

Treaty Village Resilience Program
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Local fishing practices in the Treat Villages of Papua New Guinea: Supporting capacity for improved food security and livelihoods.

David J. Welch
C₂O Fisheries

Introduction

The Treaty Villages in the South Fly District of PNG have significant food security issues. The productivity of household gardens has declined over recent years due to drought, poor soil condition, and efforts to increase the distribution of more robust seed stock and cultivars has been plagued with mis-management. Livestock are regularly euthanised by Australian Government AQIS personnel due to biosecurity concerns, given the close proximity (ca. 4 km) of Treaty Villages to the northern islands of the Torres Strait. Treaty villagers have traditionally accessed local marine resources however increasing populations has driven fishing effort up twofold between 1995 and 2012/13 with only a 20% increase in total catch (Busilacchi et. al., 2014). This is strong evidence that local fish populations are being overfished and are in decline and presents a significant challenge for future food security and associated health concerns, as well as ensuring incomes that fishing supports.

The Australian *Community Ranger* training and development model in the Treaty Villages has begun to provide the necessary holistic approach to some of the above issues, including capacity building in health, water management, construction, family planning and leadership. Given the critical importance of marine resources there is an opportunity to work with the Rangers and their villages to explore and develop local marine resource opportunities while ensuring sustainability, and to better empower communities to ensure wise use of marine resources. Therefore the scope of works for the fisheries component of the project is to: i) enhance local capacity to adopt sustainable fishing practices, ii) enhance local health and nutrition through improved food security, and iii) improve long-term livelihood options. This report summarises current local fishing practices and capacity, and explores opportunities for further capacity building that will optimise wise resource use.

Local environment

The project Treaty villages are located along the southern coastline of the PNG Western Province region. The coastal waters are typically turbid muddy habitat environments with depths less than 5m along the coastal fringe and rarely exceeding 10 m in accessible areas. There are two exceptions with narrow deep areas exceeding 20 m located inside Saibai Island and Boigu Island. There is very little hard bottom structure in the near-shore region of this coastline that is readily accessible to

Treaty villagers. For example, the northern edge of the Warrior reef complex is approximately 10 nm SSW of Daru Island and approximately 15 nm NE of Saibai Island.

Local fishing characteristics

Baseline surveys were conducted with the Rangers from the pilot Treaty Villages to better understand the local fishing characteristics and fishing capacity (Annex 1). Eighteen Rangers participated in the surveys representing the Treaty Villages of Sui, Mabaduan, Sigabaduru, Buzi and Ber (the latter two villages completed one survey together) (Figure 1), followed by a group discussion that included all 52 Rangers. This was complemented by information from a project that assessed fisheries across Treaty Villages in both PNG and Torres Strait (Busilacchi et. al., 2014).



Figure 1. Map of the Australia-PNG Torres Strait Treaty area and the Treaty Villages.

Results

1. Fishing capacity

Vessels

All villages have some fibreglass or aluminium dinghies powered by outboard motors ranging from 15-75 hp. Most dinghies however are without motors and are generally equipped with locally made sails (Figure 2). Only Sigabaduru does not have any canoes and of all the other villages surveyed each had only 3 canoes. Distances travelled from shore to go fishing were greater with powered boats (range: ~15 km – 50 km) however wind-powered boats travelled significant distances also (range: ~10 km – 40 km). Although canoes travelled less distance than other boats, they still travelled up to 20 km from shore to go fishing. All villages do shore-based fishing.

Fuel for outboards is generally bought from Daru and Torres Strait Islands, including Saibai. Some fuel is obtained by trading. To obtain money for purchasing fuel, villages mostly sell fish and crafts, but also crabs, shellfish, beche de mer, prawns, crayfish, turtle and crops. Generally large distances need to be travelled to obtain fuel. A mechanic, or someone in the village who is capable, generally does maintenance of outboard motors.



Figure 2. Examples of typical local dinghies also showing local handmade sails.

Fishing gear

All the villages surveyed use hook and line for bottom fishing, nets of some sort but mostly gillnets, and traditional spears. Other gears used locally include hook and line for trolling, cast nets, fence nets, traps, poison root, spearguns and hand collecting. Mesh sizes for net vary from 2 – 8 inches. Gear is generally purchased from stores in Daru, but they are also loaned or gifted from friends or family locally or in Torres Strait, or home made. Some gear is obtained from Port Moresby and some from Indonesia. Money for purchasing fishing gear is likely to also come from selling marine and other resources (see above).

Fishery catches

The major composition of fisheries catches by the Treaty Villages reflects the shallow, turbid, soft-bottom habitat of the local near-shore waters (Table 1). Crayfish and a range of reef fish species are also taken although less often due to the scarcity of reefs close to the villages. Notably, there is a large diversity in the types of marine resources that are harvested. There are also some subtle regional differences possibly due to the influence of the Fly River and the villages' proximity to it. For example, the only village Rangers reported the importance of the catch of prawns is Sui, which is the closest to the mouth of the Fly River, and the Gulf of Papua where a commercial prawn fishery operates. The species most often caught include: barramundi, black jewfish, crab, turtle, dugong, shark and crayfish. Of these the most popular for eating are crab, turtle and dugong while barramundi, black jewfish and crab are the most valuable (Table 1).

Swim bladders are also harvested due to their high value with the main species being barramundi, black jewfish and catfish. They are mostly sold in Daru and often to Indonesian buyers.

Table 1. List of fishery species identified by Community Rangers as being most commonly caught, preferred for eating and preferred for selling. For some species groups (e.g. crabs) the most commonly caught species is given. The number of tick marks indicate the number of villages.

Common name	Species name	Most commonly caught	Preferred for eating	Preferred for selling
Barramundi	Lates calcarifer	✓✓✓	✓✓✓	✓✓✓
Black jewfish	Protonibea diacanthus	✓✓✓	✓✓	✓✓✓
Blue salmon	Eleutheronema tetradactylum	✓		
Catfish			✓✓	
Crab	Scylla serrata	✓✓✓	✓✓✓✓	✓✓✓
Crayfish	Panulirus ornatus	✓✓✓	✓✓	✓✓

Dugong	Dugong dugon	✓✓✓	✓✓✓✓	✓✓
Eel fish	?		✓✓	
“Fish”	Various	✓		
Garfish	?	✓		
Gulamar	?	✓		
King salmon	Polydactylus macrochir	✓✓	✓✓✓	✓
“Parrotfish”	Various		✓	
Prawns	Various	✓	✓	✓
Queenfish	Scomberoides spp.		✓	
Red emperor	Lutjanus sebae	✓	✓	✓
Sea cucumber	Various	✓✓		✓
Shark	Various	✓✓✓	✓✓	✓✓
Shellfish	Various	✓✓	✓✓✓	✓✓
“Snapper”	Various		✓	
Stingray	Various	✓	✓	
Tilapia	?	✓	✓	
Turtle	Various	✓✓✓	✓✓✓✓	✓✓

Livelihoods: Selling catches

Generally seafood caught for selling are sold for cash however sometimes they are traded for good, e.g. fuel. Most of the marketed catch is sold in Daru where there are local markets and wholesale seafood buyers. Sometimes fishermen walk to Daru, which can take up to three days, to sell their catch. The catch is smoked and dried in these instances. Buyers generally prefer to buy whole fish but will also purchase them gilled and gutted, filleted, live, dried or smoked.

Sea cucumbers

Three of the four villages represented by the Rangers indicated that they caught and sold sea cucumbers. It is likely that sea cucumbers are harvested in the Protected Treaty Zone. Product is sold either as wet or dry to buyers in Daru for a price of K10-15 per kilogram wet weight or K25 dry weight.

Alternative products

Rangers from two of the villages agreed they would like to catch more barramundi, tilapia, crabs, (tiger) prawns and black jewfish, predominantly for their sale value. There are several reasons why they currently don't catch more including: poor access to markets, lack of facilities to store fish, and that there are too many people catching them. One village would like to catch more sea cucumbers and while they stated that they were waiting for the current fishing ban to be lifted, they also admitted that fishing for sea cucumbers currently occurs. One village also stated they would like to catch mackerel, a species not currently targeted in the Treaty Villages, however they don't possess the gear or skills and knowledge to catch them.

Handling seafood

Facilities for storing seafood post-capture in the region are poor, exacerbated by very large distances and primitive equipment. Generally, once captured most seafood is either placed in a bucket or left on the boat deck or the ground, and where possible shaded from the sun. Some fishers tie their catch to the side of the boat in the water to keep it alive, particularly if they intend to sell the catch. The fish are either kept whole, gilled and gutted, or filleted.

Most villages dry and/or smoke their fish so that they keep longer. Locally, this refers to the process of placing the fish over hot coals of an open fire and 'grilling' it over smoke until the fish no longer drips fats. Sometimes even small fish are 'smoked' for an hour or more. This essentially 'dries' the fish as well and enables the fish to be stored for up to three days. Rangers from villages where seafood was stored more than one day however stated that seafood sometimes spoils and can't be eaten.

Aquaculture

There has been very little aquaculture in the past in the villages surveyed, with the exception being Sigabaduru which previously grew barramundi in concrete ponds. There is currently no active small-scale aquaculture ventures in the villages due to a lack of skills and knowledge, and a lack of funds. Buzi/Ber cited numerous local natural pools that hold many fish (tilapia, etc.), but despite this all villages were interested in farming fish in the future.

2. Fisheries regulations

Although there appeared to be a lack of awareness in the detail of fisheries regulations for local waters and the Torres Strait Protected Zone, they were aware that there were size limits on some fish (citing barramundi as an example) and of strict catch limits in the Protected Zone (e.g. 6 crayfish per boat catch limit). They were also aware of current bans on sea cucumber harvest. It was clear they were unhappy with what they perceived as not being able to access their traditional fishing rights in the Protected Zone and that the boundaries constrained their PNG access to a narrow coastal strip. There was also a perception of some that they weren't allowed to fish in the TSPZ.

3. Opportunities

Initial scoping listed Fish Aggregating Devices (FADs) and/or artificial reefs as potentially providing greater access to existing marine resources. However these options are unlikely to be either

effective (FADs) due to the local bathymetry and habitats, or cost-efficient in the case of artificial reefs. This survey, complemented by the recent study by Busilacchi et al. (2014), has identified opportunities for the project to provide capacity to local Rangers and their villages in areas that would be most beneficial.

Better post-harvest handling & storage

Current infrastructure and equipment in the Treaty Villages is either lacking or primitive and therefore handling of harvested marine resources is generally poor. However, general knowledge of good handling and food preservation and storage is also lacking. This results in unhygienic food and potential associated health issues, as well as poor shelf life of products with fish sometimes spoiling before being eaten. With the relevant knowledge and skills there are simple practices villagers can adopt that would make significant advances in local fish handling and storage. This can provide for better food security but also enhance product quality for sale at markets.

Targeting alternative species

Recent fishery data and local perceptions support the likelihood that local near-shore fishery populations are either overfished or in decline. Against a backdrop of a rapidly growing human population, fishing practices in the future will need to change and targeting alternative species is one option. Several species were identified through discussion with the Rangers as being of potential.

Increasing catches of pelagic fish species

Spanish mackerel and possibly Grey mackerel are pelagic species that are known to be found in the region and yet are not targeted. These are relatively highly productive species that can generally withstand higher fishing effort than other species. Similarly, queenfish are another pelagic species typically found in the local habitats that are currently not caught very often. These species would normally be located around baitfish schools associated with hard-bottom habitats, but also require knowledge of specific trolling techniques to catch them. If further surveys and field research demonstrates the spatial and temporal presence of these species, then training in simple and relevant techniques will be conducted.

Targeting freshwater/estuarine species

In villages where there are rivers nearby Rangers have noticed rapidly increasing populations of tilapia, snakehead and climbing perch in local waters. Although they are introduced species, they provide a great opportunity as an alternative protein source to take pressure off other local fishery populations. These species are increasingly found in Treaty Village catches (Busilacchi et al. 2014) and further increases in their harvest should be encouraged along with improved preservation and storage for greater flexibility in their use.

Aquaculture

Culture of barramundi has been practiced in the past (Sigabaduru) however does not occur currently in Treaty Villages. All rangers expressed an interest in knowing how to culture species as a more reliable food source. Therefore an opportunity exists for capacity building among the Rangers at

least, and potentially for support in the development of aquaculture ventures in some villages, e.g. tilapia grow-out ponds in villages with less accessibility to riverine areas.

Improved fishing practices

Local knowledge is needed of the consequences of high fishing effort to feed a growing human population and in the use of poor fishing practices, e.g. poison root. Increasing the capacity of Rangers through knowledge transfer will be a key activity for improving local fisheries practices. We will also assess the capacity for the project to take the approach to individual villages as this is likely to be the most effective way to effect positive change in local fishing practices. Ultimately, the introduction of traditional-based fishery management at the village level at least may be required.

Infrastructure support

Although not explored at this stage of the project, there are options for supporting the development of infrastructure that would greatly enhance better use of marine products. These include:

Village freezers – These have been introduced in other parts of the Pacific with encouraging success, e.g. Vanuatu. This has involved the construction of a small lockable shed with a solar panel on the roof that fully powers a large freezer inside. These may be useful at a village/clan level to store fish for sale and/or as food storage for hard times. Challenges include ongoing long-term maintenance and fair and equitable use.

Ice machines – These can be a community resource that would greatly improve food quality and value for products sold. Can be fully powered by solar panels and housed in a small shed as with freezers. Challenges would be more about ongoing maintenance as ice use would be a user-pay system.