

Contributions of fisherwomen's indigenous fishing knowledge to the UN Decade of Ocean Science for Sustainable Development (2021–2030)

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Introduction

Fisherwomen play a vital role in the retention and transmission of indigenous fishing knowledge (hereafter IFK) in Fiji. The daily in-field experiences of fisherwomen in marine and freshwater habitats equip them with the skills and an intimate knowledge of their resources and environment (Kitolelei et al. 2021). Often, fisherwomen and fishermen within indigenous Fijian (iTaukei) communities are restricted by their gender roles, and this is reflected in their fishing activities. Fisherwomen play an important role in nurturing their children, and are often seen taking their children fishing. On these fishing trips, fisherwomen not only teach children to fish, but these trips are also a way that



Children in Batinivuriwai showing off the catch of the day, which will be sold. ©Salanieta Kitolelei

fisherwomen impart their knowledge to the next generation of fishers. Over time, the transmission of IFK between generations of fishers has declined, along with the ocean's resources and ocean health.

In an effort to reverse the cycle of declining ocean health, the United Nations declared 2021–2030 as the UN Decade of Ocean Science for Sustainable Development. The overall aim of the decade is to gather “the science we need for the ocean we want”.²

Fijian fisherwomen and their IFK provide important information that is closely linked to and complements “science”. Although not acknowledged as science, fisherwomen's IFK includes information about spawning

seasons, fish and crustacean aggregation locations, seasonality of fish, and knowledge about the lunar and diurnal responses of resources to nature. The IFK that fisherwomen possess is also linked to the iTaukei language and local dialects in which the knowledge is transmitted.

This article combines valuable insights from expert groups of fisherwomen, including shellfish gleaners, net fishing experts, crab gleaning experts, and hook-and-line experts, and these insights provide important information that can be used to fill knowledge gaps in fisheries science for the UN Decade of Ocean Science. The interviews quoted throughout the article are part of field research done by one of the authors of this paper (SK) for her PhD study on the Indigenous and local knowledge of fishers in Fiji. Although the data collection was not specifically part of the UN Decade of Ocean Programme, the ideas are aligned with it, and therefore the quotes are used as examples of women's contributions to knowledge for sustainable ocean management.

Dauvivili contributions

An important role that women play is that of shellfish gleaners (*dauvivili*). This group of specialised fisherwomen have become rare in terms of their associated IFK on shellfish. Some shells that the *dauvivili* collect are identified as cultural keystones species, and include cowries (*buli*), triton (*davui*), pearl oyster shells (*civa*) and trochus (*tovu* or *sici*). Shell culture in Fiji was developed in the pre-colonial period where shells were used not only as ornaments, shell money and decorative items, but also as heralds and atonement or petition items in traditional temples.

Over time, fisherwomen who specialise in shellfish collection have developed knowledge of the best shell fishing locations, fishing methods, reactions of the shellfish to changing tides, lunar and diurnal phases, and their conservation status. A 70-year-old fisherwoman mentioned to SK that seashells usually “point out” where she could find the next shell by the way they are found lying on the intertidal areas. A 76-year-old fisherwoman said that mature bivalves will have a small crab found in them. An 80-year-old fisherwoman mentioned to SK that *bulibuli* (money cowries, *Monetaria moneta*) are usually abundant at low-tide in the afternoons. In addition to shellfish biological and ecological knowledge, fisherwomen across Fiji, mention that shellfish have decreased in abundance and size. The reason behind these reductions in population and size is due to a combination of several factors, including overharvesting, pollution, sedimentation due to soil erosion, and climate change.

Dauqoli contributions

Net fishing is one of the most ancient fishing techniques that fisherwomen use (K. Bukarau pers. comm. to SK 25 December 2007), and this is reflected in a lullaby “*lai tei dalo*

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² See <https://en.unesco.org/ocean-decade>

ko tamaqu, lai qoliqoli ko tinaqu” (father went to plant taro and mother went net fishing). In Fiji, net fishing is known as *qoli* and expert netters are called *daugoli*. Some fisherwomen still use specialised nets, such as the *taraki* to catch *moci* (mangrove prawns, *Macrobrachium equidens*) (U. Bukarau pers. comm. to SK 8 February 2021) or the *lawani-daniva*, which are specially made nets from vines to catch *daniva* (silver herring, *Herklotsichthys quadrimaculatus*) (J. Ratabua pers. comm. to SK 22 September 2020). Expert net-fishers know the exact location to place their nets to catch their target resource (N. Brown pers. comm. to SK 26 February 2021). For example, a fishing method known as *vuvu* was used by women in Vunisinu, Rewa who made specialised nets from bamboo combined with coconut leaves and mangrove roots to capture *molisa* (Marquesan mullet, *Osteomugil engeli*) in tidal pools (T. Sole pers. comm. to SK 9 February 2021).

Understanding the behaviour of fish and other resources that can be caught using nets is what makes net fishing sustainable in Fiji (J. Veitayaki pers. comm. to SK 6 July 2022). In addition to this, the traditional nets used in some communities – woven by a group or individual traditional netmakers – give net fishers a chance to set smaller species free without killing them. Moreover, with changing times and priorities, fisherwomen have to make tough decisions between using their IFK to exploit or harvest resources sustainably, while still using their nets. This choice affects the custodianship of their resources because fisherwomen sometimes exploit IFK to meet growing obligations. For *daugoli* fisherwomen, the responsibility falls on them to choose catching and keeping smaller resources caught within their nets, or releasing them.

Daucucuru contributions

Crabs play an important role for fisheries which women are involved in. Expert crab gleaners/collectors are known as *daucucuru* in parts of Fiji particularly those involved in the *qari* fisheries (green mangrove crab, *Scylla serrata*).

An 84-year-old fisherwoman passed on much-coveted knowledge of how to find and collect large crabs from within mangroves to her children (E. Taubuli pers. comm. to SK 9 February 2021). Her method ensured that only the largest *qari* were collected and sold. Her sons use that knowledge and are the most sought-after *qari* suppliers because of the size of their catch and the taste of the crabs they sell. The taste of the *qari* depends on how and where it was caught, which can either be hand-collected or speared in the mangroves, or by using nets at high tide to capture swimming crabs.

In addition to *qari*, *kuka* (red-clawed mangrove crabs, *Perisesarma bidens*) is also highly sought after. Fisherwomen of the Rewa Delta know that the *kuka* appears in abundance alongside the *manā* (mud lobsters, *Thalassina anomala*) straight after a storm and flooding. On the day after storms, fisherwomen and their children carry buckets and nets and walk along the sides of small streams or in mangrove areas where they can find crabs crawling up trees or along the grass that grows on stream sides in large numbers. This is a survival tactic used in the delta region over generations, where the influx of crustaceans feed people if they have limited access to store-bought food. *Daucucuru* fisherwomen’s IFK teach us that it is important to understand crab behaviour in order to be use this resource to the best of its potential.

Dausiwa contributions

In every village we visited along the coast, the *dausiwa* are some of the most well-versed fisherwomen in fish behaviour that is influenced by the tide, weather and lunar cycle. The *dausiwa* are the expert hook-and-line fisherwomen who change their choice of baits to match the seasonal catch, and change their hook-and-line sizes according to fishing location and target species. Fisherwomen use a wide range of habitats – from the rivers, along the coast, blue-holes, corals to the reef edges – to catch fish. According to a 56-year-old fisher, fish are aware of the changing weather and they show this by





Women looking for ghost crabs along the coast to use as bait in Denimanu, Yadua. ©Salanieta Kitolelei

the way they nibble on the bait instead of actually biting on it (M. Biu pers. comm. to SK 3 November 2021). A 20-year-old fisherwoman knew which fish she was pulling up by the way the fish bit the bait (M. Brown pers. comm. to SK 4 November 2021). In some communities, fisherwomen sing or chant in order to bring the fish closer to their fishing lines.

Some fisherwomen mentioned to SK that nowadays, they take longer to catch decent-sized fish and have to travel farther away to capture fish. This is particularly true for many communities where they compete with licensed fishers or are closer to municipal markets. When asked to name 10 fish resources that they catch, in addition to all others, fisherwomen will always mention the *kabatia* (*Lethrinus* spp.), *kake* (*Lutjanus fulvivflamma*) and *ki* (*Upeneus* spp.). This means that these fish resources are ubiquitous in Fiji and found in many of the areas that fisherwomen visit. From the *dausiwa*, we draw lessons in patience in order to understand the behaviour of fish that are caught by fishing lines.

Daububuru contributions

The *daububuru* are the experts in freshwater resources (e.g. freshwater fish and eels), which they catch by groping for them using their hands and feet. This is purely for subsistence fishing, and the fisherwomen share their catch with fellow fisherwomen and sometimes with their neighbors. *Buburu*, or groping, is a fishing method done in small streams and tidal pools where fisherwomen or children jump into the stream and block off a part of it before they start chasing fish or eels toward the nets or capturing them with their hands. Children or men who accompany women during these trips are usually given the task of chasing freshwater resources into the nets. An expert *daububuru* understands the behaviour of the fish in small streams, and uses their feet and hands to feel around the muddy substrates or along the streamside to find the hiding spots of freshwater fish.

Conclusion

Through expert fisherwomen, we learn that knowledge of marine and freshwater resources not only comes from daily in-field experience, but also from knowledge passed down through generations. Locally, fisherwoman transmit their knowledge and in turn contribute to in-field science baselines, which the fishers they teach get to learn. As custodians of the environment, fishers (both women and men) possess knowledge of how to improve and sustainably manage the limited resources they have. As the main contributors to global challenges such as pollution, climate change, overfishing, loss of resources and the loss of languages, humans need to rethink their approach to sustainability. This article provides insights of fisherwomen who understand their environment and resources, and use their IFK to systematically exploit resources. Moreover, fisherwomen believe that the responsibility and burden falls on the shoulder of everyone who uses resources in order to contribute to creating a sustainable ocean.

References

- Kitolelei S., Thaman R., Veitayaki J., Breckwoldt A. and Piovano S. 2021. Na vuku makawa ni qoli: Indigenous fishing knowledge (IFK) in Fiji and the Pacific. *Frontiers in Marine Science* 8. doi:10.3389/fmars.2021.684303
- Thaman B., Thaman R., Balawa A. and Veitayaki J. 2017. The recovery of a tropical marine mollusk fishery: A transdisciplinary community-based approach in Navakavu, Fiji. *Journal of Ethnobiology* 37:494. doi:10.2993/0278-0771-37.3.494