatively affected, thus significantly lowering the value of the final product (SPC 1994).

Studies carried out in the Verata region of Fiji Islands revealed that there was a need for enhanced beche-de-mer processing techniques (Chamberlain 2002). Chinese marine product agents purchasing products from this part of Fiji expressed a desire for improving beche-de-mer processing techniques in this and other areas of Fiji because considerable value was lost through merchandising substandard product. Correspondingly, findings by (Jun 2002) in the Philippines revealed that products that were wet, ill-shaped or half cooked subsequent to

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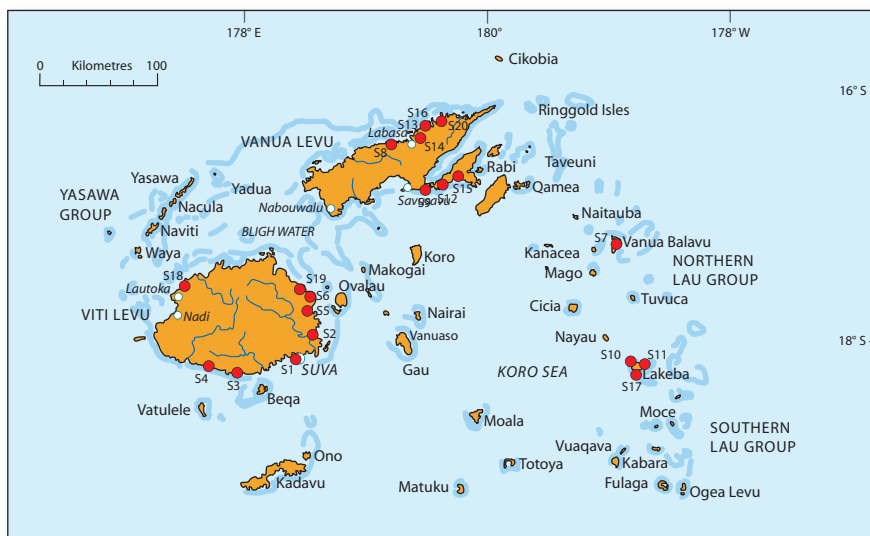


Figure 1. Sites visited in Fiji for data collection.

processing were rejected or considered to be class “B” thus earning local fishers 40% of the maximum price offered by marine product agents for a well-processed product.

Materials and methods

Study site

The study was conducted in Fiji Islands (Fig. 1) between August 2006 and July 2007.

Twenty-one sites were chosen from eastern and western Viti Levu, northern and southern Vanua Levu and two islands from the outer Lau group (Vanua Balavu and Lakeba Island). These two islands have two main buyers who are engaged in buying products from other islands in the Lau group. Therefore, data from the two islands represent the data for the Lau Group. Catch analysis and interviews with fishers was done at the time when the fishers visited the marine product agents on the two islands to sell their products, either in raw or dry form. However, the fishers based on the main islands of Fiji were visited directly in their villages, and data on harvesting and processing were collected.

Data collection

Data pertaining to Fiji’s sea cucumber fishery was gathered through library and internet research, while information on key issues such as processing was acquired through formal and informal interviews and questionnaires given to fishermen at various sites ($n = 21$) around Fiji, the fisheries officers at

the Ministry of Fisheries and Forests, and the main exporters of beche-de-mer. Data that were gathered from fishers and marine product agents included the following:

- Location of harvest
- Number of hours fished
- Time and/or season of harvest
- Species commonly harvested
- Storage method in the sea
- Sea cucumber processing methods
- Difficult steps in processing
- Species that are difficult to process or handle

Questionnaires were prepared and given to the target population. The key population targeted for interviews and catch analysis were artisanal beche-de-mer fishermen ($n = 86$), middlemen ($n = 8$) and the main exporters of beche-de-mer ($n = 5$), but for study purposes, only one exporter (Star Dragon Co Ltd located in Suva, Fiji) was involved in the entire study. An identification card and sea cucumber pictures were shown to fishers and buyers during data collection for sea cucumber identification.

Results and discussion

Beche-de-mer is produced through a series of steps that convert perishable sea cucumbers into a dried product. These steps include a first boiling, cutting and gutting, salting, a second boiling, smoke drying, a third boiling, and finally sun drying. Fishers use an alternative and shorter processing method in order to gain income more quickly, but skip fundamental steps that are crucial to producing a good

quality beche-de-mer product. Fishers reported that *Stichopus herrmanni* (curryfish), *S. chloronotus* (greenfish) and *H. fuscogilva* (white teatfish) were some of the more difficult species to process. Maintaining the quality of the high-value *H. fuscogilva* was particularly a problem, and *S. herrmanni* and *S. chloronotus* were also difficult to process due to their fragile skin and flesh. During the first boiling, the flesh of these two species disintegrates. Fishers, therefore, have minimised the collection of greenfish and curryfish. Skipping important processing steps has also affected the quality (Fig. 2) as well as the value of the dried products on the international markets. Problems with poorly processed beche-de-mer include:

- Undersized individuals belonging to all species.
- Products not cut and gutted properly (i.e. gut contents are still intact with dried product).
- Products when dried do not have proper cylindrical shape and appearance is a major grade determiner.
- Burned products.
- Products are contaminated with sand and dust when packed at the marine product agents' warehouse.

Our findings revealed that greater percentages of products belonging to low to medium value species (e.g. brown sandfish, curryfish, amberfish, tigerfish, lollyfish and deepwater redfish) had quality issues due to inappropriate processing. Inappropriate post-harvest handling techniques resulted in 10–45% loss in value for all species processed. The percentages varied in different parts of Fiji Islands depending on the processing technique used. One of the major causes of value loss was that fishers skipped fundamental processing steps (e.g. first boiling, cutting and gutting, and drying).

High-value species that can potentially bring more revenue into the country are actually being valued less due to their low quality, and so are ranked as grade B instead of grade A by international markets. The price obtained by marine product agents in Fiji also affects the price distributed to local beche-de-mer fishers. There is often a difference of 10–20% on the product price received internationally, and 20–30% of the maximum price by the fishers.

Conclusion

Beche-de-mer harvesting and processing in Fiji Islands will continue to face quality problems unless beche-de-mer legislations are properly enforced. In order to make money quickly, fishers speed up processing and skip essential steps, thus affecting the quality and value of the final product. Fishers find both smoke drying and first boiling to be difficult processing steps that eventually result in poor quality products being produced from Fiji Islands.

These poor processing methods also resulted in a final product with a poor appearance (i.e. distorted or twisted), and one that contained particulate matter (i.e. sand was present in the gut cavities) and was spoiled due to improper storage. This reduced the grade of the product from "A" grade to "B", "C" or "D" grade. Further research needs to be done on the impacts of processing methods on beche-de-mer quality in Fiji Islands.

Ways to add value to beche-de-mer products exported from Fiji Islands should be investigated. The reduced grade in the final product has also prompted immediate awareness by and education for fishermen to improve processing methods and quality of beche-de-mer in Fiji Islands.



Figure 2. Poorly processed sea cucumbers for export from Fiji Islands.

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