Australian Government

Australian Centre for International Agricultural Research

Final report

Small research and development activity

project	Developing legal value chains and alternative markets for South Fly District fisheries, Papua New Guinea
project number	FIS-2016-052 SRA
date published	
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approved by	
final report number	
ISBN	
published by	ACIAR GPO Box 1571 Canberra ACT 2601 Australia

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1. Acknowledgments

We are grateful to the Australian Centre for International Agricultural Research, the Papua New Guinea (PNG) National Fisheries Authority and CSIRO for funding this study. We acknowledge the willing contributions of PNG Treaty villagers and residents of Daru, and the PNG field team: Daina Budia Exon and the staff of the NGO Bata Community Development Foundation. We also thank the provincial and district officials who provided support to the project. We acknowledge the contribution World Wide Fund for Nature-Merauke had in organising and supporting our CSIRO-funded work in Papua Province, Indonesia. Stacey McCormack (University of Tasmania) designed and produced the infographics presented in the report. Garrick Hitchcock and John Burton (Australian National University) provided protocols for the Multi-dimensional Poverty Index calculations. Tim Skewes (CSIRO) provided Figure 1. Cecilia Villanueva (University of Tasmania) provided the estimated distances of the villages from Daru. Data collection, analysis and dissemination was conducted under the CSIRO Social Science Human Research Ethics Committee approval 054/17. Photos were provided by Sabrina Bellacci, Ria Fitriana and Sara Busilacchi.

2. Executive summary

Previous work in the South Fly District, Papua New Guinea (PNG) has revealed the complex linkages between poverty, illegal activities, over-fishing and food security. Livelihoods are heavily dependent on subsistence and artisanal fisheries. Much of the growing Asian market for bêche-de-mer, shark fin, fish bladders and mud crabs is serviced via illegal cross-border value chains into Indonesia, while legal trade exists in parallel. The ultimate project aim was to develop future management actions and projects that can increase income from legal activities and empower local communities, while reducing levels of illegal trade and unsustainable activities in the region.

This 18-month project mapped the legal and illegal value chains of high-value marine products traded by fishers in the region. Methodological complexities associated with gathering empirical information on illegal activities were overcome by using participatory approaches and building trust between the researchers, communities, value chain actors and government authorities. Participatory systems modelling was used to identify the numerous root causes of illegal trade, including the lack of incentives to cooperate and legally market the products for higher returns. Fishery management agencies also lack the capacity to manage the resources sustainably. The main recommendations identified as a result of the consultation were:

- **Systems approach to a complex problem**. The problem of illegal and unsustainable livelihoods in the South Fly is highly complex and any interventions proposed to divert fishers from the illegal value chains should address the root causes of problems.
- **Capacity-building**. A lack of capacity at all levels appears to be a major root cause of problems, and must be addressed. Stakeholders should be engaged using participatory approaches in all stages of any intervention to ensure the legitimacy and transparency of interventions, and encourage learning, collaboration and coordination.
- **Improve resource management**. Many of the marine species targeted by fishers are not being effectively managed. Community-based management of species is one potential solution for this issue, but capacity-building would be required.
- **Alternative enterprise models**. Cooperatives and 'hub-and-spoke' enterprise models may enable fishers to gain greater market power, combined with improved product quality and value-adding.
- **Diversified livelihoods**. Potential alternative livelihood activities include small-scale barramundi farming using locally-sourced feed; small-scale sea cucumber ranching; crocodile farming using tilapia or other pest fish as feed.
- **Implementation of the free-trade zone in the border area between PNG and Indonesia**. The implementation of a free trade zone following the Free Trade Zones Act 2000 in the PNG-Indonesia border area with a trade centre in Bula would provide border communities with legal and monitored access to the Indonesian market.
- **Review of the Torres Strait Treaty.** Current restrictions under the Australia-PNG Torres Strait Treaty on the movement of goods and products from PNG into the Torres Strait Protected Zone are limiting opportunities for PNG Treaty Villages' livelihoods, exacerbating poverty and illegal activities. A review of the Treaty's arrangements is necessary, at least to formalise the existing informal trade in marine products, and to improve joint management of shared BDM, sharks, barramundi and mud crab stocks.

This SRA project successfully identified barriers within value chains for different fish species and products that prevent or limit the use of alternative legal markets, and potential solutions to the problem. It was also successful in engaging international actors along the value chains and gaining their interest in working collaboratively to implement broader action research. These positive outcomes provide the basis for the implementation of research to trial alternative enterprise and community-based management models that may induce

behavioural change and have a wider impact in reducing illegal activities, overexploitation and poverty. Outcomes of this SRA could have a potential impact on community members in the South Fly, and knowledge and learning could eventually be transferred to other coastal communities in PNG facing similar challenges. There could also be indirect benefits to Australian and Indonesian governments and communities in the transboundary Torres Strait region due to reduced exploitation of shared high-value or protected marine resources (particularly bêche-de-mer, sharks, barramundi and jewfish), and reduced costs of enforcement of illegal fishing and trading activities.

3. Introduction

The South Fly District of Western Province, Papua New Guinea (PNG), borders the Torres Strait of Australia to the south, and Papua Province, Indonesia to the west (Figure 1). It is the poorest region in PNG, with an estimated Human Development Index (HDI) in 2007 of 0.270, which is approximately half of the national PNG HDI of 0.466. It is a remote area with limited road access to major markets (e.g. Port Moresby), aside from by air and boat. A joint study by CSIRO and the PNG National Fisheries Authority (NFA) found that livelihoods are heavily dependent on subsistence and artisanal fisheries (Busilacchi et al., 2015). However, due to population growth, minimal management capacity and the growing demand for food and cash, several fish and sea cucumber stocks are under threat of over-fishing.

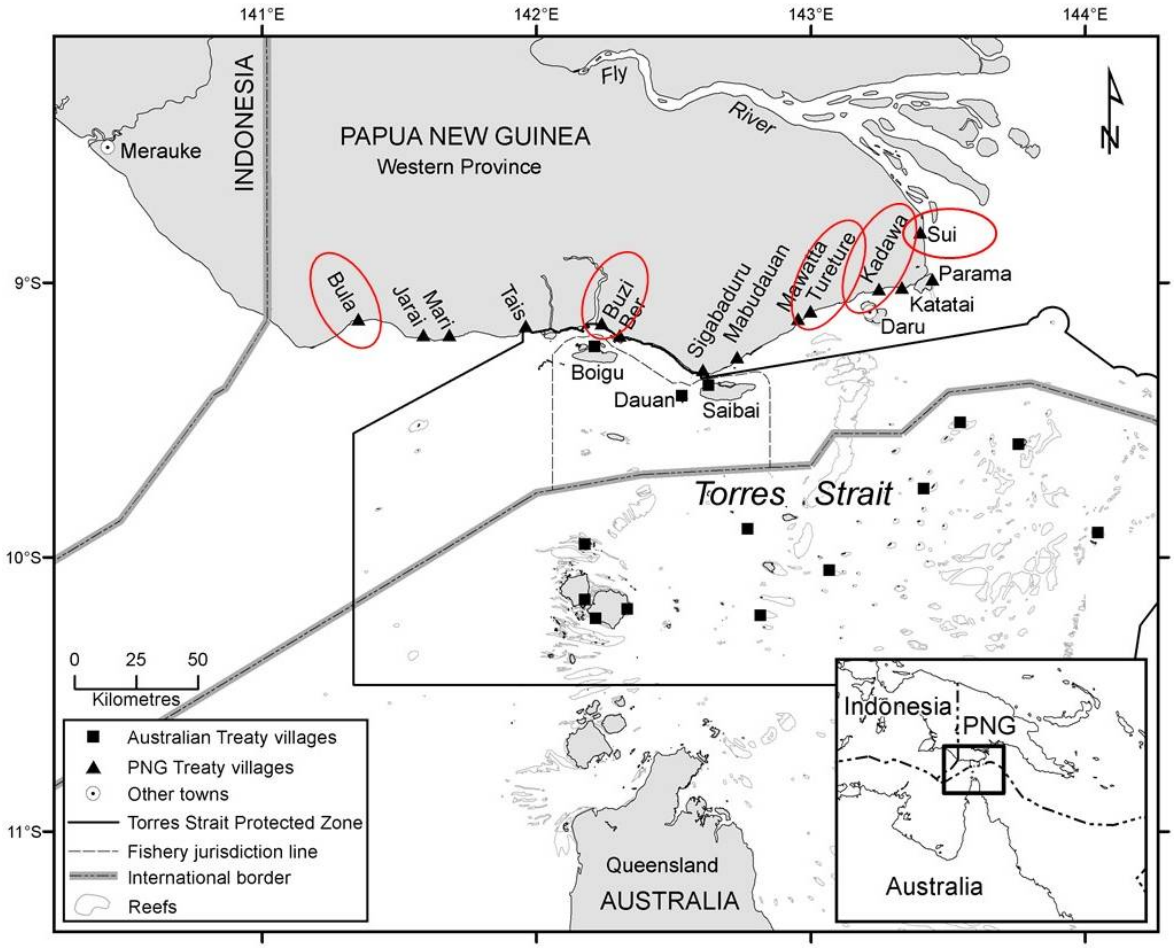

Figure 1. The South Fly District and PNG Treaty Villages, showing the Australian and Indonesian borders, Merauke and the Torres Strait Treaty Protected Zone. Surveyed villages are circled in red.

Shared marine resources have been governed by the Torres Strait Treaty between Australia and PNG since 1985. The deteriorating socio-economic situation has important implications for the Treaty (Busilacchi et al., submitted; Butler et al., submitted), which manages marine resources shared between PNG and Australia in the Torres Strait Protected Zone, including 14 coastal 'Treaty Villages' in the South Fly District of PNG. The overfishing of shared marine resources may impact upon fisheries utilised by Australian Torres Strait Islanders.

Encroachment of PNG fishermen into Australian waters requires costly fisheries enforcement and repatriation exercises. With the escalating poverty in the Treaty Villages and the provincial capital, Daru, health problems including multi-drug-resistant tuberculosis pose a risk of infection to Torres Strait Islander communities, and a cost burden when they visit Torres Strait Island communities or Cairns for treatment. The illegal entry of Indonesian traders to purchase marine products also poses a risk of disease transmission to Papua Province communities and Merauke. Increasing encroachment across both borders also poses biosecurity risks through the unregulated movement of people, animals and plant material.

At the 30th anniversary of the Treaty in 2015, the annual cycle of meetings between Australian and PNG government officials and local indigenous resource owners celebrated the resolution of many shared problems over the years, but also highlighted these escalating pressures. All parties agreed that a renewed partnership approach was required to address and pre-empt unprecedented issues, including illegal exploitation of marine resources by PNG and Indonesian fishers in their own waters, and Australian waters. This issue has also been prioritised by the Arafura-Timor Seas Ecosystem Action Program, which has been funded since 2009 by the Global Environment Fund.

As a result, the PNG NFA, CSIRO and AFMA have been collaborating since 2011 to investigate the issue of the role of fisheries for food security and poverty reduction for communities in the South Fly, focusing primarily on the illegal fisheries and marketing of marine products. Much of the background information that this project is based upon was generated by the 2011-2014 CSIRO project 'Characterization of the traditional fisheries in the Treaty communities, Papua New Guinea' (Busilacchi et al., 2015), which repeated analysis of baseline livelihood and marine resource condition data collected in 1995-1996 (Baines et al., 1997). The results clearly showed that since 1995 human development indices had declined (see also Busilacchi et al., submitted), and catch per unit effort had declined, indicating over-fishing of targeted marine and coastal resources.

In October 2014 a workshop was hosted by CSIRO and the NFA in Cairns with PNG and Australian delegates at the annual Treaty meeting to discuss the escalating problem, and potential solutions. This was followed by a similar workshop in Daru in June 2015, which engaged a broader range of PNG national and provincial government, NGOs, private sector and community representatives. Among the complex issues discussed was the causes of illegal fishing, and the lack of commercial opportunities for Treaty Villagers in fisheries. Two solutions were recommended for further investigation:

- Understand the value chains for illegally-harvested marine resources, and identify intervention points and options;
- Identify alternative markets and management for these and other marine resources through innovative partnerships such as innovation platforms, co-operatives and co-management of resources.

4. Objectives

This project aimed to follow-up on these recommendations with the ultimate goal '*to increase the income and empowerment of communities in the South Fly District while reducing levels of illegal activity and over-exploitation of marine resources in the PNG and Australian waters of the Torres Strait*.'

To achieve this goal, the objectives of this SRA project were:

1. To analyse the structure of legal and illegal trade in marine products from the artisanal fisheries of South Fly District;

2. To identify the socio-cultural and economic factors driving legal and illegal value chains, and potential intervention points;

3. To identify potential alternative legal markets and marketing strategies for fishers.

The project aimed to provide an initial step in establishing a multi-stakeholder collaboration for developing and implementing alternative livelihoods to divert fishers away from illegal activities in the South Fly District. It also aimed to engage fishers and create an enabling environment to develop and enforce community based fisheries management plans for the most exploited marine resources (i.e. sea cucumber, barramundi, jewfish and sharks). Implementation of project recommendations through action research will have direct benefits through an expected reduction of the PNG and Australian governments' costs of enforcing fisheries, protection and processing apprehended fishers, and the biosecurity risks associated with people traffic across the Indonesian-PNG and PNG-Australian borders. Potentially expected wider benefits for livelihoods and well-being in the PNG Treaty Villages and Daru will be the reduced pressure on both the PNG and Australian governments of managing escalating frustration and tension through the Treaty.

5. Methodology

5.1. Project location

The coastal area of the South Fly, PNG, shares international boundaries with Indonesia's Papua Province to the west and the Australian Torres Strait to the south (Figure 1), a transboundary region referred to as the Trans-Fly. Population in the South Fly District has likely more than doubled since 1980 (Butler et al., 2014), exacerbated by internal displacement caused by environmental and social impacts of the Ok Tedi mine in the headwaters of the Fly River catchment. Population on Daru Island, the only economic and administrative centre in the South Fly, is estimated to be around 15,197 while an additional 5,616 people live along 14 PNG coastal villages (ibid.).

The South Fly is one of the poorest regions in the world and its Multi-dimensional Poverty Index (MPI) is comparable to some of those of the poorest countries in the world, such as Timor-Leste, which is 97th out of the 113 developing countries for which the MPI has been calculated (Busilacchi et al., submitted). People in the South Fly are on the economic periphery of PNG due to their physical and political remoteness from the main centres (Arthur, 2004). Due to the very poor soil and the economic disadvantage of the region compared to other parts of PNG, livelihoods and food security of the communities in the area heavily depend on goods and services provided by marine and other aquatic ecosystems (Busilacchi et al., 2015).

The waters adjacent to the Trans-Fly contain diverse marine ecosystems of global biodiversity significance (Schug, 1996). In the South Fly the main marine products traded by coastal communities are dried sea cucumbers ('bêche-de-mer' (BDM); *Holothuria* spp.), shark fins (mainly taken from *Carcharhinus* spp.), fish maw (dried swim bladders) from barramundi (*Later calcarifer*), black jewfish (*Protonibea diacanthus*) and catfish (*Arius* spp.) and live mud crabs (*Scylla serrata*) (Busilacchi et al., 2015; Busilacchi et al., 2018). South Fly fishers often trade these products with Indonesian middlemen who illegally cross the border from Merauke in Papua (Busilacchi et al., 2018). Mud crab is traded with Australian Torres Strait inhabitants. Before this project, not much was known about the product type, product flow, and logistics of trade with the Indonesian middlemen and the Torres Strait islanders.

5.2. Fieldwork team

The fieldwork in PNG was carried out by a field team of seven staff members from a local non-government organization (NGO) based in Daru and one of the researchers (SB). JP accompanied the team, but was not actively involved in collecting data in the South Fly. SB and JP alone conducted the interviews in Port Moresby and Jakarta. The fieldwork in Merauke, Jakarta and Surabaya was conducted by a team consisting of a local consultant (RF) and an accompanying guide from World Wide Fund for Nature (WWF)-Merauke, and funded entirely by CSIRO co-investment (Figure 2).

Figure 2. Interviews with Indonesian value chain stakeholders in Papua Province

5.3. Data collection

As a first step to address the objectives of the SRA project, a desktop activity was conducted. Current knowledge published in scientific and grey literature on illegal wildlife trade, value chain theories, and effective interventions was reviewed. A review of best practices for the investigation of illegal activities was also included. The review informed the design of the survey methods to collect the data and information to map the illegal value chains.

To address the objectives we integrated an analysis of illegal and legal value chains for high-value marine products in the South Fly with an analysis of the social relations, culture and politics preventing or limiting the use of alternative legal markets (Bolwig et al., 2010; Riisgaard et al., 2010). We used a mixed-research method, which combined quantitative research methods with qualitative research methods. Triangulation and complementarity of data from mixed-method approaches can ultimately obtain the most accurate results when investigating illegal activities (Gavin et al., 2010). Data and information were collected through key informant (KI) and individual interviews, focus group discussions (FGDs) and the final multi-stakeholder workshop in Daru (see questionnaires and guide forms in Appendices).

The methodological complexities and inherent dangers associated with gathering empirical information on illegal activities are well known. Collecting sensitive data using direct questions can be affected by non-response and social desirability bias (Nuno & John, 2015). Nevertheless, direct surveys have an important role in understanding the drivers of participating in illegal trade. Building trust between the researcher and respondent as well as building trust in the research itself, while eliminating the perception of possible prosecution among participants through a participatory approach are essential and effective strategies to endure direct survey techniques are successful (ibid.). We explain below how trust was built and perceptions of prosecution allayed in our study.

Informed consent was sought from participants before commencing interviews, FGDs and workshops (see Appendices). Confidentiality, anonymity and the secure storage of raw data in Australia were requirements under the CSIRO Social Science Human research Ethics Committee approval 054/17. The objectives of the study were explained to participants and emphasis was given to the study's intention to understand the current dynamics of the trade and exploitation of marine resources to increase conservation and improve communities' livelihoods. In addition an amnesty from prosecution was guaranteed to the participants. Local team members were well-respected and trusted, and were crucial in explaining project objectives to potential participants, and assuring culturally-appropriate protocols were observed.

The total number of people interviewed in the KI and individual interviews was determined by the point when saturation had occurred. Actors in the ports of Surabaya and Jakarta did not respond to our request for an interview, or were not available at time of the interview. In cases where data on quantities and prices were not disclosed by the actors (especially buyers and exporters) estimates were inferred from published statistics and based on respondents' information. Information on end-market prices was retrieved from published literature and website sales for the BDM (Purcell et al., 2018), fish maw (Tuuli et al., 2016) and live mud crab trade. Collecting reliable price data among fishers, middlemen and small traders was not straightforward due to the lack of transactions records kept by most traders and the prices had to be recalled from memory. Because different currencies are used in different villages depending on their proximity to neighbouring countries, prices were converted using currencies' rates for the sampling period: 1 $AU = 0.78 $US; 1 PGK = 0.30 $US; 13325.00 IDR = 1 $US. During the individual interviews, ten indicators of living standards, education and health were also enumerated to calculate the Multi-dimensional Poverty Index (MPI) (Alkire & Santos, 2010) to explore if there was a relationship between involvement in illegal activities and people's livelihoods.

In April 2018 a final multi-stakeholder workshop was held in Daru, involving 54 participants from the value chains, including PNG fishers, traders, middlemen, government and non-government actors. Participatory systems modelling was used to identify the numerous root causes for illegal trade. During the workshop each participant was asked to identify the main issues within the value chains that were causing illegal activities and unsustainable livelihoods. These issues were then grouped into eight themes. Participants were then divided into eight groups consisting of a mix of stakeholders to promote discussion and learning. Each group was assigned one key issue identified in the previous activity. The groups were asked to analyse their problem using 'causal loop analysis' (Figure 3).

Figure 3. Participants at the final multi-stakeholder workshop identifying the barriers to engaging in legal value chains

6. Achievements against activities

Activity 1 Project planning, secondary data collection (February - April 2017):

The initial literature review used to design the project can be found in the following paper:

Busilacchi, S., Butler, J. R. A., Van Putten, I., Cosijn, M., Posu, J., & Fitriana, R. (in preparation). Root causes of the persistence of illegal value chains of high-value marine products in presence of legal value chains: the case of the South Fly, Papua New Guinea. *Ambio*

Activity 2 Value chain mapping (March – December 2017):

Altogether six fieldtrips to conduct the surveys in PNG and Indonesia were undertaken by the team:

1-5 May 2017	Visit to Jakarta (SB)
18 Jun – 14 Jul	Fieldwork in Port Moresby, Daru and villages (SB, JP)
23 – 31 Jul	Visit to Jakarta (SB, AS, JP)
22 – 27 Oct	Visit to Port Moresby (SB, JP)
Sep – Oct	Fieldwork in Merauke, Surabaya and Jakarta (RF – TierraMar)
18 – 22 Nov	Visit to Jakarta (SB, RF)

Two infographics were produced as Deliverable 1 (see Appendices 1 and 2). A report of the fieldwork in Merauke, Surabaya and Jakarta was also produced by RF (TierraMar).

***Activity 3 Analysis of opportunities and barriers (January – March 2018)*:**

An infographic of the opportunities and barriers within each value chain that prevent or limit the use of alternative legal market opportunities was produced as Deliverable 2 (see Figure 25).

***Activity 4 Recommendations for future development and management action (April – June 2018)*:**

Final recommendations are presented in this report (Deliverable 3).

7. Key results and discussion

7.1. Analysis of the structure of legal and illegal trade in marine products from the artisanal fisheries of South Fly District (Objective 1)

7.1.1. Products

A previous study by Busilacchi et al. (2015) found that the most valuable products for fishers in the South Fly are fish maw (swim bladders), shark fins, BDM and mud crab (Figure 4). Communities in the South Fly are heavily reliant on these products for their livelihoods, which are considered in Chinese culture as treasures of the sea, and believed to have medicinal properties.

Figure 4. End markets for the high-value marine products traded in the South Fly: a) fish maw b) shark fins in a retailer shop in Singapore; c) BDM in a retail shop in Hong Kong and d) live mud crab in Singapore

7.1.2. Trade flow

Fishers in the South Fly have access to three markets for their high-value marine products: licensed buyers on Daru; unlicensed Indonesian middlemen from Merauke in Papua Province; and Torres Strait islanders in Australia (Figure 5). The licensed buyers on Daru are accessible only by people with transport and who reside in villages that are a maximum of one-day return distance from Daru (i.e. Sui to Mabudauan villages). Unlicensed

middlemen from Merauke come across the Indonesian border to visit and trade with the South Fly communities. Torres Strait islanders in Australia are accessible only by people in the communities close to the Australian border (i.e. Mabudauan to Buzi). A total of five different value chains, two for dry products (fish maw, shark fin and BDM) and three for live mud crab, are associated with these three markets.

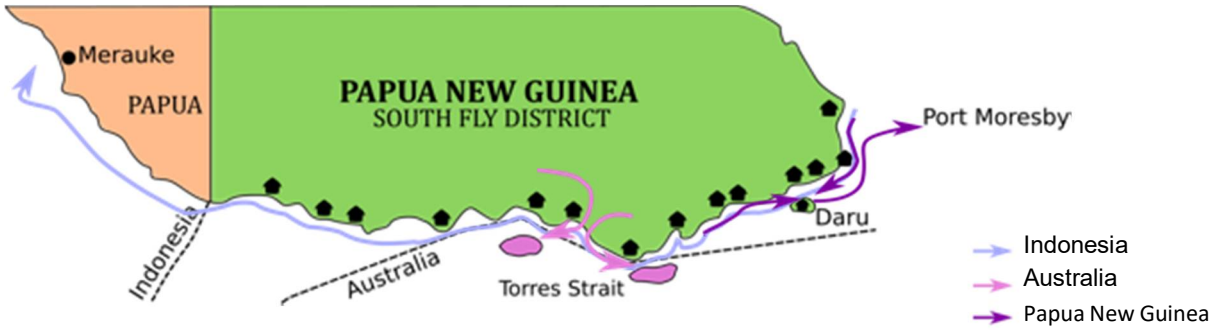

Figure 5. Trade flow of the products: fish maw, shark fins, BDM and live mud crab (graphic *Stacey McCormack*)

7.1.3. Fisheries and exploited species

Targeted species for the fish maws are jewfish, barramundi and catfish (Figure 6). The two main targeted species, jewfish and barramundi, are both vulnerable to overexploitation due to their life cycles (Busilacchi et al., 2015). Fishers along the South Fly coast use gillnets to catch coastal fish species. Netting is traditionally an activity carried out by men. In contravention to a fisheries regulation in place to avoid overexploitation of barramundi (Barramundi Fisheries Management Plan, 2004), illegal gillnets with mesh sizes larger than 6 inches are often used. These gillnets are illegally provided by the Indonesian middlemen in exchange for dry products. Apart from mesh size limits, the management plan for the barramundi fishery imposes size limits and other spatial and temporal measures in PNG territorial waters. However, there is little knowledge of this management plan in local communities and it is not implemented by fishers and other stakeholders. No management plan is in place for jewfish.

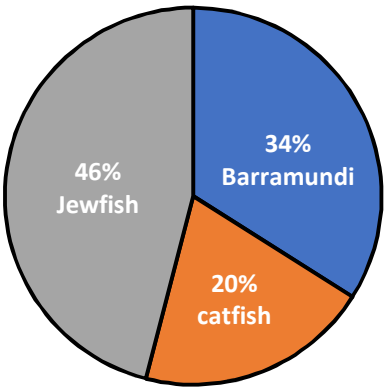

Figure 6. Left: percentages of jewfish, barramundi and catfish caught for their maw as reported by respondents. Right: Catch from gillnets with jewfish, catfish and several species of sharks.

Sharks are nowadays mainly caught as by-catch in the gill nets. Both buyers and fishers reported a decline in demand for shark fins in the last few years. Explanations for the decline were lower demand at the end market due to an extensive anti-finning campaign in China and tougher regulations in Indonesia. Among the shark species regularly caught by fishers figured several species listed as endangered or critically endangered in the IUCN Red List, such as the endemic northern river shark (*Glyphis garricki*) and the green sawfish (*Pristis zijisron*) (Figure 7). No management plan for the artisanal shark fisheries is currently in place.

A characteristic of the shark fin and fish maw fishery is the high amount of waste produced by these operations. Fish meat is commonly disposed of after the removal of the bladders and fins due to the lack of refrigeration facilities and transportation in the communities.

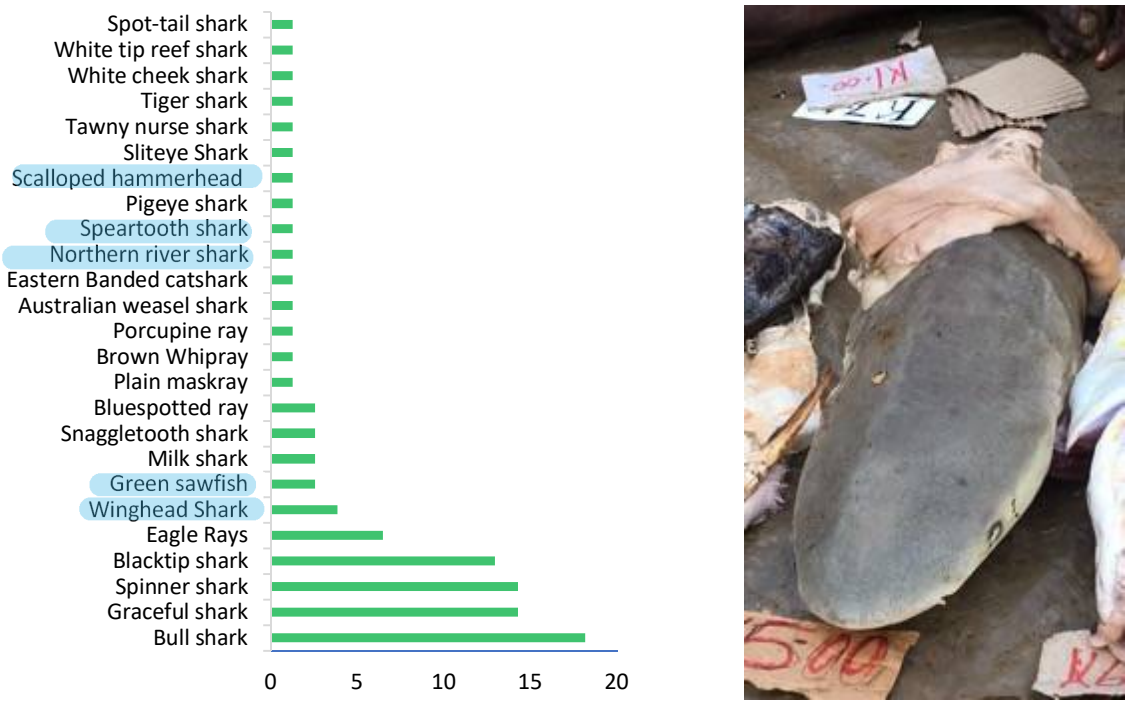

Figure 7. Left: species caught in the gill nets as identified by fishers (percentage). Highlighted in blue are the species listed as endangered or critically endangered in the IUCN Red List. Right: finned shark on sale at the market in Daru.

Illegal activities were also observed for the sea cucumber fisheries. Despite a NFA moratorium which closed the sea cucumber fisheries between 2009 and 2017 and the strict regulations under the new BDM management plan (see the National Beche-De-Mer Fishery Management Plan 2016), the harvest for BDM continues uninterrupted and is regularly traded in the Indonesian value chain. Under the new BDM management plan, the fishery was reopened for 4 months in 2017. Fishers reported that after taking advantage of the open season to sell as much BDM as possible to the licensed buyers in Daru, they continued harvesting and selling the products illegally to the Indonesian buyers. According to respondents, Sandfish (*Holoturia scabra*) was the most targeted species (Figure 8). Low-value deep-water species such as lollyfish (*Holoturia atra*) and curry fish (*Stichopus hermanni*) were also reportedly caught. Respondents also reported that due to the decreased presence of sea cucumber on the reefs in PNG waters, they often illegally cross the border to harvest on Australian reefs in the Torres Strait.

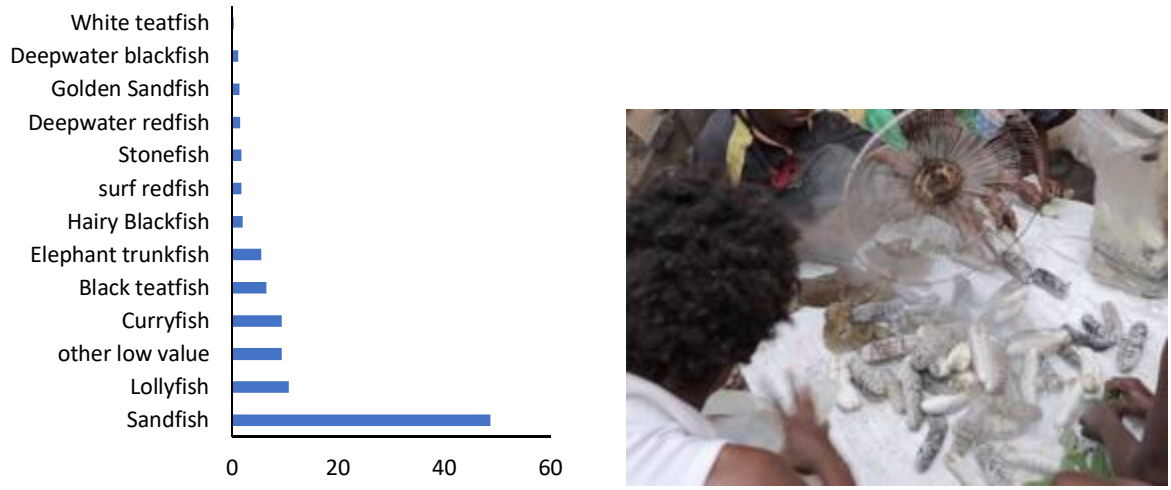

Figure 8. Left: species of sea cucumber in the catch as reported by respondents (percentage). Right: sea cucumber being dried.

7.1.4. Actors in the illegal and legal VCs

Dry products

Fish maw, shark fin and BDM are traded through the same value chains (Figure 9). Fishers usually semi-dry or dry the bladders, fins, and sea cucumbers before selling them. Buyers both in Daru and Merauke lamented the poor quality of products from the South Fly villages, and poor quality reduces the selling prices.

Figure 9. Example of trade flow of dry products: some of the shark fins harvested in the South Fly are traded in the villages and then sold as 'hisit' (low value processed shark fins with no skin) for the Japanese market in Surabaya.

Illegal value chains

Indonesian middlemen from Merauke are the main buyers of the three dry products, generally traded together (Figure 10). Eight groups of cross-border Indonesian middlemen were identified. Each group regularly visits communities along the coast from Bula in the South Fly District and the banks of the Fly River to Kerema in Gulf Province. The Indonesian middlemen are Papuan from the Marind-Anim ethnic group who have strong kinship relationships, including recent marriages, with people in the South Fly communities.

Several PNG and Indonesian quarantine, export and custom regulations are breached once the Indonesian middlemen cross the border with the dry products. Export and quarantine of fish and their products in PNG are regulated under the National Agriculture Quarantine and Inspection Authority (NAQIA) Act 1997. In order to export to other countries, exporters are required to obtain the quarantine import conditions of the importing country before seeking certification from NAQIA. An animal health certificate is then issued for export clearance upon payment of a fee. Fish and fish products also need an export clearance from PNG customs, and an export permit from the NFA. Similarly a health and safety certificate from PNG is needed to export marine products in Indonesia. This letter is provided after producing a letter of origin from the Department of Marine Affairs and Fisheries. In the case of sharks a letter of recommendation certifying that traded species are not among the CITES listed species (Ministry of Marine Affairs and Fisheries decree N. 18, 2013 and decree N. 59, 2014) is also required.

Indonesian middlemen and PNG fishers are vulnerable to apprehension and prosecution by PNG and Indonesian authorities when crossing the border with the products. PNG fishers are also vulnerable to prosecution when fishing illegally for BDM during closed seasons. Bribes to local authorities on both sides of the border often enable traders and fishers to carry out these illegal cross-border trade activities.

Middlemen groups have two modes of operating. Some groups of middlemen work for traders in Merauke and are paid a fixed amount each trip. Other middlemen have their own business and bargain with different traders. After arriving in Merauke with the dry product, the cross-border middlemen sell the products to small or big traders, all of whom are men (Figure 10). Fishing for fish maw and shark fins is a common activity for fishermen in the Merauke district as well, so after the fish maws and shark fins are sold to traders in Merauke, they are mixed and traded (branded) as Indonesian products.

Shark fins have become more difficult to trade due to a recent decree by the Indonesian Ministry of Fisheries, which requires a letter of recommendation for all traded fins (Ministry of Marine Affairs and Fisheries decree N.18, 2013 and N. 59, 2014). BDM follows a different trade route to shark fin and fish maw. Due to unfavorable habitat, sea cucumbers are not present in Merauke District, so that all the BDM (or ‘trepang’ as it is called in Indonesia) traded in Merauke has been illegally smuggled from the South Fly. For this reason a ban on BDM trade in the Merauke District was implemented in 2012 by a Bupati Decree and all the BDM which arrives in Merauke has to be smuggled out of Merauke. Usually BDM are shipped out of Merauke in containers transporting scrap metal bought in the South Fly villages. The BDM enter the legal value chain only after they arrive in Jakarta or Surabaya.

Export from Merauke is only carried out by large traders (Figure 10). The large traders in Merauke often have business agreements with international exporters in Jakarta or Surabaya. Some large Merauke traders are directly employed by the exporters in the export ports. In most cases the exporters directly finance the trade operations in Merauke and also in PNG. One exporter in Jakarta reported that investors from Hong Kong are his main buyers. Hong Kong buyers usually retain high quality products for the domestic Hong Kong market and sell the low quality products into China. The trade of low quality products into China is mostly illegal to evade high import taxes. According to the exporter in Jakarta, Hong Kong buyers have recently stopped buying products from the Indonesian exporters due to a crackdown on the illegal trade from Hong Kong to mainland China.

Legal value chains

Fishers who are within one day travelling of Daru have the option of selling their products to licensed buyers in Daru (Figure 10). Six licensed buyers, all of whom are men, operate in Daru for dry and wet fish maw, BDM and shark fins. Licensed buyers in Daru reported some

difficulties in obtaining product from fishers as the fishers prefer to sell their product to Indonesian buyers since, as fishers themselves put it, “the Indonesian middlemen arrive at your door step.”

Most of the licensed buyers in Daru are also international exporters. They export directly to Singapore, Hong Kong and Malaysia depending on the quality of the products. High quality products usually go to Hong Kong and Singapore and the more inferior products go to other Asian countries. International exporters in Daru work preferentially with trusted Chinese buyers in importing countries. A few licensed buyers send the products to international exporters in Port Moresby, who then sell them to the same end markets. Several middlemen are also involved in trade of dry products, including one woman. Some of these middlemen work for international exporters in Port Moresby. The middlemen and woman buy from fishers in the villages and sell both to licensed buyers in Daru (the legal chain) and Indonesian traders (the illegal chain). Some of these middlemen sell to retailers in Port Moresby for the domestic market. Some of this latter trade is illegal where, for instance, BDM is sold during the closed season.

Live mud crabs

Mud crabs are commonly sold on the Merauke market by PNG fishers who travel there themselves. Mud crabs are also given to the Indonesian middlemen for their own consumption when they visit the villages (Figure 11). Although it is somewhat a grey area, the sale of crabs in Merauke could be considered as traditional trade and hence freely traded by inhabitants of the border area between PNG and Indonesia (under the Basic Agreement between the Government of PNG and the Government of the Republic of Indonesia on Border Arrangements 1974). Under the Basic Agreement and subsequent amendments, border residents are “permitted to engage in traditional and customary border trade within the respective border areas” (Special Arrangements Article 11.1). Traded goods must not exceed US$300 in value. Fisheries products however are not specifically listed in Annex A of the traditional goods exempted from duty or tax under the laws and regulations of the respective countries (Special Arrangements Article 11.2).

Crabs are sold and exchanged with Torres Strait traditional inhabitants (Figure 11) and this crab trade is also a grey area. It can be considered as traditional trade and regulated under the Treaty between PNG and Australia (Torres Strait Treaty 1985). Traditional inhabitants are permitted “free movement and performance of lawful traditional activities in, and in the vicinity of, the Torres Strait Protected Zone” (Torres Strait Treaty Articles 11 and 12). Traditional activities in the Treaty “shall be interpreted liberally and in the light of prevailing custom” but it specifically rules out activities of a commercial nature (Torres Strait Treaty Article 1.1). In both cases above, quarantine should be still regulated. Once in the Torres Strait, the mud crabs are sometimes mixed with the local catch and sold to wholesalers in Cairns, mainland Australia. During the final multi-stakeholder workshop in Daru in April 2018, participants noted that recently Australian Quarantine has stopped all trade in animals, including mud crabs, from the South Fly to the Torres Strait. This ban can potentially disrupt one of the main livelihoods for people in the communities close to the Torres Strait islands.

Mud crabs are also sold in the Daru market by PNG fishers (Figure 11). Traditionally mud crab harvesting and selling have been carried out by women in the South Fly. The interest in live mud crabs from the South Fly has been increasing in the last few years and recently several buyers, both local and external, applied for mud crab licenses. An international buyer/exporter noted that the stocks in the area are still in good health, in contrast to other countries such as Indonesia and Kenya. Singapore and Hong Kong are the main markets for international crab exporters. Local middlemen in the villages and Daru also buy from the fishers and sell to the licensed buyers in Daru or Port Moresby. Some of the local middlemen work as subcontractors for international exporters in Port Moresby and Daru.

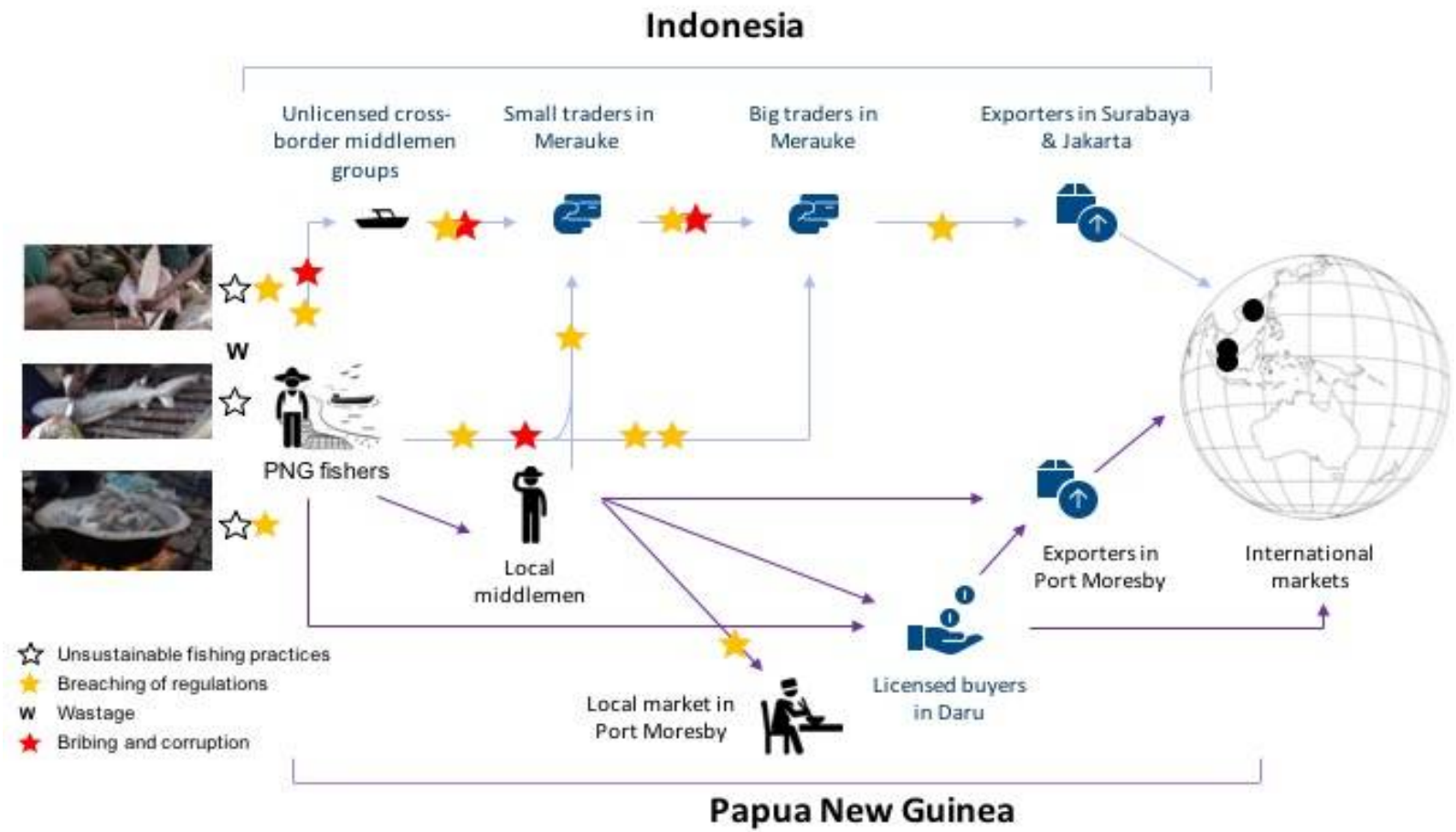

Figure 10. Actors in the illegal value chains (blue lines) through Indonesia and legal value chains (purple lines) through PNG of fish maw, shark fins and BDM. White stars represent points along the value chains where fishers practice unsustainable and/or illegal fishing activities; yellow stars represent points along the value chains where quarantine, custom, export and/or fishing regulations are breached; red stars represent points along the value chains where respondents reported to pay bribes to officials in order to conduct their activities; W indicates points along the value chains were wastage of product occurs.

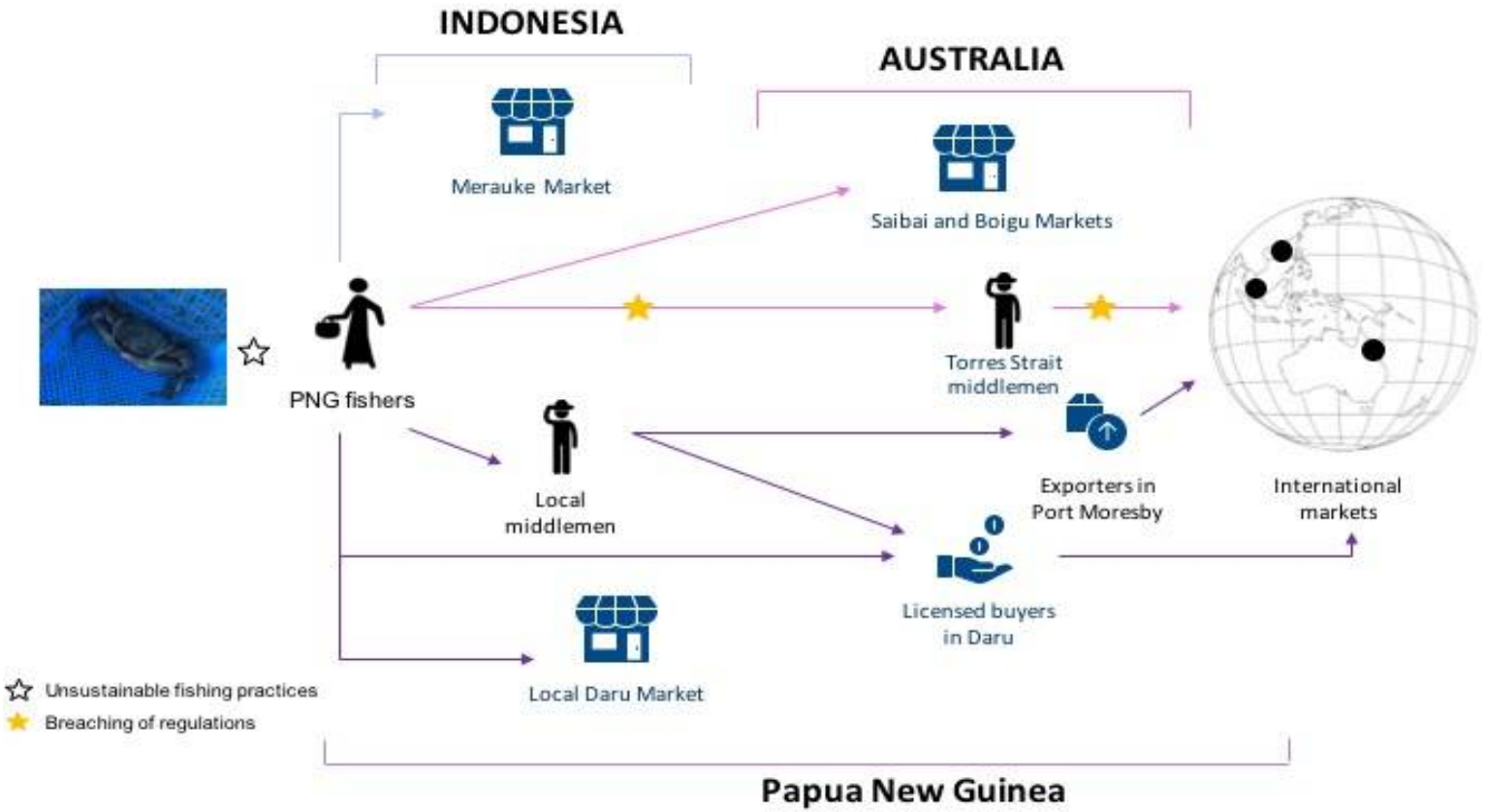

Figure 11. Actors in the Indonesian (blue lines), Australian (pink lines), and PNG (purple lines) live mud crab value chains. White stars represent points along the value chains where fishers practice unsustainable and/or illegal fishing activities; yellow stars represent points along the value chains where quarantine, custom, export and/or fishing regulations are breached.

7.1.5. Prices and grading of the high-value products

Dry products (fish maw, shark fin, BDM)

Collection of price data among fishers, middlemen and small traders proved very challenging since no records of transactions are retained. Often products are not weighed and a 'guess price' is given. Different currencies are also used in different villages which creates confusion among users about conversion rates. Villages close to the Indonesian border commonly use Indonesia Rupiah, the ones close to Australia use Australian dollars and the others use the national currency, Kina. Indonesian middlemen exchange the Rupiah for Kina in Merauke or Jakarta.

Fish maw: Prices of fish maw, shark fins and BDM along the value chains are largely dependent on demand by Chinese buyers and consumers and then they are simply passed to the next link in the chain all the way to the fishers. For some dry products price differences were detected depending on the trader to whom the fishers sold their product, and the village they reside in (village location and buyer are correlated because there is often only one buyer option or one preferred buyer option). Overall, the difference in fish maw prices (independent of species) between villages was statistically significant (Kruskal-Wallis chi-squared = 17.83, df = 5, p-value = 0.003168) (Figure 12). However, there was no statistically significant differences in shark fin prices between the villages (Kruskal-Wallis chi-squared = 4.3235, df = 4, p-value = 0.364).

Fish maw prices were higher in Tureture and Kadawa, where people were more organised in hosting and trading with the cross-border middlemen and where several kinship ties exist according to FGD participants. Higher prices paid to fishers in these communities reflect their greater bargaining power compared to other communities. In Bula, only people who have family ties with people in Merauke own nets. FGD participants In Bula mentioned that the most vulnerable people in the village are those with no family ties to Merauke. People who had family ties and thus also had nets fetched high prices in Bula. People who do not own nets cannot easily engage in the trade of marine products with the cross-border traders. These people hunt deer which they sell to cross-border traders. Deer product prices are however lower than those for marine products, especially in remote villages.

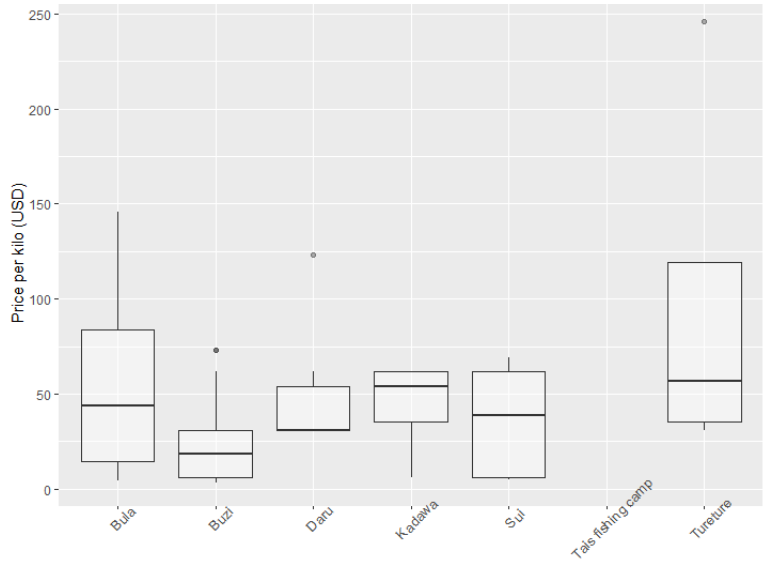

Figure 12. Average prices/kg of fish maw (in US$) in the surveyed villages (25th and 75th percentiles and outliers are also reported).

Chinese consumers are very attentive to product quality and prices vary accordingly. The exporter in Jakarta reported that (in general) products from Merauke are of the best quality in Indonesia, and thus fetch the highest prices. However buyers in Merauke also indicated that fish maws from PNG are lower in quality than those from the Merauke fisheries due to lack of processing skills. In an attempt to raise prices for PNG product some Indonesian middlemen are reported to be training PNG fishers to improve their processing techniques.

Even though we were not able to collect prices for all actors along the value chains, it is clear that mark-ups for dry products from the initial and final prices are extremely high (see Figure 17, Figure 18 and 20 for mark-up amounts). Fishers consistently fetched higher prices when selling to the legal buyers than the illegal. They earned the least when selling to local middlemen.

Limited information is available for fish maw prices on the Chinese markets. However, it is clear that Croakers' maw, among which black jewfish (*Protonibea diacanthus)*, fetch the highest prices (Tuuli et al., 2016). Black jewfish maw are possibly among the most valued on the Chinese market due to its rarity after overexploitation in many areas. Unlike the other fish maw species, black jewfish maws have a specific grading system according to sex, with higher prices for male maw; larger sizes (the bigger the better); colour (clear translucent colours are preferred); and lower fat content (with fat traces decreasing the value) (Figure 13). Respondents in Merauke reported that they also 'rename' black jewfish maw from the South Fly and trade it as Chinese bahaba (*Bahaba taipingensis)* which is a Chinese endemic species listed as critically endangered in the IUCN Red List of threatened species (http://www.iucnredlist.org/details/61334/0). A large, high quality maw of this species can reach up to hundred thousands of dollars due to its rarity (Moore 2012 in Tuuli et al., 2016). Barramundi and catfish maws are less valued, especially when the maw has not been processed well. In summary, black jewfish maws fetched the highest prices with high quality jewfish maw reported to be sold at around US$1000/kg to the consumers. Barramundi and catfish maws were sold at US$540/kg and US$40/kg respectively.

Figure 13. Bad (left) and good (right) quality jewfish maw according to traders in Merauke

Shark fin: Although actors reported a decrease in shark fin demand in the last few years, they are still the most highly priced marine products. Decrease in demand was perceived to be due to the stricter regulations in Indonesia and the strong anti-finning campaigns in China. Grading is based on size, cut and division between white and black fins, although it was difficult to establish any standardised definition among buyers of what were white and black fins (Figure 14). The price mark-up between the price paid to fishers and the final selling price on the Chinese market is the highest among the dry products (Figure 18). Shark fins are sold to the end consumers in Hong Kong and Singapore for an average price of US$1,000/kg.

Figure 14. White and black shark fins in Merauke (left) and large fins in Singapore (right).

BDM: Final prices of BDM greatly varied depending on the species (Purcell et al., 2018) but also according the quality. According to buyers in Hong Kong and Port Moresby, consumers have recently become more attentive to the quality of dry BDM product and it has become more difficult to sell low quality products (Figure 15). Product grading is based on lack of damage, dryness, species, and size. Buyers in Port Moresby reported to have received poor quality BDM from Daru in 2017. They mentioned that BDM from Daru were not well dried and at risk of rotting. They also reported that they had been unable to sell part of the BDM that came from Daru and that they had to reprocess the products in order to sell them overseas. The lack of processing skill reduced the prices of BDM which was also reflected in the price mark-up between the price paid to fishers in the South Fly and final prices (Figure 19). There is also more attention paid to the provenance of the BDM. This may be the reason most of the BDM is now sold as Australian product, even when it is clear that the product was not caught in Australia (Barclay et al., 2016).

Figure 15. BDM for sale in retail shops in Hong Kong (left) and Singapore (right).

Live mud crab

Live mud crab quality mainly depends on crab sizes and shell thickness (Figure 16). Prices were the lowest when mud crabs were sold at the market in Daru (Figure 20). Overall the price of crabs did not vary much between local middlemen, licensed buyers in Daru and the Merauke market. The highest price is fetched by selling to the Torres Strait Islanders. Australian dollars are used in these transactions and final prices are around 6 USD/kg. Higher price mark-ups were observed for sales in Singapore or Australia. There was a 6x mark-up in the value chain to Australia and 11x mark-up in the international value chain through licensed buyers in Daru.

Figure 16. Live mud crab for sale at the market in Daru (left) and online sale for Australian consumers (right).

In contrast to dry products, which are only traded by men for the international market, women have a traditional role in obtaining and selling mud crab for local consumption. Men have become more involved in crabbing and the crab trade now that this species has become more economically valuable, but women have also maintained their roles. Overall, 46% of fisherwomen reported to be involved in crabbing activities, versus 23% of fishermen.

7.1.6. Traded quantities of high-value products through the illegal and legal value chains

According to quantities reported by fishers, a higher volume of product is traded through the illegal value chain than the legal (Table 1). Reported percentages of BDM harvested refer only to the open season. However BDM trade continues during the closed season, and has never stopped during the moratorium.

Table 1. Proportion by value of products traded through legal and illegal value chains

Product	Legal value chain	Illegal value chain
Fish maw	29%	71%
Shark fins	27%	73%
Beche-de-mer	36%*	64%*
Mud crabs	12%	88%

**Values refer to the open season. During the moratorium and during the closed season in 2017 the trade was 100% through the illegal value chains.*

In summary, the current value chains are highly inefficient, inequitable and unsustainable for the following reasons: 1) they are long, especially through Indonesia, with up to six actors; 2) there are limited value-adding activities along the value chains; 3) they deliver very low returns to fishers; 4) people involved in the illegal activities, especially fishers and Indonesian middlemen, are vulnerable to prosecution, penalties and have to pay bribes in order to conduct the trade; 5) there is a high level of waste from the fish maw and shark fin harvests; and 6) the associated fisheries that the fishers depend on are unsustainable and unmanaged.

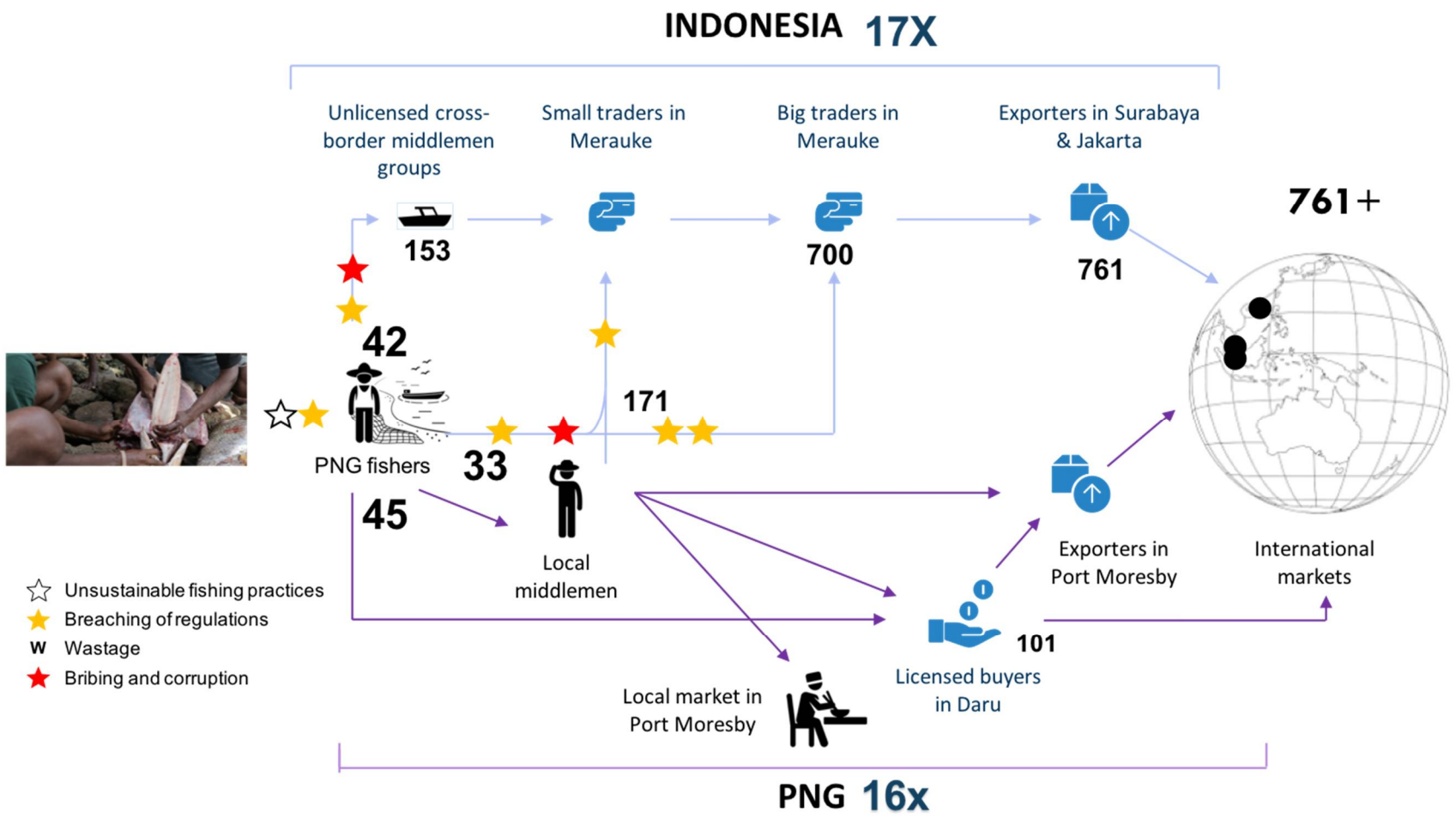

Figure 17. Prices ($US) for fish maw (jewfish, barramundi and catfish together) along the value chains. All prices are at 2017 exchange rates. Mark-ups from the fishers to the end consumers for each value chain are shown in light blue.

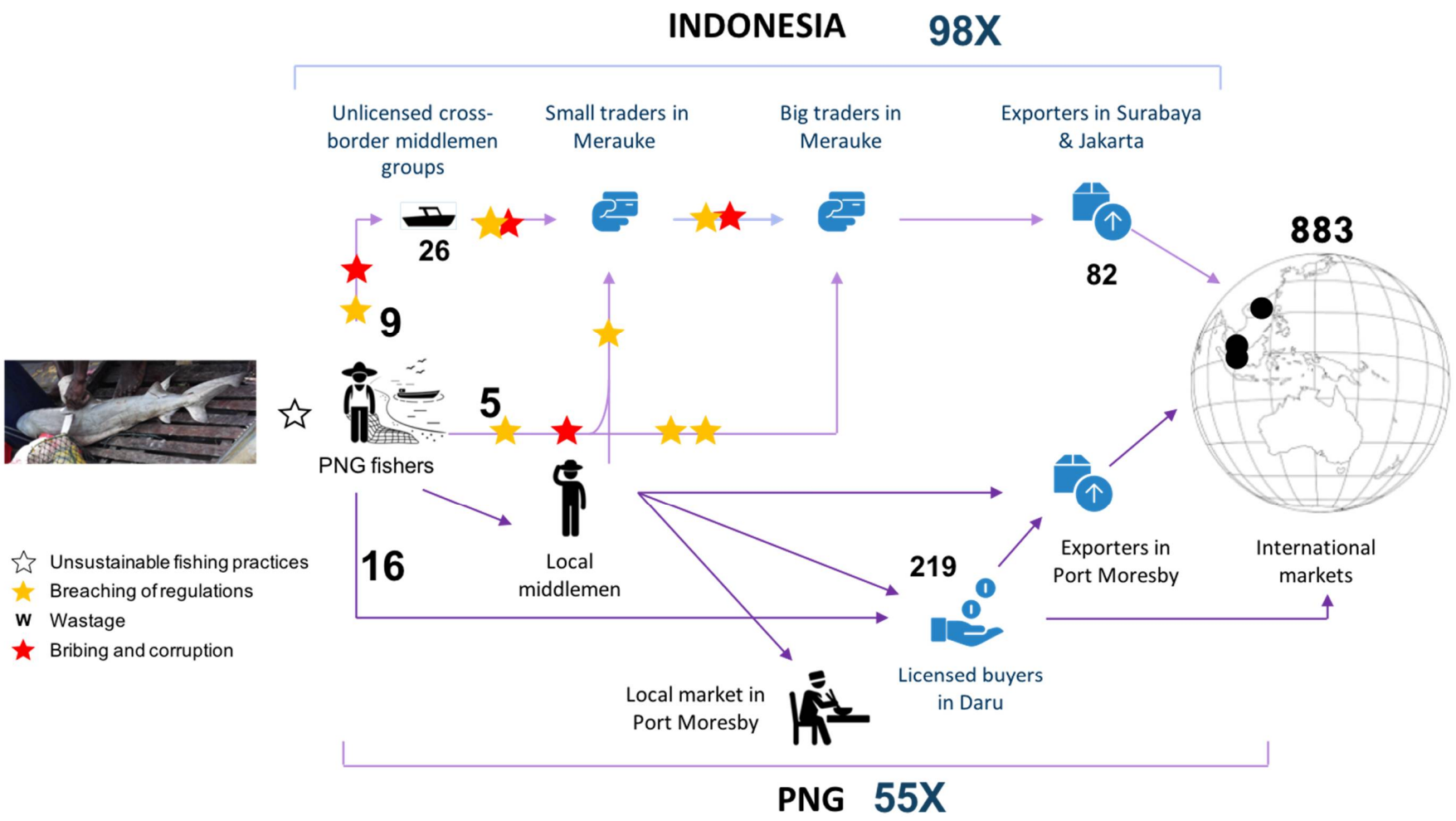

Figure 18. Prices ($US) for shark fin along the value chains. All prices are at 2017 exchange rates. Mark-ups from the fishers to the end consumers for each value chain are shown in light blue.

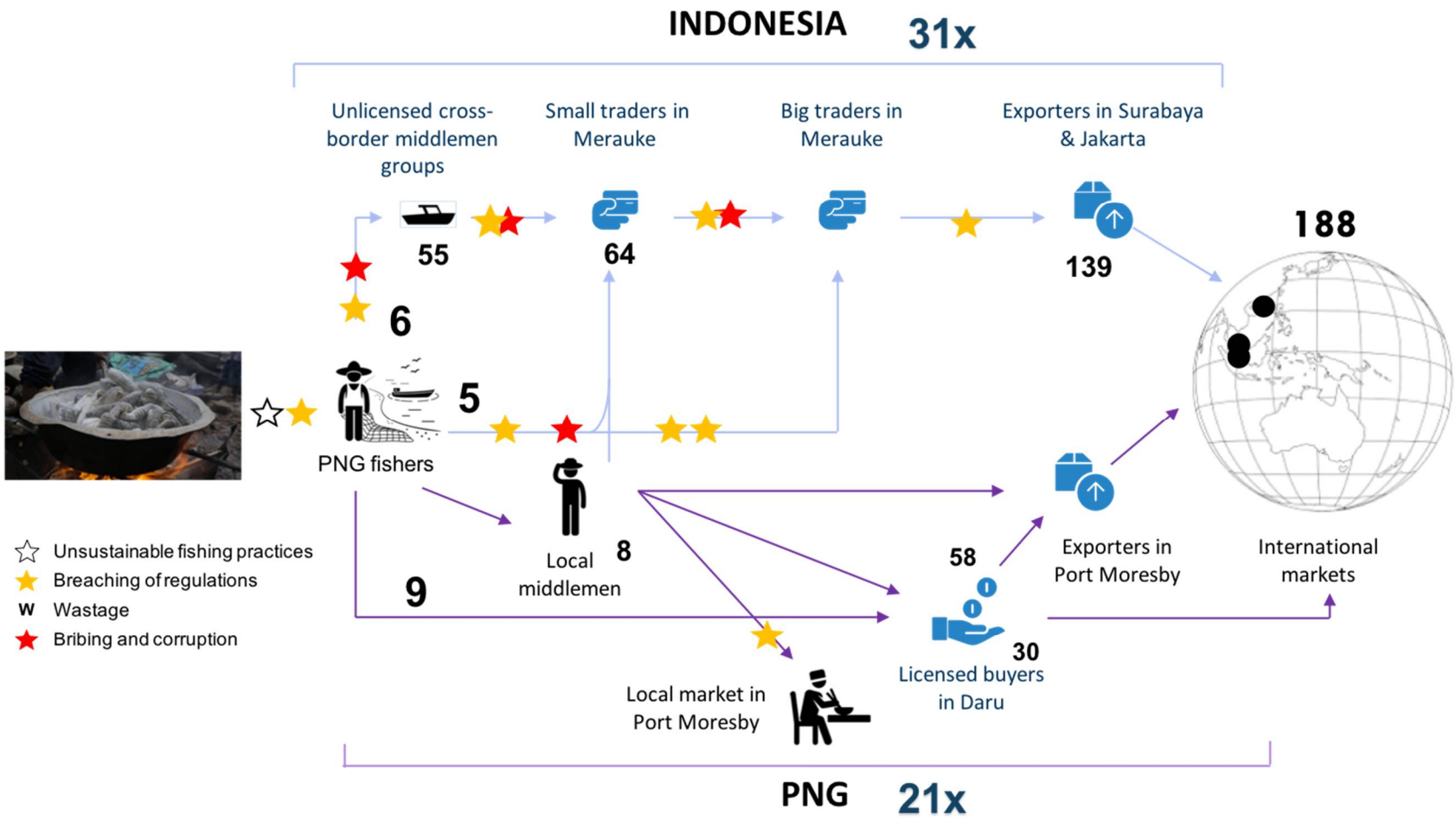

Figure 19. Prices ($US) for BDM along the value chains. All prices are at 2017 exchange rates. Mark-ups from the fishers to the end consumers for each value chain are shown in light blue.

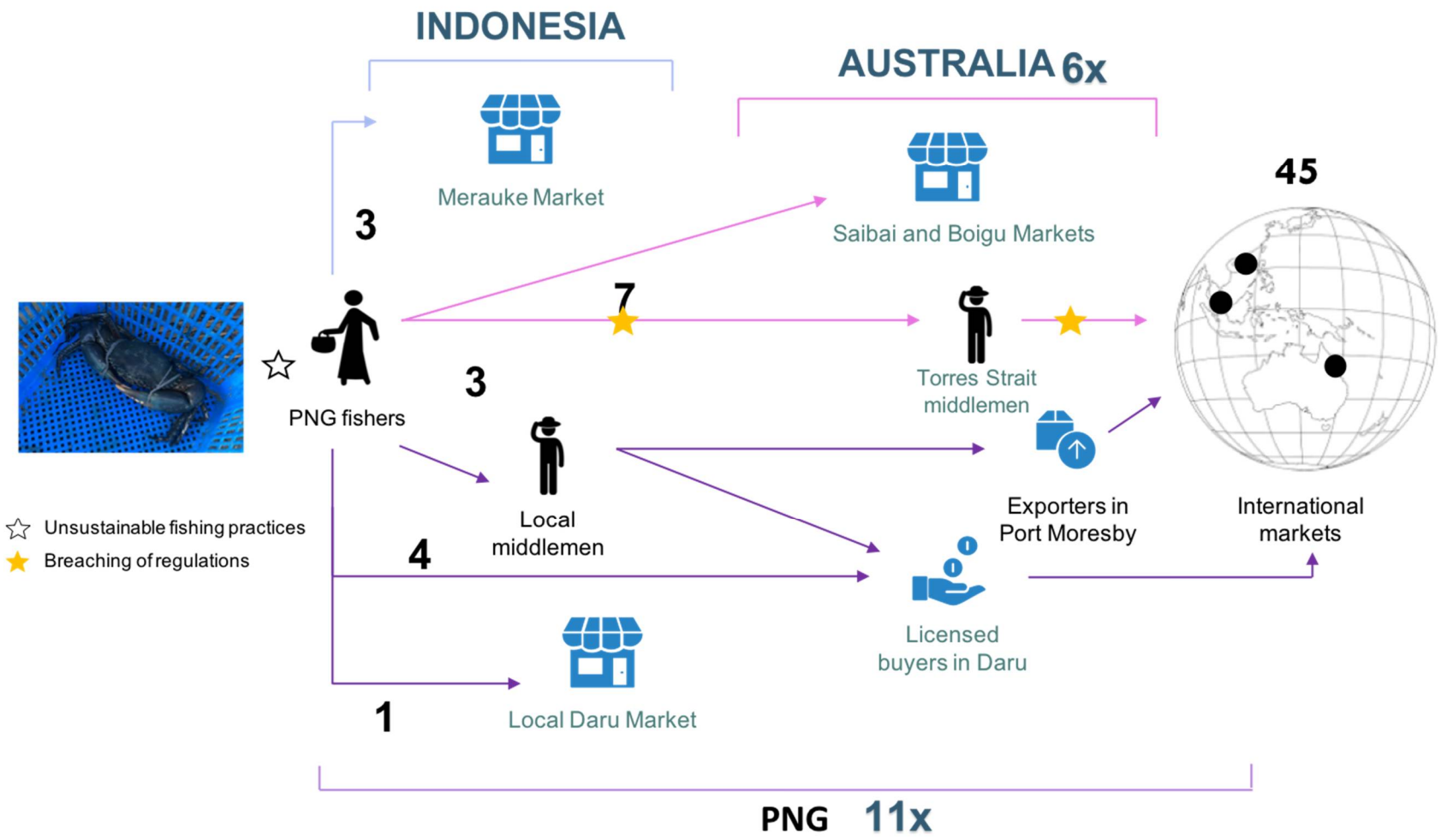

Figure 20. Prices ($US) for live mud crabs along the value chains. All prices are at 2017 exchange rates. Mark-ups from the fishers to the end consumers for each value chain are shown in light blue.

7.2. Identification of the socio-cultural and economic factors driving legal and illegal value chains, and potential intervention points, alternative legal markets and marketing strategies for fishermen (Objectives 2 and 3)

When asked why fishers trade through Indonesia (i.e. the illegal value chains), respondents mostly cited that fishers do it to improve their living standards since it is the only available market in most of the villages (Figure 21). It was also often reported that fishers trade with Indonesian buyers because they bring with them goods such as flour, rice, batteries and fuel which are essentials in the villages but cannot be accessed otherwise. They also mentioned convenience because the traders came “to their door.”

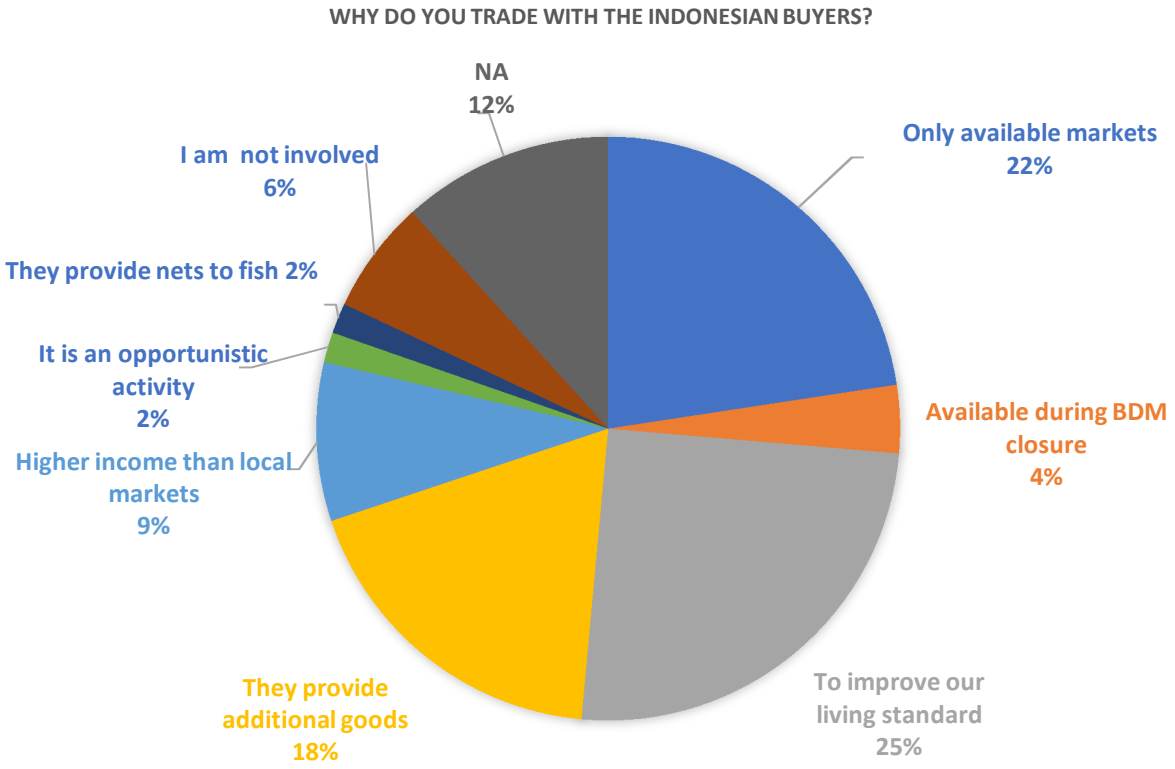

Figure 21. Answers to the question: Why do you trade with the Indonesian buyers? (n = 239)

When respondents were asked whether they thought that fishers would still get involved in illegal activities if they had alternative legal markets and livelihoods which provided the same income, most of the respondents said fishers wouldn't get involved in illegal activities (54%). Respondents who thought that fishers would not stop selling the product to the Indonesian middlemen if an alternative was provided, stated that fishers would do both, since people in the villages need cash (Figure 22). The other two most cited reasons were related to the fact that Indonesian middlemen travel directly to the villages to pick up products and that they bring with them goods essential to the communities which could not be accessed if the trade stopped.

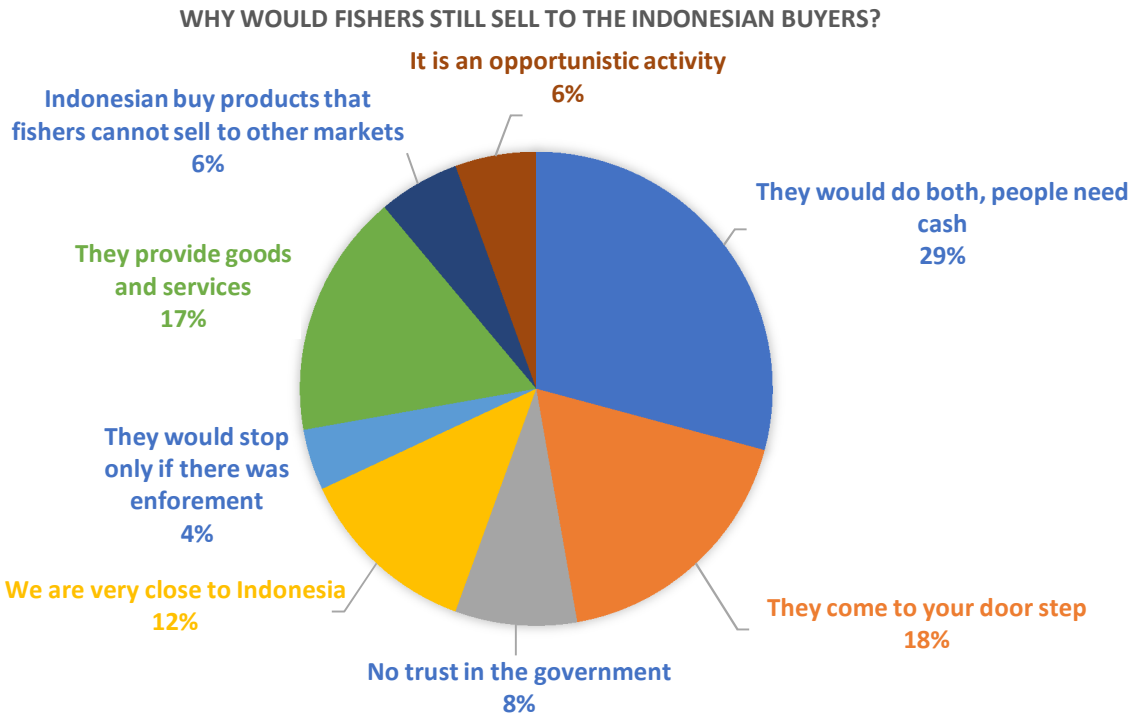

Figure 22. Answers of respondents who said that fishers would not stop trading with Indonesian traders if they had alternatives to the question: Why would fishers still sell to Indonesian buyers? (n = 72)

When respondents were asked which alternative legal markets for marine resources could be developed to divert fishers away from illegal fishing and trade, prawns was the main species cited as potential new species to trade outside the local markets (Figure 23). Tilapia, reef fish and shellfish were other potential species reported for the development of new fisheries markets. The need for markets for the discarded meat from jewfish, barramundi, catfish and sharks was also reported. Several respondents also noted the need for more efficient and equitable markets for live mud crabs.

Freezers in the villages, affordable transport and a new local market in Daru were reported as priorities to allow fishers to be involved in alternative markets and value chains. Several respondents suggested that a system with fisher cooperatives managing the fish market in Daru and buying products from the fishers would be an effective solution. Fish farming, mainly for tilapia and crocodile, was also an alternative livelihood often cited. When asked about possible markets or livelihoods activities other than exploitation of marine resources, the majority of respondents reported agriculture (Figure 24). Coconut plantations, other cash crops or products from community gardens were often cited. Farming was also reported as a potential alternative livelihood, with chickens and pigs on top of the list. Farming is already practiced in the villages on a small scale, with animals sold to the Indonesian middlemen or on the Merauke market. According to respondents, the Australian Quarantine often does not allow people in the villages to farm chickens and pigs to protect the Australian borders from potential biosecurity threats. Due to increasing population in Papua and the Merauke district, demand for fresh produces is fast increasing. Hence, local authorities in Merauke expressed their interest in discussing options to implement free trade agreements between Merauke and South Fly Districts to allow legal trade of agricultural and marine products and livestock

(chickens and pigs). According to the authorities in Merauke, previous attempts to start a dialogue with PNG counterparts have been unsuccessful.

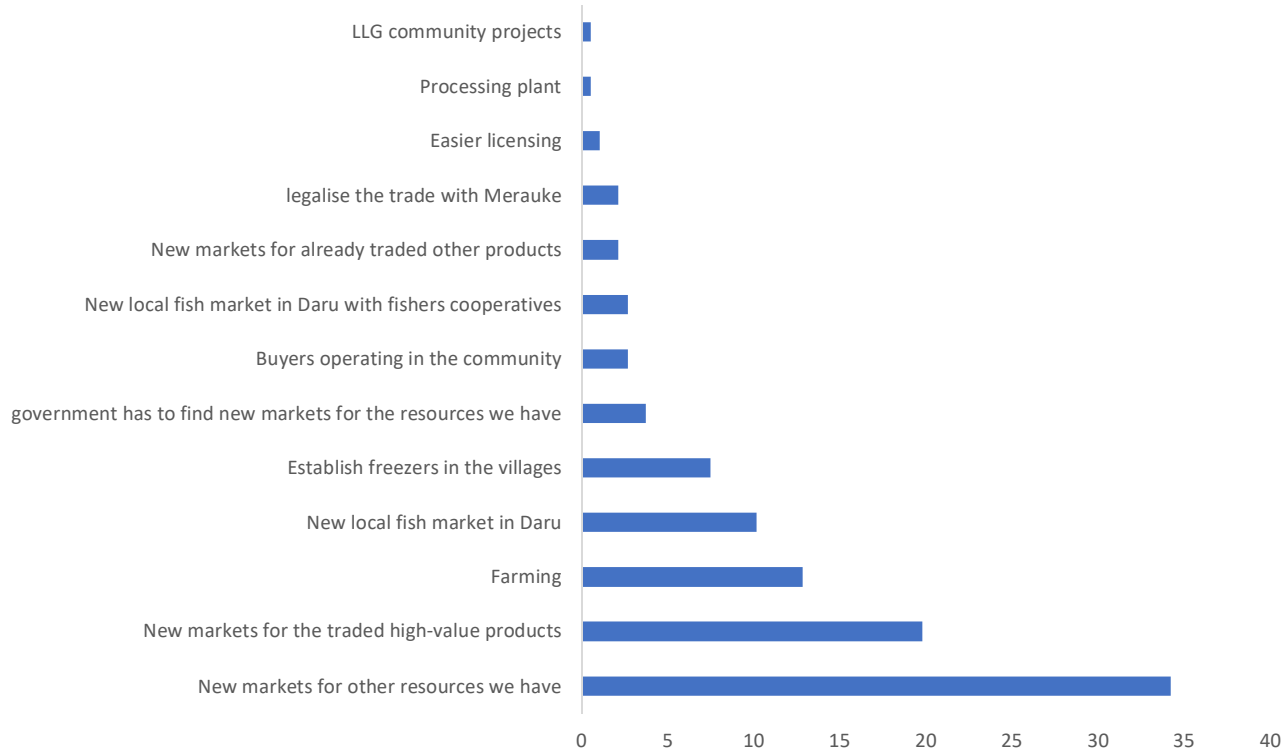

Figure 23. Possible solutions to marine product problems reported by respondents (n = 194)

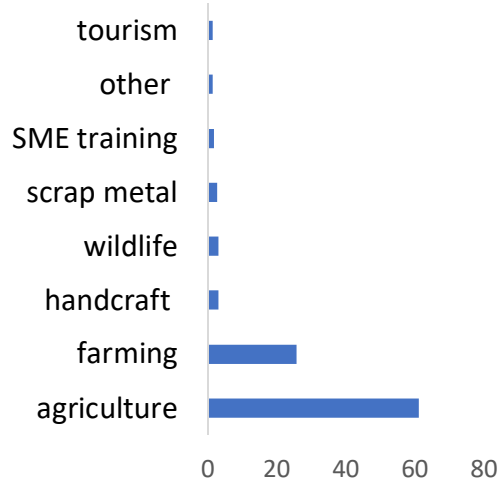

Figure 24. Livelihood alternatives suggested by respondents (n = 194)

At the final multi-stakeholder workshop in April 2018, participants identified the main barriers that fishers face to become involved in legal value chains and/or alternative markets and livelihoods. Eight main themes were identified: the difficulties for villagers to obtain new buyer and exporter licenses; the high costs of running a seafood business; lack of information flow; lack of capacity among fishers for quality management; and the low capacity of management agencies at government and local levels (

).

Causal loop analysis (see Butler et al., 2015) was used to identify the linkages and feedback loops between the root causes and symptoms for each theme. Twelve solutions were identified. NFA, provincial and district fisheries capacity-building, and collaboration and trust-building amongst villagers, and also between fishers and other stakeholders were prioritised. These interventions were also identified by KI interviews who often highlighted the need for more collaboration amongst stakeholders, and the need to build the capacity of fisheries agencies. The need to build trust among people in the villages and between fishers and other stakeholders was also repeatedly reported as a priority. Problems with the current Torres Strait Treaty and the need for a revision of the Treaty to be more consistent with the current issues faced by traditional inhabitants were also reported in the workshop. This also was often mentioned by KIs, who also mentioned the relative flexibility of the PNG-Indonesia Agreement. The need for villagers to be able to save part of their income in order to allow them to become involved in other businesses was also mentioned. Participants highlighted that the involvement of NGOs with successful track records of having implemented such activities in other areas would also be beneficial.

Solutions were then identified which tackled the causes. Those which addressed the systemic, root causes were prioritised. The results were then combined (Figure 25).

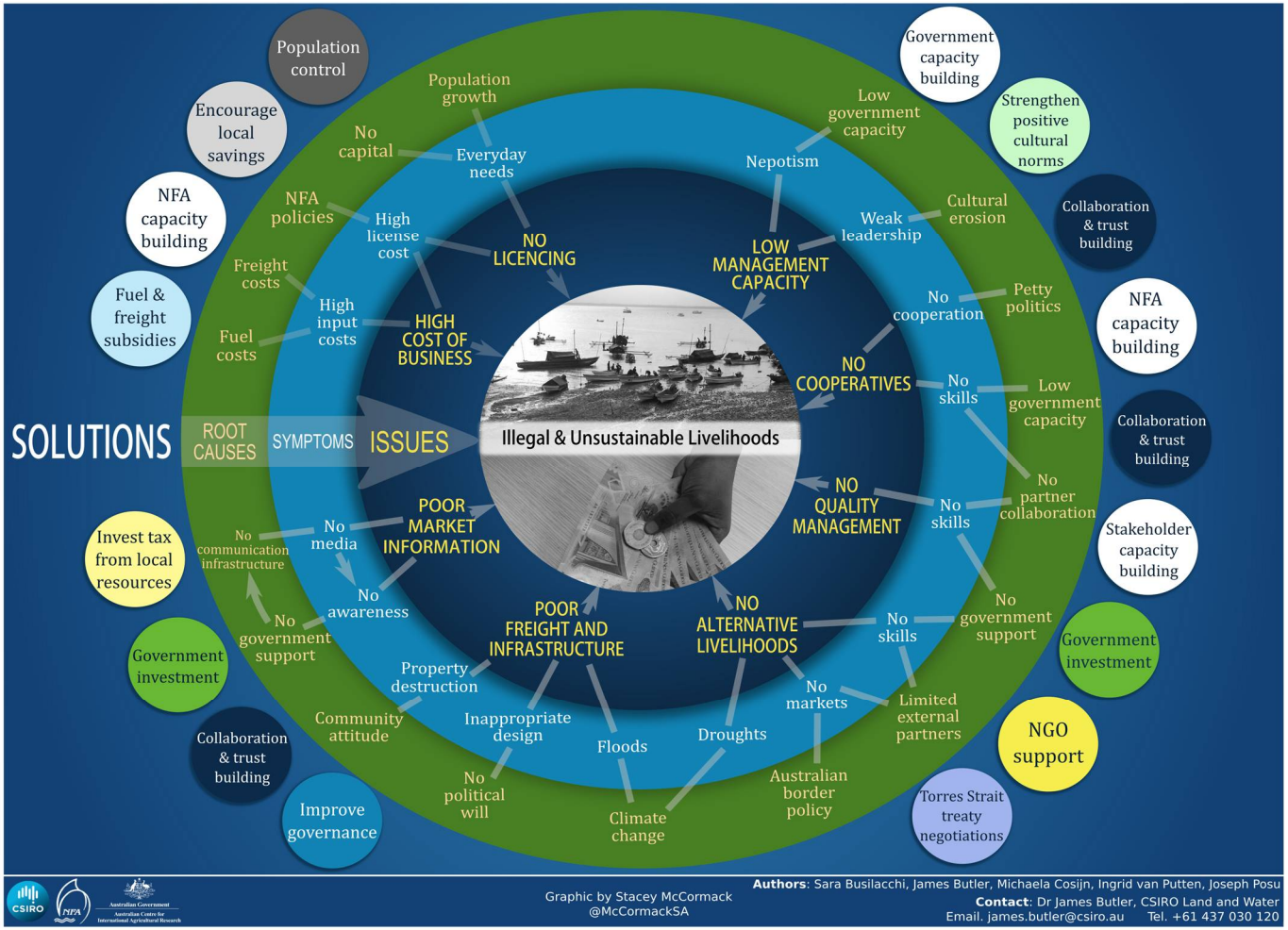

Figure 25. Issues, symptoms and root causes of illegal and unsustainable livelihoods, as identified by participants at the final multi-stakeholder workshop in Daru, plus their linkages and solutions. Note that feedback loops are not illustrated.

8. Impacts

This SRA project provides the diagnostic component of any future wider action research projects looking into ways of increasing community well-being and ensuring sustainable fisheries, while reducing the illegal and unsustainable activities in the borderland region of the South Fly, PNG.

The project was able to engage with all groups of actors along the value chains, including the illegal value chains. It provided for the first time a platform where actors in the illegal value chains were able to discuss with other stakeholders the monitoring and management of the value chains without fear of prosecution.

Future implementation of the recommendations through an action research project would improve fishers' income and encourage more sustainable resource use, with corresponding impacts on poverty alleviation. The primary beneficiaries would be the PNG coastal villages. The potential total number of beneficiaries is up to 20,000 people in the South Fly.

Through its Provincial Support and Industry Development Division, NFA is keen to develop viable fishery enterprise models throughout coastal PNG, and consequently the approaches developed by any future action research projects could be scaled out to numerous other communities, particularly in areas that are remote from markets. There will also be indirect benefits to Australian and Indonesian governments and communities in the transboundary Torres Strait region due to reduced exploitation of shared high-value or protected marine resources (particularly BDM, sharks, barramundi and jewfish), and reduced costs of enforcement of illegal fishing and trading activities.

9. Conclusions and recommendations

9.1. Conclusions

Results of this SRA highlight the importance of taking a systems-based approach to any future interventions in the South Fly. Clearly in a complex context such as the South Fly, single development or conservation interventions may not be effective in isolation. To increase the likelihood of successfully combatting illegal trade of wildlife, conservation and development should be merged, which requires a systems approach. Any future interventions in the South Fly will require action in several dimensions of this particular system in order to achieve impact and positive change. Future interventions will have to be multidisciplinary, including developing innovative ways to share information, to change stakeholder behaviour, building skills and capacity at different levels along the value chains, with particular focus on fishers and agencies involved in the governance of these value chains.

9.2. Recommendations

9.1 Systems approach to a complex problem

The problem of illegal and unsustainable livelihoods in the South Fly is highly complex, with multiple root causes and symptoms. Any interventions proposed to divert fishers from illegal value chains should address the root causes of problems. Otherwise they are likely to result in failure.

9.2 Capacity-building

A lack of capacity at all levels appears to be a major root cause of the problem, and must be addressed. Fishers and all other relevant local stakeholders should be engaged using participatory approaches in all stages of any intervention. This will ensure the legitimacy and transparency of interventions, and encourage learning, collaboration, coordination and capacity-building.

9.3 Improve resource management

Many of the marine species targeted by fishers are not being effectively managed. To ensure the sustainability of these resources, improved management is critical. Community-based management of species is one potential solution for this issue, but capacity-building would be required. Sustainable, community-based management of other resources (e.g. deer, pigs) is also necessary to enable diversification of livelihoods and reduce pressure on marine species.

9.4 Alternative enterprise models

To ensure greater returns to fishers from the value chains, alternative enterprise models should be tested which are culturally-appropriate. Cooperatives and ‘hub-and-spoke’ models have been suggested by participants as models which may enable fishers to gain greater market power, combined with improved product quality and value-adding. Enhancing market information for fishers through communications infrastructure is also necessary to support these business models.

9.5 Diversify livelihoods

Potential alternative livelihood activities which could diversify income and reduce pressure on current marine resources include: small-scale barramundi farming using locally-sourced feed; small-scale sea cucumber ranching; crocodile farming using tilapia or other pest fish as feed; farming of livestock (e.g. chickens).

9.6 Implementation of the free-trade zone in the PNG-Indonesia border area

Merauke, and Indonesia at large have developing economies and a growing population, with concomitant growing demand for marine, terrestrial and agricultural products. The implementation of a free trade zone following the Free Trade Zones Act 2000 in the PNG-Indonesia border area with a trade centre in Bula would provide PNG border communities with legal and monitored access to the Indonesian market.

9.7 Review of the Torres Strait Treaty

Current restrictions under the Torres Strait Treaty on the movement of goods and products from PNG into the Torres Strait Protected Zone are limiting opportunities for PNG Treaty Villages' livelihoods, exacerbating poverty and illegal activities. As a result, illegal trade of marine products is occurring through the Torres Strait, involving PNG fishers and Australian middlemen. Also, the lack of opportunity has resulted in illegal fishing of BDM in Protected Zone waters, and hence resources shared by PNG and Australian Treaty communities. A review of the Treaty's arrangements is necessary, at least to formalise the existing informal trade in marine products, and to improve joint management of BDM, sharks, barramundi and mud crabs.

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10.2. List of publications produced by project

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Conference attendance:

Busilacchi, S., Butler, J. R. A., Posu, J., Cosijn, M., Van Putten, I. *Shark fins: high-value commodities or survival products?* The 10th Indo-Pacific Fish Conference, 2-6 October 2017. Tahiti, French Polynesia.

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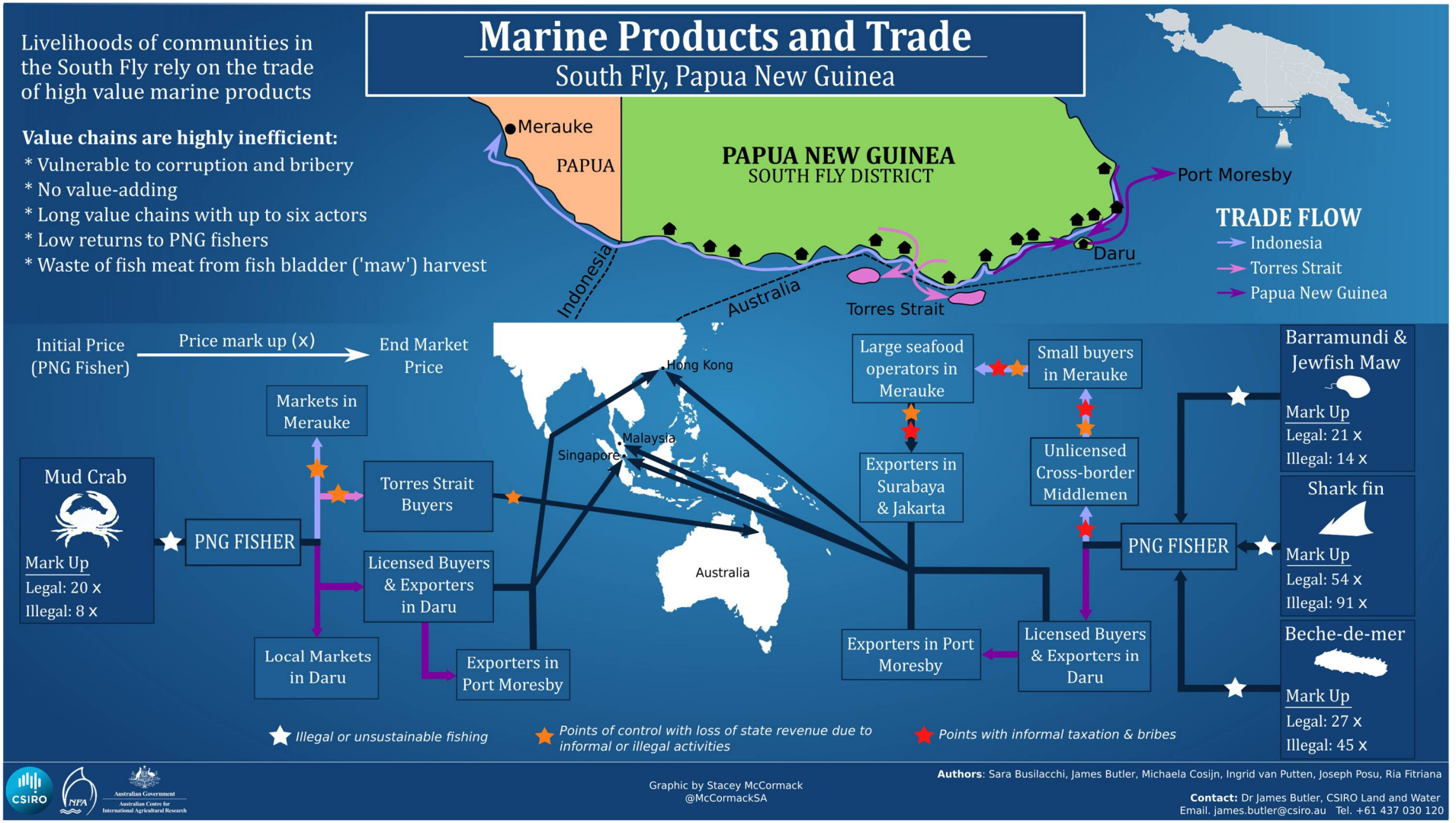
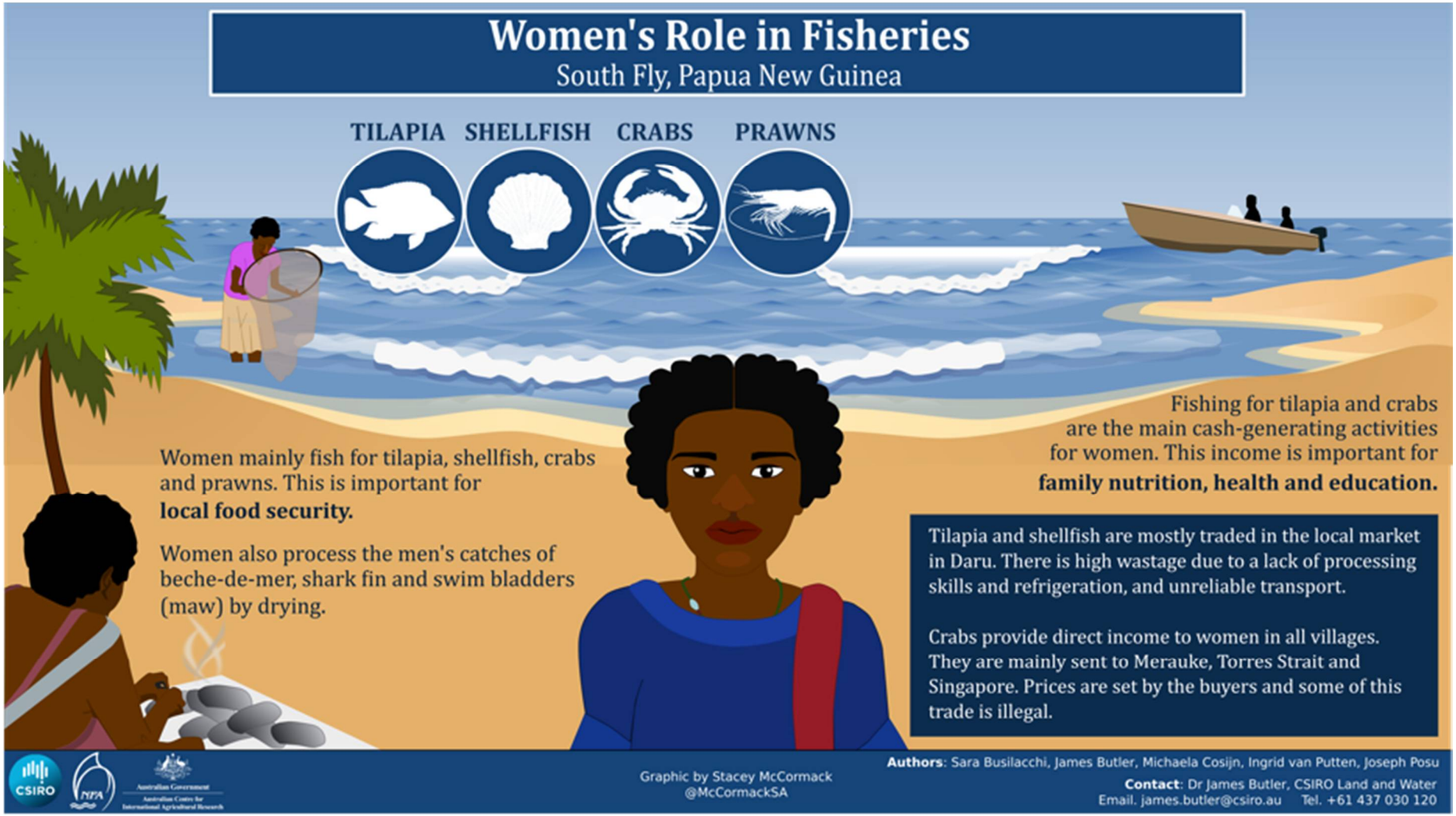
Busilacchi, S., Van Putten, I., Butler, J. R. A., Cosijn, M., Posu, J. *Transforming value chains for marine products in the South Fly District of Papua New Guinea.* 3rd World Small-scale Fisheries Congress: Trans-disciplinarity and Transformation for the Future of Small-Scale Fisheries, 22-26 October 2018. Chiang Mai, Thailand.

11. Appendices

11.1. Appendix 1: Infographic of value chain mapping



11.2. Appendix 2: Infographic of women's role in fisheries



11.3. Appendix 3: Verbal and written consent forms and information sheet

Verbal consent record

Verbal introduction and permission to conduct the interview

- Introduce yourself
- Overview of the interview

About the project

The project is a collaboration between CSIRO, ACIAR and PNG NFA. The goal of the project is to improve the lives of people in the coastal villages of the South Fly District while finding good management options for the fisheries. To ensure the well-being of people living in the coastal villages, it is important that fishermen and women can sell their catch at fair prices by improving existing legal markets and by finding new ones. Also, new options to earn money should be identified. It is also important to find, in collaboration with people in the villages, good management options to make sure that there will be fish and sea cucumbers to sustain the lives of present and future generations.

The information that we are collecting today will help to identify options for future markets and/or other income-earning activities and for the proper management of the fisheries.

What is involved?

- Project team members will ask to participate in this interview, which aims to collect information to understand current ways of living of people and find, in collaboration with people in the villages, new markets or cash-generating activities.
- Participation in this interview is for collecting background information only.

Participation and withdrawal

- It is up to you whether you decide to participate or not.
- Participation is voluntary and you are free to stop participating or withdraw information at any time.

Risks

- Participation in this research should involve no physical or emotional distress.

- If you feel uncomfortable talking about certain information, you are free not to answer.
- Please discuss any concerns or risks with members of the project team so we can try to find ways to minimise any risks.

Confidentiality

- You will not be directly identifiable in any reports, publications or discussion of results.

Use of the information you provide

- Information may be written up in reports, research publications and other formats such as information sheets. Information may also be verbally presented as part of project and stakeholder engagement meetings.
- You will not be identifiable in the reporting of results.

Ethical review process

- This project adheres to the guidelines of the ethical review process of CSIRO, Australia. You may wish to discuss your participation in this study with members of the project team. Contact details are given in the information sheets provided.

Confirm willingness to participate:

- Do you have any questions relating to your participation?
- Are you happy to be involved in the interview today?
-

RECORD OF INDIVIDUAL CONSENT

I have discussed the information and am satisfied they understand the nature of the research, and their role in it. The participant has been provided with project information and contact details of the project team.

Name of the interviewer: _____
Signature: _____
Location: _____
Date: _____

Written consent record

Dear Participant,

Please review the information below and sign where required if you agree to participate in this research project. (Note if you would like the interviewer to read this to you please request that they do).

I acknowledge that:

- I have agreed to participate in the above project being conducted by the CSIRO, ACIAR and PNG NFA.
- I have been provided with information about the project, and have discussed my participation with a team member. My questions regarding participation and any risks and benefits have been answered to my satisfaction. I understand my contribution to the research will involve participating in short interviews which aim to understand the dynamics and nature of cross-border activities.
- I have been provided with contact details of project team members and understand that I can contact them at any point during the study.
- I understand that my participation in the project is entirely voluntary and that I am free to withdraw from the study at any time and without having to provide a reason for my withdrawal.
- I am also free to withdraw information I have given without having to provide a reason.
- I understand that the information I provide for this research will be written up as part of case studies, research publications and other formats such as information sheets. Information may also be verbally presented as part of project and stakeholder engagement meetings.
- Information provided by me will only be accessed by members of the project team and used for the purposes outlined above. It will be stored securely and retained for a period of five years after which it will be destroyed.
- All information will be de-identified so that it cannot be linked to me.

Name:_____

Signature: _____

Date: _____

Information sheet

Thank you for agreeing to participate in this research. This study adheres to the guidelines of the ethical review process of CSIRO, Australia. You are free to discuss your participation in this study with project staff, or with any of the contacts listed below.

About the project

The project is a collaboration between CSIRO, ACIAR and PNG NFA. The goal of the project is to increase income and empowerment of coastal communities in the border area of the South Fly District in PNG while reducing levels of over-exploitation of marine resources. Communities' livelihoods in the South Fly are heavily dependent on small-scale fisheries. In the last decades however, some fish stocks are being overexploited due to population growth and a lack of alternative options. To ensure communities' well-being and the long-term sustainability of marine resources, there is a need to enhance returns to villagers from the marine products they catch and/or to find alternative markets for these products.

By analysing the value chains for specific marine products (bêche-de-mer, shark fins and fish maw (dried fish bladders) from barramundi and jewfish), the research will identify key stakeholders along the value chains, and the value that is added along the chain. Through participatory activities with South Fly fishermen, women and local buyers, potential alternative management and marketing strategies will be investigated. Results from the project will inform future management and development activities in the South Fly.

What is involved?

You have been asked to participate in this interview due to your knowledge about the issues around cross-border trade and/or your role in regulating and/or monitoring and/or managing the cross-border trade/legal trade of bêche-de-mer, shark fins and fish maw. The aim of these interviews is to gather information about the legislative and institutional framework around the marine product value chains, the trade dynamics, the actors involved, and product prices. A better understanding of the trade and the value chains is a key step to implement appropriate participatory management strategies and to identify alternative markets. Interviews cover topics relating to the nature and dynamics of the cross-border trade, actors involved in the trade, prices of the products along the value chains; about the legislative and institutional frameworks around the value chains and your opinion on how this issue can be addressed.

Participation and withdrawal

Participation in the interview is completely voluntary. It is up to if you chose to participate. You may choose to stop the interview at any time or withdraw specific information given.

Risks

Participation in this research should involve no physical or emotional distress. If you feel uncomfortable disclosing certain information, you are free not to answer. If at any time you are concerned about risks due to your participation, please discuss with the project team, so we can work out a way to minimise the risk.

Confidentiality

You will not be directly identifiable in any reports, publications or discussion of results.

Use of the information you provide

Information you provide will be used for research purposes, including assessing the resilience of illegal value chains and identifying barriers to moving into legal value chains or other income generating activities; providing information on how to develop more effective intervention strategies to increase the strength and functionality of legal value chains and strengthen household livelihoods and sustainable exploitation practices as a consequence.

Information may be written up in case study reports and research publications or other formats such as information sheets. Information may also be presented as part of project and stakeholder engagement meetings.

Ethical review process

This study adheres to the guidelines of the ethical review process of CSIRO, Australia. You are free to discuss your participation in this study with project staff. Contact details are listed below if you want to further discuss about the project in future.

Further information

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NFA
Fisheries Manager

Ph: +675 3090444
Email: jposu@fisheries.gov.pg

Dr Sara Busilacchi
CSIRO
Research Scientist

Ph: +61 406 559 328
Email: sara.busilacchi@csiro.au

11.4. Appendix 4: Key informant discussion points

KEY INFORMANT INTERVIEW GUIDE

Opening questions

1. What is your role within the Ministry/agency?
2. How long have you worked here for?

The next questions are in relation to the cross-border trade of marine products between PNG and Papua

3. What is the role of your Ministry/agency in *regulating* cross-border traditional trade and/or import of marine resources?
4. What is the role of your Ministry/agency in *monitoring* cross-border traditional trade and/or import of marine resources?
5. What is your personal role (if any) in regulating or monitoring cross-border traditional trade?
6. Is your Ministry/agency directly responsible for managing the cross-border traditional trade and/or import of marine products?
7. What is the legislative framework around the cross-border traditional trade and import of marine products?
8. Are you aware of the presence of illegal trade of natural products between PNG and Indonesia? Why do these activities break the rules?
9. If yes, what is your Ministry/agency approach to dealing with this illegal cross-border trade?
10. What are the management outcomes of these approaches? If successful, what are the success factors in this management? If you are unsuccessful, what are the challenges.

Key questions

The next questions are asking a bit more detail about the cross-border trade between PNG and Papua

11. What products are traded across the border? List all marine products traded in the course of traditional and/or cash exchanging activities. Is there any other wildlife product?
12. Who are the key people/groups involved in this illegal cross-border trade?
13. What role do these people/groups play in the illegal cross-border trade?
14. How many wholesalers/importers/exporters are involved in the South Fly communities, Merauke and other places in Indonesia?
15. Are there any other areas along the border where similar activities are happening? Can you list other places involved in cross-border trade on the Indonesian side of the border?
16. What are the dynamics of the trade (i.e. is there a peak time of the year that trade happens, does trade happen mainly in particular places or everywhere, do the same people trade with particular people all the time or is it fluid)?

17. When, where and how do the products enter the legal value chain?
18. Do you know if there are any price differences between illegal and legal trade?
19. Do you have any data or written information on cross-border and/or imported prices or supply chains? Or do you know of others who may have these data?

Asking for your opinion on illegal cross-border trade

20. From your point of view - what would be your recommendation to address the issue of illegal cross-border trade?
21. What issues might be encountered when trying to address illegal cross-border trade?

Probing questions

- Ask further questions to encourage participant to reflect more deeply on the meaning of their comments.
- Repeat words around which further in-depth discussion is required

Closing question

- Ask them who else you should talk to in the future who is working in this area and who may have information for us.
- Ask if there is anything else they want to add

Summary

- Quickly summarise the major comments
- Thank them for their time

11.5. Appendix 5: Individual interview questionnaire

A. General information on respondent

Respondent ID: Age: Gender:

1. **Where is your homeland?**
2. **If migrated, why did you move?**

Are you part of any fishermen, women or traders association, co-operative or community group? Describe.

B. Information on respondent's household for estimation of the Multi-dimensional Poverty Index

3. **How many people live in your household?** < 6yo ____ 6yo to 18yo ___ Men___ Women____
4. **Has your household ever lost a member younger than 18?** Yes No
5. **How many people between 6 and 18yo go to school?**
6. **Are there members of your household who have finished grade 5?** Yes No

7. **How many days in the last week has your household eaten protein in your meal (e.g. meat, fish, chicken, eggs)? Which?**

1 2 3 4 5 6 7

8. **What is your house made of?** *(If in the participant's house, no need to ask; observe and tick appropriate)*

All bush material		Mixed material with metal roof	
Bush material with metal roof		Other	

9. **How do you get water?** *(If in the participant's house, no need to ask; observe and tick appropriate)*

Piped to house		Creek or well	
Rainwater tank attached to house		Other	

10. What do you use to cook? *(If in the participant's house, no need to ask; observe and tick appropriate)*

Electricity		Firewood	
Gas		Other	

11. Does the house have working electricity?	Fixed power	Generator	Solar	None
12. Does the house have one of the following?	Pit toilet	Septic tank	Other	None
Is the toilet shared with other families?	Yes	No		

13. Household assets *(only in working condition)*

Household possessions	Number	Comments
Car		
Truck		
Tractor (hand or other)		
Motorbike		
Motor powered boat		
Phone (mobile or fixed)		
Radio		
TV		
Bicycle		

14. What are the activities that provide cash and food to your household? Who does it *(not their name but relationship and gender)*? Please list them in order of importance from highest to lowest. Specify whether garden is shared, if applicable.

Activity	Person/s in household	Gender Food/Cash
1.		
2.		
3.		
4.		
5.		

15. Are you directly involved in the trade with Indonesian buyers? YES NO

16. In the fish trade (any), what is your role? List in order of importance from higher to lower if more than 1.

Fisher (go q.18) Processor (go q. 31) Buyer (go q. 40) Other/None (go q. 51)

C. Participant involvement in fisheries and trade of fish/seafood

---------- **FISHER** ----------

17. For the most landed fish/seafood, in which season do you catch it? Which gear do you use? How many Kg on average in a month? What is the average fishing trip length? What is the average number of people fishing with you? How many times do you fish on average during the fishing season? Please list them in order of quantity landed from higher to lower. *(ID cards are provided for sharks and sea cucumbers, identify caught species)*

Fish/seafood	Season	Gear/s	Kg/m Time	People	Times/y
1.					
2.					
3.					
4.					
5.					
6.					
7.					
8.					
9.					
10.					
11.					
12.					
13.					
14.					

18. Where do you fish? *Show it on the attached map*

Fish/seafood	Area/s
1.	
2.	
3.	
4.	

19. List in order of quantity landed (high to low), the fish/seafood products or species landed in 2016, the average quantity landed per trip, who and where you sold it to, and its average price in 2016.

Fish/seafood product or species	Kg or g/trip	Market/buyer	K/Kg - 100g
1.			
2.			
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
12.			

20. Have landed quantities and prices changed in the last two years? For the most landed fish/seafood products or species in 2014, do you remember the average quantity landed per trip, who and where you sold it to, and its average price in 2014.

Fish/seafood product or species	Kg or g/trip	Market/buyer	K/Kg - 100g
1.			
2.			
3.			
4.			
5.			
6.			
7.			
8.			

21. If quantities and/or prices have changed, what do you think are the causes?

22. Do you own a boat?

IF YES:		IF NO:	
Vessel type, length, year		Do you hire boats	
Engine horsepower		How often do you hire?	
Debt on it?		How many people hire with you?	
With whom?		How much does it cost to hire?	K/d
How much is the repayment?	K/m	How long do you hire it for?	

23. Fuel costs *(if boat doesn't have an engine skip this question)*

A. What is your average fuel use per trip?	K/trip
B. What was the average fuel price paid in 2016?	K/L
Calculated fuel cost per trip (use as a check):	K/trip
C. From where do you source your fuel?	

24. What other costs do you have each fishing trips? (e.g. crew pay, bait, ice)

Cost item	Cost (K/trip)
1.	
2.	
3.	
4.	

25. What additional recurring fishing costs do you have? (e.g. permits, gear debits)

Cost item	Cost (K/trip)
1.	
2.	
3.	
4.	

26. Do you sell other wildlife products?

Wildlife product	Market	Kg or pieces/month	K/Kg - pieces
1.			
2.			
3.			
4.			
5.			
6.			
7.			

27. Do you process the fish/seafood yourself? YES *go to PROCESSOR section*

NO *go to next question*

28. Who does process the fish/seafood you catch in your household? *(if no one skip this question)*

Position in Household: *(interview in a separate interview later)*

---------- PROCESSOR ----------

29. Do you process fish/seafood caught by other fishers?

If yes, how much of your monthly processed fish comes from other fishers?

How many fishers do you buy ~~it~~ from?

How many are local?

What is the most expensive species? And the cheapest? Highest K/kg Lowest K/kg

30. List in order of quantity processed (high to low), the fish/seafood products or species (divided by grade/quality/types) processed in 2016, the average quantity processed each time, who and where you sold it to, and its average price in 2016.

Fish/seafood product	Kg or g/time	Market/buyer	K/Kg - 100g
1.			
2.			
3.			
4.			
5.			
6.			
7.			
8.			

31. Have processed quantities and prices changed in the last two years? For the most processed fish/seafood products or species in 2014, do you remember the average quantity landed per trip, who and where you sold it to, and its average price in 2014.

Fish/seafood product	Kg or g/time	Market/buyer	K/Kg - 100g
1.			
2.			
3.			
4.			
5.			
6.			
7.			

32. If quantities and/or prices have changed, what do you think are the causes?

33. For each fish/seafood product, in which season do you process it? Which equipment do you use? How long does it take to have the product ready? How many people work with you? How many times on average do you process products during each fishing seasons? Please list them in order of processed quantities from higher to lower.

Fish/seafood product	Season	Equipment	Time	People	Times/s
1.					
2.					
3.					
4.					
5.					
6.					

34. What are your main costs for processing fish/seafood? (e.g. labour, hire equipment)

Cost item	Cost (K/time)
1.	
2.	
3.	
4.	
5.	

35. What recurring additional processing costs do you have? (e.g. licence, insurance)

Cost item	Cost (K/time)
1.	
2.	
3.	

36. Do you process other wildlife products?

Wildlife product	Market	Kg or pieces/month	K/Kg - pieces
1.			
2.			
3.			
4.			
5.			

---------- BUYER ----------

37. Business type *(if applicable)*
Your position

38. How many people do you employ full time (by gender)? How many do you employ seasonally? *(if no one skip this question)*

FT Female:	FT male:	S female:	S male:

39. Which fish/seafood product or species do you trade? Who do you buy it from? Do you further process it? Who do you sell it to? Please list them in order of quantities purchased from higher to lower.

Fish/seafood product	Who do you buy it from	Further processing (y/n)	Who do you sell it to?
1.			
2.			
3.			
4.			
5.			
6.			
7.			
8.			
9.			

40. Do you buy other wildlife products?

Wildlife product	Who do you buy it from?	Who do you sell it to?	Kg - pieces/m	K/Kg - pieces
1.				
2.				
3.				
4.				
5.				
6.				
7.				

41. List in order of <u>quantity</u> <u>purchased</u> (high to low), the fish/seafood products or species <u>purchased</u> in 2016 (divided by grade/type), the average quantity <u>purchased</u> monthly, who you bought it from

Fish/seafood product	Kg-100g/m	Who did you buy it from?	K/Kg - 100g
1.			
2.			
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			

42. List in order of <u>quantity</u> <u>sold</u> (high to low), the fish/seafood products or species sold in 2016 (divided by grade-type), the average quantity <u>sold</u> monthly, who you sold it to, and its average price in 2016.

Fish/seafood product	Kg-g/m	Who did you sell it to?	K/Kg - 100g
1.			
2.			
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
12.			

In the last two years, have you noticed any change in quantities (purchased and sold) and/or prices? Explain the changes. What do you think are the causes?

43. Which costs do you have each time you buy products? (e.g. transport costs, labour)

Cost item	Cost (K)
1.	
2.	
3.	
4.	

44. Which costs do you have each time you sell products? (e.g. freight, transport, labour, packaging)

Cost item	Cost (K)
1.	
2.	
3.	
4.	

45. Which additional recurring costs do you have? (e.g. insurances)

Cost item	Cost (K/trip)
1.	
2.	
3.	

D. Participant's knowledge and participation in the trade with Indonesian buyers

---------- **EVERYONE** ----------

46. Why do you sell your products/*(If not directly involved ask:)* **why do people sell their products to the Indonesian buyers?**

47. Who decides the prices of products? Can you bargain?

48. Do you have any debt with the Indonesian buyers? *(If not directly involved ask:)* **Do you know if people have any debt with Indonesian buyers?** NO

YES, explain

49. Would you still sell your products/*(If not directly involved ask:)* **would people still sell their products to Indonesian buyers even if there were other options to make the same amount of money?**

50. In your opinion, which other markets can be developed to commercialise the available marine resources? And other cash generating activities not including marine resources?

Markets for marine resources:

Alternative cash-generating activities:

51. What is it needed to effectively develop these alternative markets?

52. Would everyone in the village/Daru have the same opportunity to be involved in it? YES

NO, explain:

Which groups are more likely to be excluded?

11.6. Appendix 6: Focus group (men and women) discussion points

FGD MEN - GUIDE

Introduction

- Introduction of facilitator, research team and project. Explain what will be done in FGD and that the research team will be taking notes, but no individual names will be recorded. Ask permission to use voice recorder and take photographs.
- Read the verbal consent form, ask for participants' permission to be involved in the FGD.
- Pass around information sheets for people to keep and the sign-in sheet (with age, gender, main job, any position held within the community).

Opening question

As an introduction, could you introduce yourselves and tell whether you are currently working, and what type of work you do.

Introductory questions

- Can you describe the main sources of income for men and women in the village/Daru?
- What types of people are more likely to have fewer income options in the village? (probe: types, explanation for the situation)
- What types of people are more likely to earn less in the village?
- If not involved in any income-generating activities, how do people survive?

Transition questions

Now that we have discussed how people make a living in the villages/Daru, I would like to discuss more in detail the trade with Indonesian buyers, starting by understanding the proportion of people in the village who are involved in the trade with Indonesian buyers.

- Do you know approximately how many fishers are in the village/Daru corner? Any woman among the fishers?
- And do you know what percentage of the fishers sells their products to the Indonesian buyers? Any women among the fishers selling to Indonesian buyers?
- Not considering fishers, which other groups of people are involved in the trade with Indonesian buyers? (probe: types, numbers) what is the percentage of women?

Key questions

Topic 1. Understanding the dynamics of the trade with Indonesian buyers

We know from our previous study that the Indonesian buyers come to the village/Daru to buy marine products.

- Can you describe who the Indonesian buyers are (not names)? (probe: how many, their relations with people in the village, are they Melanesians, do they speak PNG languages, are they always the same, who do they work for)
- What types of people are mainly involved with the Indonesian buyers? (probe: poorer, richer, outsiders, traditional owners, immigrants)
- Can you describe how the Indonesian buyers operate when they are in the village? (probe: how often do they come to the villages, boats used, what do they sell, what do they buy, do they give credits/loans, how do they pay)
- Do you know what happens to the products once they leave the village? (probe: next destination, final destination, wholesalers in Papua, further processing, costs they are sold in Papua)
- Have prices or demand changed in the last few years, let's say in the last two and five years? (probe: how, reasons)

Topic 2. Understanding people's motivations to engage with cross-border trade

- Do people know the potential impacts of the cross-border trade of marine products on the people in the village and the marine resources? (probe: social disruption, overexploitation, loss of ecosystem goods and services, long-term impact on livelihoods)
- In your opinion, why do people get involved in the trade with Indonesian buyers? (probe: cash, power, relationships, debts, no other options)
- Would people still sell their products to Indonesian buyers if they had other options to earn the same income?

Topic 3. Understanding social relations, institutions and legislations around cross-border trade

- How would you describe the relationship between people in the village and Indonesian buyers? (probe: equal, buyers have the power, community has power)
- Who decide the prices of products? Can you bargain?
- Do you know which management rules apply for sharks, sea cucumber and barramundi? Who enforces them?
- Do you know which other custom, trade and quarantine rules apply to the cross-border trade of fish/seafood products with Indonesia? Who enforces them?
- Do you think people in the village observe these management rules?

Topic 4. Identify alternative livelihoods

Now, I would like to discuss about possible alternative livelihoods to the trade with Indonesian buyers.

- In your opinion, which other markets can be developed to commercialise available marine resources?

- And which other income-generating activities can be developed?
- What is needed to effectively develop these alternative markets? (probe: institutional framework, legislation, credit, cooperation, technology)
- Would everyone in the village have the same opportunities to be involved in the new markets or income-generating activity? (probe: power relations: gender, age, education, family relationship, clans)
- What is needed to equally involve everyone in the village in any new markets or income-generating activities? (probe: finance, increased skills and knowledge)
- Are these services and resources available in the village?
- Who can be potential service and resource providers?

Topic 5. Decision-making

Finally, a few questions on how income from fishing is used in the household

- Who makes decisions around fishing and selling? (probe: joint process, more men, more women)
- Who controls the income from sales? (probe: pooled together, men, women)
- Is the income from the trade with Indonesian buyers spent on specific things? (probe: education, health, obligations, alcohol)

Summary

Summarise the main major themes (the note taker would have summarised the information and given it to the facilitator) and ask participants if this reflects the group discussion.

Conclusion

We are now reaching the end of the discussion. Does anyone have any further comments to add before we conclude the session? I would like to thank you all very much for your participation in this discussion, your opinions are very valuable to assist in identify alternative markets and income-generating activities.

FGD WOMEN - GUIDE

Introduction

- Introduction of facilitator, research team and project. Explain what will be done in FGD and that the research team will be taking notes, but no individual names will be recorded. Ask permission to use voice recorder and take photographs.
- Read the verbal consent form, ask for participants' permission to be involved in the FGD.
- Pass around information sheets for people to keep and the sign-in sheet (with age, gender, main activities, any position held within the community).

Opening question

As an introduction, could you introduce yourselves?

What is your contribution to household incomes – both in fishing related activities and other activities? Get women talking in general, not all women need to answer. (probe: types of activities, percentage)

What other tasks do you conduct daily? (probe: look after children, garden, cooking, fire wood collection)

Key questions

Topic 1. Women's involvement in the cash economy, constrains and solutions

- Can you describe the main sources of income for men and women in this village/Daru?
- What are the challenges faced by women to engage in income-generating activities? (lower knowledge, lower skills, lack of confidence, lack of financial services, workload)
- What would they need to be equally engaged in the income-generating activities? (appropriate finance, more information, increased knowledge and skills)
- What is the involvement of women in the fishing sector vs male roles? (probe: fishing, processing, market sales, selling to buyers)
- What are the sector specific challenges for women? (probe: low processing skills, no financial services, lack of knowledge about markets)
- What would they need to be better involved in this sector? (appropriate finance, more information, skills, empowerment)

Topic 2. Understanding people's motivations to engage with cross-border trade

We know from our previous study that the Indonesian buyers come to the village/Daru to buy marine products.

- Do people know the potential impacts of the trade of marine products on the people in the village and the marine resources? (probe: social disruption, overexploitation, loss of ecosystem goods and services, long-term impact on livelihoods)
- In your opinion, why do people get involved in the trade with Indonesian buyers? (probe: cash, power, relationships, debts, no other options)
- Would people still sell their products to Indonesian buyers if they had other options to earn a similar income?
- How would you describe the relationship between people in the village and Indonesian buyers? (probe: equal, buyers have the power, community has power)

Topic 3. Understanding social relations, institutions and legislations around cross-border trade

- How would you describe the relationship between people in the village and Indonesian buyers? (probe: equal, buyers have the power, community has power)
- Who decide the prices of products? Can people bargain?
- Do you know if there are management rules that apply for sharks, sea cucumber and barramundi? Who enforces them?
- Do you know if there are other custom, trade and quarantine rules that apply to the cross-border trade of fish/seafood products with Indonesia? Who enforces them?
- Do you think people in the village observe these management rules?

Topic 4. Identify alternative livelihoods

I would like now to discuss about possible alternative livelihoods to the trade with Indonesian buyers.

- In your opinion, which other markets can be developed to commercialise available marine resources?
- And which other income-generating activities can be developed?
- What is needed to effectively develop these alternative markets? (probe: institutional framework, legislation, finance services, cooperation)
- Would everyone in the village have the same opportunities to be involved in the new markets or income-generating activity? (probe: power relations: gender, age, education, family relationship, clans)
- What is it needed to equally involve women in any new markets or income-generating activities? (probe: finance, more information, skills, empowerment)
- Are these services and resources available in the village? (why no, why not accessed by women)
- Who can be potential service and resource providers?

Topic 5. Decision-making

- Who makes decisions around fishing and selling? (probe: joint process, more men, more women)
- Who controls the income from sales? (probe: pooled together, men, women)

- Is the income from the trade with Indonesian buyers spent on specific things? (probe: education, health, obligations, alcohol)

Summary

Summarise the main major themes (the note taker would have summarised the information and given it to the facilitator) and ask participants if this reflects the group discussion.

Conclusion

We are now reaching the end of the discussion. Does anyone have any further comments to add before we conclude the session? I would like to thank you all very much for your participation in this discussion, your opinions are very valuable to assist in identify alternative markets and income-generating activities.

11.7. Appendix 7: Participants at the final multi-stakeholder workshop in Daru

Participants	Organization	Role
1.	Resources Owner Old Mawatta Village	Fish buyer/SME
2.	Aquila Enterprise	Manager Operation
3.	SME	
4.	Finirose Marine Resources	Managing Director
5.	Gowai Fishing Enterprise	Operation Manager
6.	Resources Owner Old Mawatta Village	Fish buyer
7.	Gowai Fishing Business Group	Managing Director
8.	New Century Seafood	Manager
9.	Solwara Fishing Enterprise PNG	Supervisor
10.		Crab buyer
11.	Sunset Fisheries Co-op	Chairman
12.	Treaty Inhabitant Council (Kiwai LLG)	Councillor for Tureture
13.	Treaty Inhabitant Council (Kiwai LLG)	Ward member for Buzi
14.	Treaty Inhabitant Council (Kiwai LLG)	TIC Chairman; Councillor for Sigabaduru

15.	Treaty Inhabitant Council (Kiwai LLG)	Chairman for Bula
16.	Treaty Inhabitant Council (Kiwai LLG)	Councillor for Kadawa
17.	Treaty Inhabitant Council (Kiwai LLG)	Councillor for Katatai/Deputy President
18.	Treaty Inhabitant Council (Kiwai LLG)	Secretary and representative for Parama
19.	Treaty Inhabitant Council (Kiwai LLG)	Ward Member for Sui
20.	Daru Udaru Urban Ward rep	Sub Ward Leader Iaru Ward
21.		Women Representative Daru
22.	Representative Kadawa Village	Law and Order Committee
23.	Daru Pioneers	Executive Member
24.	Ward Development Committee	Village court/Chairman for Tureture
25.	Ward Development Committee	Secretary
26.	South Fly District Administration	Project officer
27.	Daru Urban LLG	Town Mayor
28.	South Fly Border Administration	Officer
29.	South Fly	
30.	South Fly District Administration	District Administrator
31.	South Fly District Administration	Project Planner

32.	Fisheries Western Province Administration	Officer
33.	Fisheries Western Province Administration	Officer (enforcement)
34.	Fisheries Western Province Administration	Fisheries Officer (Projects)
35.	Fisheries Western Province Administration	Manager
36.	National Agriculture Quarantine and Inspection Authority	SAHO
37.	National Fisheries Authority – Management Division	Manager
38.	PNG Police	Officer
39.	Police Force	Officer
40.	NFA - Provincial Support & Industry Development	Support Officer
41.	Bata Community Development Foundation	Coordinator
42.	Bata Community Development Foundation	Volunteer
43.	Bata Community Development Foundation	Volunteer
44.	WorldVision	Nutrition Coordinator
45.	Decentralization and Citizen Participation Partnership	Program Manager
46.	PNG Market Development Facility	Business Advisor - Fisheries Sector
47.	Ok Tedi Development Foundation	Executive Manager Programs
48.	Ok Tedi Development Foundation	Business Development Officer

49.	Australian Centre for International Agricultural Research	Assistant Country Manager
50.	Building Resilient Communities in the Treaty Villages	Ranger
51.	Building Resilient Communities in the Treaty Villages	Ranger
52.	INLOC (Building Resilient Treaty Villages)	
53.	C_20/RRRC	Fisheries Scientist
54.	CSIRO, Land and Water	Senior Researcher
55.	CSIRO Indonesia	Director
56.	CSIRO, Land and Water	Researcher