

Improving the livelihoods of *moci* fishers by training them in seafood safety and best handling practices

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Fiji's Ministry of Fisheries and Forestry is working to support and empower women fishers involved in the moci (mangrove shrimp) fishery by enhancing their skills and knowledge on food safety and safe handling practices. This in turn, will lead to the improved quality of moci sold in local markets.

Background

The mangrove shrimp (*Palaemon concinnus*) – known as *moci* – is a brackish water species that is an important source of protein and a local delicacy for people living in Fiji's Rewa Province. When *moci* is wrapped inside *dalo* (taro) leaves it is referred to as *rourou vakautona*, a traditional food served to the chiefly household in Rewa Province.

Fiji's Ministry of Fisheries and Forestry conducted a market survey in the country's Central Division (Suva and Nausori markets) in October 2020 to get baseline data on women fishers who sell *moci*, and to better understand the challenges they face as sellers in local markets. The study found that *moci* is harvested predominantly by women fishers. During low tide, women use handnets and other small nets to collect *moci* from tidal pools or channels in mangrove and estuarine areas. Potato sacks and the Indian *saree*² are also used by some women to catch *moci*. *Moci* sells for FJD 5.00–10.00 a heap, and women typically sell 10–20 heaps at municipal markets on Saturdays (Ministry of Fisheries and Forestry, unpublished data). Two women traders from Rewa Province buy *moci* from harvesters and then sell the shrimp to restaurants (e.g. Tiko Seafood) and visitors from New Zealand and Australia.

One of the main issues raised by fishers was that hot weather causes *moci* to change, from grey to red, which reduces its market value. The women had no access to refrigeration to help preserve the freshness of their product, and most women simply placed the *moci* on large *drau ni via* leaves, which are laid down on the hot concrete.

The Ministry of Fisheries and Forestry conducted a workshop in March 2022 in Vunuku Village to address some of the issues raised by *moci* fishers during baseline surveys. The workshop brought together women *moci* fishers from four districts: Vutia, Dreketi, Rewa and Burebasaga. In total, 10 villages from these four districts participated in a two-day workshop.

The topics covered were fisheries management and licensing, post-harvesting methods, maintaining the cold chain, and food safety. Fishers shared information on storage, transportation and marketing strategies, as well as their weekly expenses and income from selling *moci*.

Mapping the fishery



Figure 1. *Moci* harvesting sites in Dreketi District.

A habitat mapping exercise was carried out with the fishers to get an overview of their main harvesting areas, their preferred fishing gear and methods (Fig. 1), and how *moci* is stored on site to ensure its freshness and to maintain food safety standards. Fishers generally prefer to fish in small creeks and waterways in mangrove areas, especially those closest to the village. They also prefer not to harvest from the same location every month. Instead, they rotate their harvesting sites to allow *moci* to grow and reproduce. According to one of the harvesters, *moci* spawn every month and prefer a clean environment (Amelia Liku, *moci* fisher, pers. comm.).

Fishers usually visit mangrove areas, especially during low tide, to set their nets for *moci*. This activity, however, is not restricted by the tides. The fishers continue to set their nets

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² A *saree* is a piece of (often) brightly coloured cloth, about five to seven yards long, that Indian women wear.

as long as they are getting a good catch or once they have met the target for the market, which is about 5 kg of fresh *moci* per day. On average, a *moci* fisher spends about three hours (except on weekends) at their harvesting site. Once caught, the *moci* are rinsed twice with sea water to ensure all mud and debris are removed. The *moci* are then packed in fine-mesh shopping bags that help to drain any excess water to ensure that freshness is maintained. Fishers use various methods to harvest *moci*; some women use an Indian *saree* to construct a pushnet, while others use a potato sack (Fig. 2). In both cases, the fabric is tied around a metal frame and flour is added as food to attract *moci*. Potato sacks and *sarees* are used rather than nets, because the fine weave of these materials prevents the *moci* from escaping. If these fabrics are cleaned and cared for regularly they can be used for several months.

Overview of fisheries management and licensing

There is currently no legislation protecting *moci*. However, Regulation 8 of the Fisheries Regulations (Cap.158 as amended) provides that: “No person shall take, stupefy or kill any fish in any lake, pool, pond, river, stream or in the sea by use of any of the following substances or plants:

- a) any chemical or chemical compound;
- b) any substance containing derris;
- c) any substance containing the active principal of derris, namely, rotenone;
- d) any plant or extract or derivative from any plant, belonging to the genera *Barringtonia*, *Derris*, *Euphorbia*, *Pittosporum* or *Tephrosia*, or place any of such substances or plants in any water for the purpose of taking, stupefying or killing any fish.”



The fishing licensing process was explained to *moci* fishers: they must first fill out and present a Fishing Permit Application that has been verified and endorsed by the Commissioner’s Office prior to them being issued a fishing licence by the Ministry of Fisheries and Forestry. If an applicant has a boat with an engine, she needs to submit the Survey Certificate and the Boat Master License to the Maritime Safety Authority of Fiji. In Fiji, fishing licences are non-transferable and valid for only one year. As part of their licencing conditions, fishers are required to provide records of their catch to the ministry.

Post-harvest methods and best handling practices

Poor handling and processing of seafood, especially within the artisanal and subsistence fisheries (including *moci*), is one of the major challenges of fishers in Fiji. A lack of knowledge about good handling practices results in poor quality seafood, reduced value, and limited opportunity to connect to big markets. Most *moci* fishers lack adequate storage capability during and after harvest. The commodity is merely wrapped in *drau ni via* leaves during harvesting to keep the *moci* cool and prevent it from changing colour from grey to red or reddish brown too quickly. The *moci* are then transported home where fishers freeze the *moci* for later sales, or transported directly to the market from the harvesting site for live sales. Wet or damp cloths are used to maintain the freshness while at the market.



Figure 2. *Moci* fisher, Amelia Liku, deploying her net (left) and with her catch (right). ©Diana Divalotu

The fishers were briefed on the main causes of seafood spoilage, which is through bacteria, enzymes and chemical reactions. They were then taught four simple ways of minimising seafood spoilage:

- ① Care – handle seafood with care after harvest;
- ② Cool – wet or cover seafood with wet clothes or leaves;
- ③ Clean – keep handling and storage container clean by using clean water and keep the handling area clean; and
- ④ Quick – gut, clean and store the seafood as quickly as possible.

A demonstration was given on how to properly handle and process *moci* during and after harvesting. A flow chart of each step in the post-harvest process was made and shared with participants (Fig. 3). *Moci* fishers were lectured on the importance of maintaining the cold chain, which is crucial for preserving the quality and safety of *moci*. Fishers were also taught how to use clean water to make ice, and the proper procedure for placing the *moci* in an ice box (Fig. 4). This is done by placing a layer of ice on the bottom of the ice box, and then a layer of *moci* packed in a ziplock bag, ensuring that a ratio of 1 kg of ice to 1 kg of *moci* is maintained. During the training, the Ministry of Fisheries and Forestry provided each village with one ice box, buckets for storing *moci* while fishers are harvesting them, and pushnets (Fig. 5).

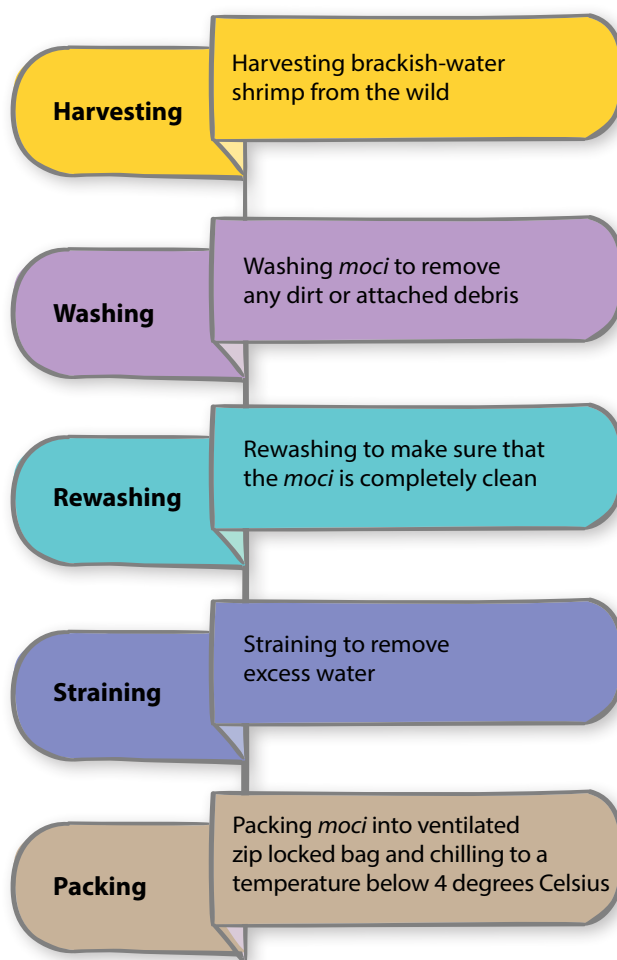


Figure 3. The different steps of the post-harvest process.



Figure 4. Officers demonstrating best handling and proper icing practices to participants. ©Pretika Kumar



Figure 5. Minister of Fisheries presenting the certificate and ice box to the participants. ©Pitila Waqainabete

Challenges for *moci* fishers

One of the major issues for *moci* fishers is the distance they must cover to reach their harvesting sites; many women do not have access to a boat so must walk 1.0 to 1.5 hours to reach their fishing sites. None of the women fishers have a boat master's licence, and so rely on men to captain the boat, although the men have their own fishing schedules. If the *moci* fishers make special requests for boat use, it is costly for them because they have to hire it.

Maintaining the cold chain and reducing post-harvest loss are other challenges because fishers do not have electricity at home and use a relative's or neighbour's fridge who does have electricity to store their catch until market day. Most fishers try to take their harvest to the market daily to solve storage issues, but due to their remote location and scheduled bus services, some fishers are not able to go to the market daily. Sales days are normally Thursday, Friday and Saturday. Leftover *moci* from the market is discarded because there is no fridge to keep the produce fresh in the market. The weekly post-harvest loss is estimated to be around 1 kg per fisher (Ministry of Fisheries and Forestry, unpublished data). The major consumers of *moci* are Indo-Fijians, but sales are down during Hindu festival months (e.g. April, February, October/November) when people only eat a vegetarian diet. A high post-harvest loss is recorded during these festive months because sales are low and the product is taken home for personal consumption or given to relatives as gifts. Anything left over is discarded.

In terms of marketing, there is limited space for fishers at the markets, and because *moci* fishers are not licensed, they pay FJD 3.00/day for a market stall. Consequently, most fishers sell outside the market on paved footpaths. Adhering to food safety standards may not be possible for the *moci* fishers who

place their catch on taro leaves on the paved footpaths. The price for *moci* goes down by the afternoon because it changes colour to reddish brown due to the heat from the footpaths. The price sometimes goes as low as FJD 2.00 or FJD 3.00 per heap – down from FJD 5.00 when fresh. When looking at revenue compared with expenses, women fishers make very little profit, hence they do not have extra money to focus on packaging or improving on hygiene and food safety.

Next steps

The Ministry of Fisheries and Forestry hopes to help *moci* fishers form cluster groups so that they can be issued with fishing licences that would allow them to access a proper table at the market to sell their harvest. Further training is needed on fisheries best practices and management, value adding and financial management.

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