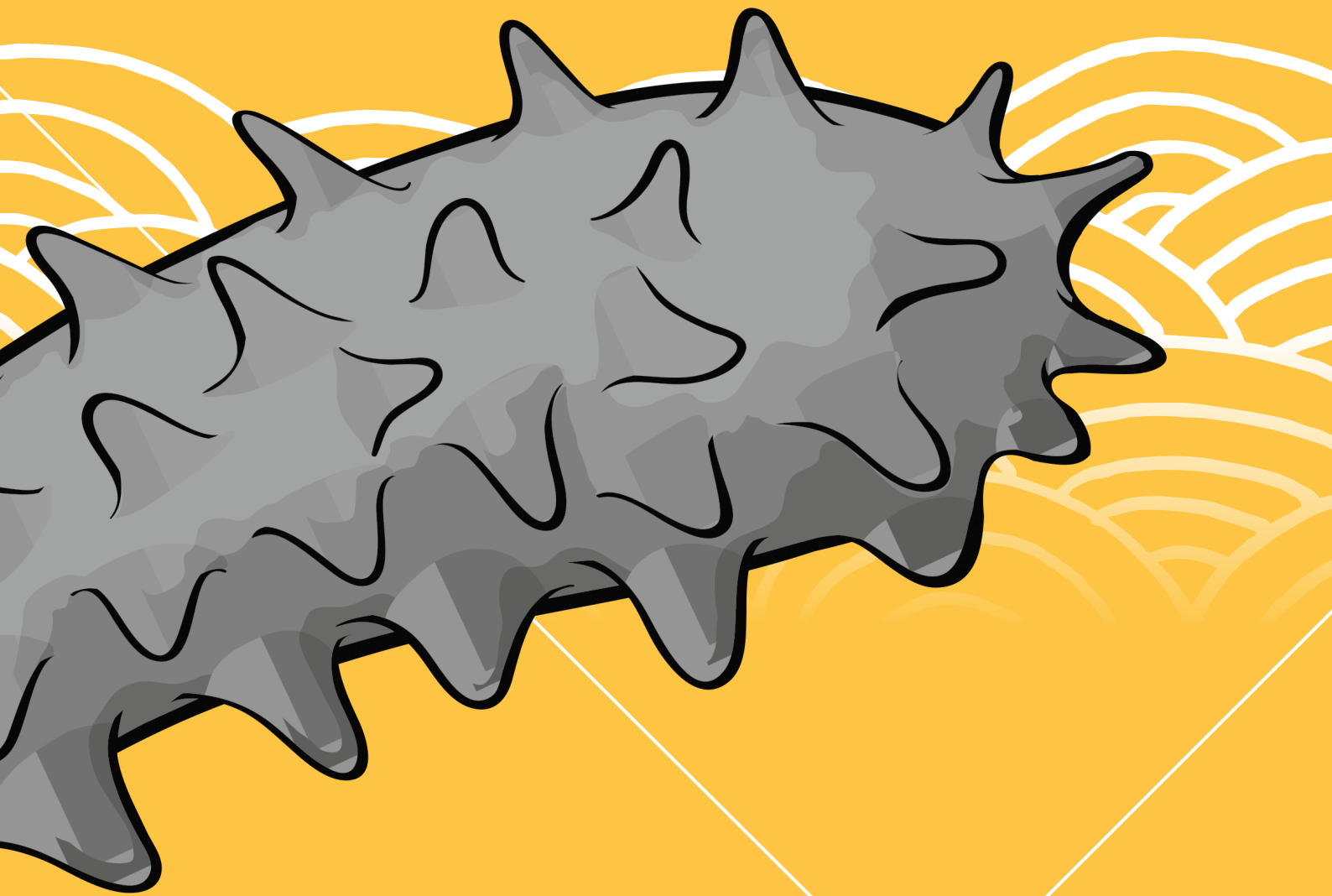


Interactive Governance Analysis of the  
***Bêche-de-Mer*** 'Fish Chain'  
from Papua New Guinea to Asian Markets



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ISBN-13: 978-0-9953662-2-0

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Barclay, K., Kinch, J., Fabinyi, M., EDO NSW, Waddell, S., Smith, G., Sharma, S., Kichawen, P., Foale, S. and Hamilton, R.H. 2016. Interactive Governance Analysis of the *Bêche-de-Mer* 'Fish Chain' from Papua New Guinea to Asian Markets. Report commissioned by the David and Lucile Packard Foundation, University of Technology Sydney, Sydney, October.

Editor: Terry Fitzgerald

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#### ACKNOWLEDGEMENTS

This work would not have been possible without the generous assistance of many people. Thanks to the villagers of Timoenai, Mbunai and Pere on Manus Island who hosted us and participated in group interviews. We are grateful also to the researchers who contributed key informant interviews (named in the Methodology section of the report). At the PNG National Fisheries Authority (NFA) the work was facilitated by Mr John Kasu (Managing Director), Mr Leban Gisawa (Fisheries Management Executive Manager), and Ms Luanah Yaman (Sedentary Resources Manager). We hope the research is useful for your ongoing efforts to make PNG's sea cucumber fisheries sustainable. We also greatly appreciate the opportunity to do this research through funding from the David and Lucile Packard Foundation. Mr John Claussen and Mr Stuart Green of the Packard Foundation provided much guidance and advice, and contacts for related work.

#### DISCLAIMER

The legal information in this Report and Appendices is general information only and does not constitute legal advice.

## GLOSSARY AND ABBREVIATIONS

ACIAR	Australian Centre for International Agricultural Research
BDM	<i>bêche-de-mer</i>
CBFM	Community-based Fisheries Management
CBRM	Community Based Resource Management
CEAFM	community-based ecosystem approaches to fisheries management
CEPA	PNG Conservation and Environment Protection Authority
CI	Conservation International
CITES	Convention on the International Trade in Endangered Species
CMT	Customary Marine Tenure
CPUE	catch per unit of effort
EAFM	ecosystem approach to fisheries management
FAO	Food and Agriculture Organization of the United Nations
FIA	Fishing Industry Association
HACCP	Hazard Analysis and Critical Control Points
HDI	PNG's Human Development Index
ICCAT	International Commission for the Conservation of Atlantic Tunas
IUCN	International Union for Conservation of Nature
IUU	illegal, unreported and unregulated fishing
LLG	Local Level Government
LLGMAC	Local level government Management Advisory Committee
LMMA	Locally Managed Marine Area
MCS	Monitoring, Control and Surveillance
MEAR	Mwanus Endras Asi Resource Development Network
MSG	Melanesian Spearhead Group
MSY	Maximum Sustained Yield
NDF	non-detrimental findings
New Song	'A new song for coastal fisheries - pathways to change' 2015 strategy of the Secretariat of the Pacific Community
NFA	National Fisheries Authority
NFC	National Fisheries College

NGO	non-government organization
NMAC	National Management Advisory Committee
NOAA	US Department of Commerce’s National Oceanic and Atmospheric Administration
Organic Law PGLLG	<i>Organic Law on Provincial Governments and Local Level Governments (1998)</i>
PFO	Provincial Government Fisheries Office
PMACs	Provincial Management Advisory Committees
PNA	Parties to the Nauru Agreement
PNG	Papua New Guinea
SPC	Secretariat of the Pacific Community
TAC	total allowable catch
TNC	The Nature Conservancy
UPNG	University of Papua New Guinea
VAT	value added tax
WCS	Wildlife Conservation Society
WWF	World Wildlife Federation

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## 1. INTRODUCTION

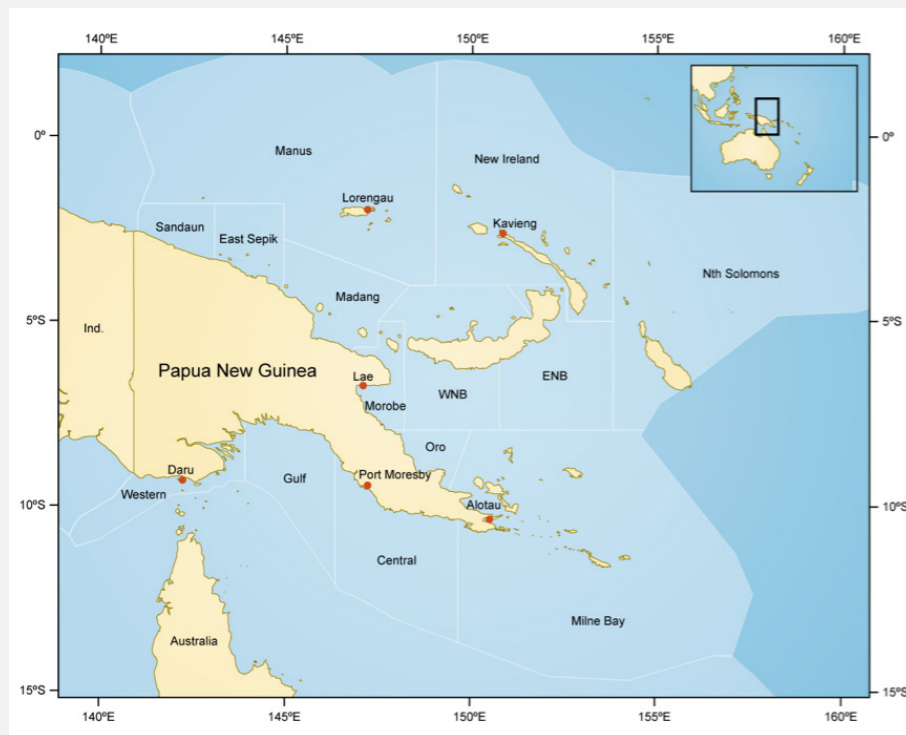
### 1.1 Executive Summary

Tropical sea cucumber, called *bêche-de-mer* (BDM) in its dried form, is a luxury seafood and health food, with its main market in southern China and smaller markets in Singapore, Malaysia and other countries.<sup>1</sup> Regional markets for BDM have existed for centuries, and they have expanded greatly since the 1980s with growing incomes in China. Sea cucumbers are relatively easy to harvest and process, even in remote coastal and island locations in Papua New Guinea (PNG) (see Figure 1). Once dried, BDM is shelf stable and high value relative to its size and weight, so it is an ideal cash-earning commodity for communities where cash-earning opportunities are extremely limited. Increasing prices and an influx of buyers entering the trade seeking BDM led to overfishing in PNG in the 2000s. In 2009 the government instituted a moratorium on the fishery, banning exports, and the PNG National Fisheries Authority (NFA) closed the fishery. Since then the NFA has revised the sea cucumber fishery Management Plan and conducted stock assessments in preparation for re-opening the fishery in 2017.

The objective of this study was to conduct a governance analysis that will assist the NFA and other stakeholders to grasp the factors influencing the effectiveness of the new Management Plan. We employed the ‘interactive governance’ approach, wherein ideas from governance studies have been developed for use in fisheries management (Kooiman et al. 2005; Jentoft and Chuenpagdee 2015). In this approach all of the factors affecting the governance of a fishery – human and non-human, government, civil society and market – are considered. Furthermore, these governance influences are considered at the various scales relevant to the fishery, from local to national and global. The research utilizes qualitative methods, with data collected from interviews with fishers and traders in PNG and China, BDM scientists and policy makers around the world, in addition to conducting an extensive literature review.

<sup>1</sup> Sea cucumbers, once dried, become the commodity *bêche-de-mer* (BDM), also called trepang in South East Asia.

FIGURE 1. Map PNG



The sea cucumber fishery in PNG was extensive; it was conducted in most coastal and island locations around the country and involved more than 22 species of sea cucumber from very high value to very low value. It was a small-scale informal fishery with multiple landing points, conducted mostly from shore, canoe or dinghy. Women, men and children fished close to shore and gleaned in shallow areas. Young men dominated the fishing conducted further from shore or which involved deep diving. Some level of processing was done by fishers – minimal processing if the BDM could be sold quickly, full drying if fishers had to wait some weeks to be able to sell their product. Exporters were based in provincial capitals or Port Moresby and bought through buyers who travelled out to fishing areas or fishers who brought product to them to sell direct. There was a handful of exporters in each maritime provincial capital and more in Port Moresby, which meant the export node of the supply chain was much more consolidated than the fishing node.

In the early years BDM was exported, mainly via Singapore as an entrêpot to other regional markets. In later years Hong Kong replaced Singapore as the main entrêpot. Most of the product was bound for new markets in mainland China, with some high value product retained for more established high end markets in Hong Kong or Singapore. Hong Kong, as a luxury seafood hub for the Chinese market, is a free port with no tariffs, while there are tariffs as high as 30 percent (depending on China's trade relations with the export country) for import into China. So although the trade from Hong Kong into China is extensive, it is a form of 'grey trade' (that is, illegal). The BDM trade, from buying from villagers through export to import

and retail was highly dependent on relationships. Rather than arms-length, contract-bound market arrangements, trading was almost entirely based on relationships and trust, with prices varying depending on the relationships between sellers and buyers. There were also many examples of malfeasance and relationships gone sour.

There are various social systems that affect the operation of the BDM trade, and therefore its governance (see Tables 1 and 2). From 2001 the PNG government had in place a Management Plan for BDM that centred on the control of exports via licensing and the clearing of export shipments. The paperwork around export shipments was the main source of data on the fishery, and it was used for a Total Allowable Catch (TAC) and closed season system for managing the fishery. Each PNG province had a TAC, and when it was reached the fishery was closed for the year. The TACs had not been set scientifically because Maximum Sustained Yield (MSY) had not been calculated for all provinces. Where stock assessments had been done these were used. Where there had been no stock assessment the historical catch record was used to estimate the total harvestable amount for each province, of which 70 percent was set as the TAC (Kinch, 2004a). It is possible the TACs were not set at the right levels, but in any case the TACs were routinely exceeded, and this seems a key reason for the failure of the first Management Plan to prevent overfishing. There were also illegal exports of BDM of unknown quantities, with some level of trading continuing during the moratorium. NFA stock assessments carried out since 2009 show varying levels of recovery for different species and locations.

TABLE 1. PNG BDM System Properties

	Social	Natural
<b>Diversity</b>	Fishery type: all small-scale informal, no industrial, medium- or large-scale	22+ sea cucumber species targeted commercially
	Product variation: from 'first boil' to fully dried	Habitats: estuarine, sea grass, reef and sandy bottom, at varied depths
	Market types: all export, no domestic	Species vary in terms of spawning seasons, growth rates, conversion rates from wet to dry
	Exporter types: Provincial-, Port Moresby-, or overseas-based	
	CBRM capacity varies greatly across regions	
	Provincial and LLG capacity varies greatly	
Market variation: mature high value markets, new markets including low value and varied species		
<b>Complexity</b>	Reduced by regulating exports rather than the fishery	Whiteteat protected from overfishing by depth range, other species not
	Complex and varied supply chains	
	Increased by joint-management including provincial & LLG levels, and stakeholders including resource owners	Lots of different species, but many look similar in dried form, making it harder for data collection/traceability/regulation
	Local-level management can be LLG and/or CBRM, research & conservation organizations may also be involved	
<b>Dynamics</b>	High prices and high demand	Easily overfished species
	High need for cash in fishing areas and few alternative sources of cash	Sediment and water quality changes possible due to overfishing
	Plasticity of labour – diverted from food gardening to fishing during open season	Overfishing in some areas has reduced capacity for stocks to recover
	Heavy involvement of non-PNG nationals in trading, desire for PNG nationals to take this over	Aquaculture: stock enhancement & ranching possible
	Political & economic pressure to re-open the fishery	Climate change
	Pressure for devolution & co-management	
	Chinese economic upturns & downturns	
	Chinese government policy on corruption with flow on effects on luxury seafood consumption	
	New markets accepting different species & quality	
	Importation via Hong Kong largely illegal to avoid tariffs	
	Hitherto no state or non-state measures for sustainability at the market end of fish chain	
<b>Scale</b>	Main base of management National-level with some delegation to provincial-level. Intent to increase devolution to provincial- and local levels	Connectivity areas by habitat & species seem to be relatively localized (ongoing scientific inquiry on this topic)
	Regional & global markets	

The new Management Plan drafted for when the fishery reopens is based on the same management tools of TACs and closed seasons with size limits. Various measures have been introduced to strengthen these, including improved reporting of sales as data for monitoring the TACs and points-based export license criteria to encourage good operators and 'weed out' bad ones. In addition, the new Management Plan includes greater scope for devolution of resource management functions to provincial and local levels. There is also a Communication and Education Strategy, which will be important in supporting the effectiveness of the new Plan. Community-based Resource Management (CBRM) is allowed for in the new Management Plan, although to date not much CBRM exists in PNG, and there are significant challenges for it to be effective in sustainably managing sea cucumber fisheries due to their high value. Another challenge for devolution is that the provinces have been less than proactive in taking up the role of improving fisheries management.

Regionally and internationally there are some potential measures that could influence governance of the fishery, including Pacific Islands governments sharing information on traders and the possibility of listing overfished species under the Convention on the International Trade in Endangered Species (CITES). Greater scrutiny of imports by the Chinese government is another potential influence. Market incentives for sustainability are not yet significant in the main Chinese markets, although at the high marketing end food safety and quality concerns could potentially be linked to ecological factors. There is potential for PNG product to be marketed as coming from 'pristine' South Pacific waters without the industrial or sewerage pollution found in many Asian source countries. PNG's reputation in end markets for poor or unreliable quality BDM is a problem, which PNG's fishery managers are considering as a factor to address in improving the sustainability of the industry.

FIGURE 2. Retail Sale of Various Types of BDM (photo credit: Michael Fabinyi)



TABLE 2. Multi-Scale Assessment of Governing Systems Performance Against Governance Goals

KEY: a) **Green**: existing measures/instruments/influences; **blue**: potential ones.  
 b) Interactive governance goals – food security (FS), community wellbeing (CW), livelihood viability (LV), social justice (SJ) and environmental sustainability (ES)  
 c) '+' indicates a positive effect on the governance goal, '-' a negative effect

Scale	Measures/ Instruments/Influences	Governance Effects	
Village	LLG-based resource management plans	Minimal resources/capacity to develop resource management plans, implement & enforce them. Weak potential to improve without government or other assistance.  Gender & intersectional distributive and decision-making justice may be addressed if LLGs interested.	+FS, LV, ES  +CW, SJ
	NFA Communication Strategy	Potential to improve awareness of regulations at village level, and possibly compliance.	+FS, LV, ES
	LLGMACs	Weak potential to improve without addressing lack of resources/capacity.  Gender & intersectional distributive and decision-making justice addressed by women and youth representation.	+FS, LV, ES  +CW, SJ
	Village Courts & Local Land Courts	Could be used to enforce LLG-based management plans and/or CBRM	+ES
	Conservation NGO/Charitable foundation-supported CBRM	Does not exist in most BDM fishing communities, externally supported CBRM cannot be scaled out to cover the whole fishery. Potential to improve especially if community and/or supporter are interested in gender and other equity issues.	+FS, LV, ES, CW, SJ
	Independent CBRM	CBRM only exists to date with external support.	-ES
	Strong need for cash, dearth of other cash earning opportunities	Strong incentive to keep fishing unsustainably.  Food production and other income earning opportunities neglected during fishing season?	-ES  -FS, CW, SJ
	High prices offered by buyers/exporters	Strong incentive to keep fishing unsustainably.  Brings significant income into villages.	-ES  +FS, CW, LV
	Distribution of income patterns	Problems with young men controlling much of the income, using mostly for recreational purposes.	-CW, SJ

KEY: a) **Green**: existing measures/instruments/influences; **blue**: potential ones.  
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 c) '+' indicates a positive effect on the governance goal, '-' a negative effect

Scale	Measures/ Instruments/Influences	Governance Effects	
Province	Provincial Governments	Lack resources & capacity	-FS, CW, LV, SJ, ES
		Tendency to prioritize fisheries lower than other concerns, appropriate fisheries funds for other purposes	-FS, CW, LV, SJ, ES
	PFOs	Resources & capacity bolstered by NFA. Able to administer export regulations in old & new Management Plan, but it was not effective in preventing overfishing last time.	-ES
		Effective in new Management Plan (+ES). Stock assessing responsibilities in new plan.  Engagement with fishing communities to enforce regulations, support compliance & community development	+ES  +FS, CW, LV, SJ, ES
	PMACs	Multi-stakeholder group advising on BDM Management Plan ongoing implementation. Resource owners, women & LLGs represented.	+SJ
	Customs	Able to administer export regulations in old & new Management Plan, but it was not effective in preventing overfishing last time.	-ES
		Effective at preventing overfishing in new Management Plan.	+ES
	Province-based exporters & importers/ financiers/ technical advisers operating at the Provincial level	Strong influence through market power on how/ where fishing is conducted, but high demand and no evidence of efforts to improve sustainability.	-ES
		High prices, extension on quality.  Potential influence through incentive for maintaining reliable supplies, investing in aquaculture.	+FS, CW, LV  +ES
	Conservation NGOs	To participate in PMACs, effectiveness unknown.	+ES?

KEY: a) **Green**: existing measures/instruments/influences; **blue**: potential ones.  
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 c) '+' indicates a positive effect on the governance goal, '-' a negative effect

Scale	Measures/ Instruments/Influences	Governance Effects
National (PNG)	<i>Fisheries Management Act</i>	Provides legal framework for fisheries management. +ES
	New BDM Management Plan	Strengthened measures from the old Management Plan. +LV, FS, ES
	NFA Board	Maintained moratorium effectively. +ES
	NFA	Well-resourced, high capacity, but unable to prevent previous overfishing. +ES,-ES Could facilitate broader fisheries governance through community development, gender & intersectional discrimination awareness, and Communication and Education Strategy. +FS, CW, LV, SJ
	NMAC	Worked with NFA to improve Management Plan and strengthen devolution (+ES, SJ). Old Management Plan did not prevent overfishing. -ES Multi-stakeholder representation, but not women, youth or resource owners. +/-SJ
	Customs	Able to administer export regulations in old & new Management Plan, but it was not effective in preventing overfishing last time. -ES Effective in new Management Plan. +ES
	Other Agencies	Quarantine for food safety certification? +ES,LV? Conservation and Environment Protection Authority for sustainability certification? +ES?
	Port Moresby-based exporters & their importers/financiers/ technical advisers	Strong influence through market power on how/ where fishing is conducted, but high demand and no evidence of efforts to improve sustainability (-ES). High prices, extension on quality. +FS CW LV Potential influence through incentive for maintaining reliable supplies, investing in aquaculture. + ES
	Conservation NGOs & Foundations	Liaising with NFA. Participates in NMAC. Effectiveness unknown. +ES?

KEY: a) **Green**: existing measures/instruments/influences; **blue**: potential ones.  
 b) Interactive governance goals – food security (FS), community wellbeing (CW), livelihood viability (LV), social justice (SJ) and environmental sustainability (ES)  
 c) '+' indicates a positive effect on the governance goal, '-' a negative effect

Scale	Measures/ Instruments/Influences	Governance Effects
Regional	SPC Coastal Fisheries Programme	BDM Information Bulletin +LV
		Extension for BDM processing quality +FS LV
		Regional traders database +ES, SJ
	SPC New Song approach to coastal fisheries	Increase profile & whole-of-government approaches to coastal fisheries, harmonize policies +FS, CW, LV, SJ, ES
	MSG Roadmap for Coastal Fisheries	National Roadmaps being developed +FS CW LV SJ ES
	Traders operating regionally	Not studied for this project but likely to be similar as above for national, provincial and village scales. +/- FS, CW, LV, SJ, -ES Potential influence through incentive for maintaining reliable supplies, investing in aquaculture. + ES
	Regional importers	Not studied for this project but likely to be similar as below for China/Hong Kong. +/-ES
International	Customs codes	Use to trace suppliers and end markets for BDM, the state of BDM fisheries globally +ES Could be even better with improved data +ES
	CITES	Could stimulate improved management of fishery in PNG +ES
		Could improve data through required trade records. +ES
		May alienate traders from other stakeholders and prevent collaboration to improve governance. -ES
	Global BDM trade	Serial depletions. -ES
	CBRM support by international NGOs & Foundations	Small proportion of sea cucumber fishing communities implementing CBRM. Varied effects in different locations but generally positive. +FS, CW, LV, SJ, ES Developing understanding of scaling out CBRM, having CBRM less dependent on resource-intensive external support. +FS, CW, LV, SJ, ES
NGO campaigns on sea cucumber overfishing	Could build awareness of ES problems among consumer audiences. +ES	

KEY: a) Green: existing measures/instruments/influences; blue: potential ones.  
 b) Interactive governance goals – food security (FS), community wellbeing (CW), livelihood viability (LV), social justice (SJ) and environmental sustainability (ES)  
 c) '+' indicates a positive effect on the governance goal, '-' a negative effect

Scale	Measures/ Instruments/Influences	Governance Effects	
National (China/ Hong Kong)	Customs	Imperfect data on imports of BDM.  Could be much improved data if the grey trade was significantly reduced and Customs information clarified.	-/+ES  +ES
	Quarantine	Could operate as regulation of food safety, encouraging high value production. No indication of this so far.	+LV
	Fisheries agency	Could implement international/regional IUU regulations at the point of importation. No indication of this so far.	+ES
	Importers/wholesalers/retailers	Food safety & quality focus among some traders targeting high-end markets. Governance effects would require further research.	?
		Could require meeting environmental criteria, no indication of doing this so far.	+ES
	Retailers/consumers	Food safety & quality concerns in some high-end markets. Governance effects would require further research.	?
Environmental concerns.		+ES	

The key findings about how to improve governance go beyond the usual scope of fisheries management. Therefore, for the governance of BDM in PNG to improve there must be greater cooperation between fisheries managers and people in other government agencies and other organizations.

**1.1.1 Key Finding: Effective BDM Governance Means Development**

Interviews with all stakeholders demonstrate clearly that BDM is widely considered to be an important commodity because it can support coastal fishers who have very few other avenues for cash income. This is reflected in the policy and legal documents. BDM must therefore be treated foremost as a community development opportunity, for which the ecological sustainability of the fishery is foundational but where the fostering of development possibilities for fishing communities is equally as important as the fisheries management tools per se.

Yet BDM incomes even at the peak of the fishery did not significantly contribute to development in fishing areas, and the development potential of the fishery has been stymied by its lack of sustainability. In many cases the cash seems not to have been used in ways that resulted in long-term wellbeing improvements for villagers, but rather for short-term consumption and recreation.

For the BDM trade to be an ongoing source of cash income for rural villagers and for that income to improve community wellbeing, the fishery and trade must be managed as a community development issue. Support for communities to think through how cash income from BDM could best be used for development in their particular context, along with resource management, should be central to policy and practice around this commodity. This finding aligns with the SPC regional 'New Song' for coastal and inshore fisheries management and with the *FAO Guidelines for Securing Sustainable Small-Scale Fisheries*. Fisheries managers are not experts in community development, so to pursue this thoroughly means fisheries managers must collaborate with agencies and other organizations who do have this expertise, to ensure that resource management principles are effectively integrated with community development strategies.

Similarly, the desire for ethnic Papua New Guineans to develop businesses in exporting sea cucumbers was prevalent in the interviews, and this is implemented as policy in the form a ban on foreign nationals holding licenses in the industry. This measure, however did not result in the emergence of many ethnic Papua New Guinean traders. It may be more effective to implement business development initiatives such as internships, education and other experiences that could enable Papua New Guineans to develop the knowledge, contacts and capital required to succeed in the BDM export business – learning from foreign nationals and successful Indigenous Papua New Guinean business people in other sectors.

Tables 3, 4 and 5 show this study's three sets of recommendations regarding the BDM industry in PNG. These will be described further in Chapter 5.

**TABLE 3. Recommendations Regarding Development**

Recommendations	Responsibility
1. Conduct further research on how to work effectively and feasibly with other departments and non-fisheries organizations to facilitate development via BDM.	NFA, other departments, donor bodies and NGOs, SPC (implementing the New Song).
2. Building on Recommendation 1, and on lessons learned regionally, including in other sectors, launch community development programs to support villagers to manage their income from marine resources to further the governance goals of food security, community wellbeing, livelihood viability and social justice.	Villages and community groups including Churches, various PNG Government departments, NGOs, donors, NFA (in a facilitating and coordinating role).
3. Instigate business development projects, such as sponsoring education in relevant business areas, internships, and facilitating partnerships between Papua New Guineans hoping to enter the business and seasoned seafood traders.	NFA, other PNG government departments, Chinese embassy sections dealing with government scholarships and business exchange, business associations.

**1.1.2 Key Finding: Management Instruments Goodness of Fit**

Our analysis compares the ‘goodness of fit’ between fisheries management instruments used and the operations of the fishery and trade in BDM. We find that on the whole the new BDM Fishery Management Plan is a good fit – it is pragmatic and based in a thorough understanding of how the fishery operates.

The principle of controlling exports, a point at which the product is consolidated and the industry is formal, is an excellent fit between a management tool and the operation of the industry. The fishery is dispersed across vast areas where government presence is low and the fishery is informal, so directly regulating the fishery as such at the national scale is not feasible in the foreseeable future. The principle of regulating export underpins the effectiveness of the plan as a whole.

The question of regularly scientifically assessing the state of the fishery and setting fishing limits accordingly is difficult because of the multiple species across multiple diverse geographies. Combining TACs and closed seasons is the strategy the NFA has chosen to continue with, although they did not work in the past. In order for them to work better in the future it will be important to monitor the fishery more closely and close the fishery each year in a more timely manner. Questions remain about whether it will be possible to do the science thoroughly enough to ensure the TACs are set at the right level in each region every year. The TAC and closed season approach could be supplemented with other precautionary measures and scientific methods that are less resource intensive than TACs.

The devolution embodied in the new Management Plan is a good fit between the political necessity of devolution in the PNG context and the practical reality of a lack of capacity and drive for governing at most provincial and local levels. We find that the new Management Plan amounts to a pragmatic solution that allows for devolution where provinces and local level groups demonstrate the drive and capacity to do it, but does not *rely* on devolution. Various related policies, such as ongoing support of Provincial Fisheries Officers (PFOs) through Memorandums of Agreement with NFA and the Communication and Education Strategy intended to support the new Management Plan can help foster the capacity and drive for devolution.

To date the potential for international arrangements to improve governance are largely untapped. Some of the arrangements with regional and international institutions that could be activated include: listing under CITES; regional data sharing on BDM traders; improving Customs trade data; improving traceability through the export, import, wholesale and retail notes of the supply chain; and marketing measures linking food safety, quality and environmental factors in production.

**TABLE 4. Recommendations Regarding Management Tools**

Recommendations	Responsibility
4. Retain the focus on the point of export as the main point of control in the new Management Plan. Ensure effective implementation by monitoring catches closely and closing each fishery decisively at the appropriate time.	NFA, including the departments responsible for licensing, monitoring and enforcement.
5. Investigate ways to improve the science base of the new Management Plan. Consider participatory research including village-based fishers.	NFA, PFOs, fishing communities and/or their LLGs, NGOs working in CBRM.
6. Retain the new Management Plan principle of allowing for devolution without requiring it. Actively encourage devolved arrangements where provincial governments, LLGs and/or communities demonstrate capacity.	NFA, NMAC, PFOs, community organizations, Local Level Governments.
7. Investigate options beyond training and MOU funding for improving capacity at provincial government level, such as bureaucratic reform.	NFA and National Government departments responsible for provincial government, PFOs, provincial governments themselves.
8. Strengthen size limit communication with villagers, including wet lengths for different species, and strengthen enforcement of ban on exporters, so that fishers cease to have a likely market for undersized product.	NFA, PFOs.
9. Investigate options for improving international reporting on the trade in BDM, including through: 1) Customs processes (export and import); 2) traceability for food safety and quality; 3) a regional trader database; and 4) CITES listing.	CITES member states, NFA, SPC, PNG Customs, Chinese authorities for customs, excise and quarantine, Chinese food safety authorities, PNG Government and other seafood producer states exporting to China, conservation NGOs.

**1.1.3 Key Finding: Relationships are Key to BDM Governance**

Our analysis highlights the importance of relationships in governance. Governance could be improved if greater collaboration can be achieved between industry and government, and within the industry between different supply chain actors. The research indicates that relations between exporters and fisheries managers in the past tended to be top down and punitive in tone, which did not effectively encourage a culture of compliance. This could be improved if through the licensing criteria fisheries managers are able to restrict access to exporters with a long-term business interests in BDM in PNG, and then are able to work collaboratively with those exporters for the mutual goal of a sustainable fishery. Likewise, more integrity and trust between fishers, buyers, exporters and importers would leave less room for illegal and unsustainable practices.

It is widely recognized in fisheries management internationally that achieving sustainable fisheries is in small part about technical issues only, and in larger part

is a complex social and political problem. Yet most effort continues to be spent on the technical issues, because that is what people know best. Moreover, while the problem of human relationships is recognized, it is not yet well understood *how* to improve key relationships in fisheries management. This analysis highlights where governance could be improved through improving key relationships, but further investigation is needed to work out how to go about improving those relationships. For example, how can stakeholders encourage less malfeasance and build trust in supply chain relations, and who is responsible for this? How can relations between government and industry be shifted from exporters being seen as the 'bad guys' towards a collaborative effort for the shared governance goals of sustainable fisheries and development in rural areas? Further research is also needed to draw lessons from measures that have improved or worsened key relationships among stakeholders in fisheries, as well as other sectors.

TABLE 5. Recommendations Regarding Relationships

Recommendations	Responsibility
10. Conduct further research into improving the relationship aspects of fisheries management tools as part of the Communication and Education Strategy. This should include: 1) devolution relations between levels of government; 2) relations between government officers and village-based fishers; 3) relations between government and exporters; and 4) private sector relations along supply chains.	NFA, donors, NGOs, industry representatives.
11. Develop the Communication and Education Strategy for BDM as a central pillar for the effective implementation of the new Management Plan.	NFA.

### 1.2 Methodology

The project employed a qualitative methodology centered around interviews, inception and culmination workshops, and a review of the published literature and technical reports on sea cucumber fisheries and the trade in *bêche-de-mer* (BDM).

Interviews were conducted during fieldwork visits to PNG, Hong Kong and China and also remotely by both by phone, Skype and email from the researchers' desks (see Table 6). Principle Investigator Kate Barclay undertook interviews during fieldwork in Port Moresby, Alotau and Manus in August 2015. The interviews with fishers included four interviews with groups of fishers; one with four men from Brooker Island in the Louisiade Archipelago (interviewed on their boat in Alotau) and three with large groups of 40+ people each in the Mwanus Endras tribal network villages of Mbunai, Pere and Timoenai on the south coast of Manus Island. Co-researchers Graeme Smith, Jeff Kinch and tribal network leader Pongie Kichawen assisted Kate Barclay with these interviews. In addition, Mwanus Endras tribal network leaders Manuwai Matawai and Pongie Kichawen provided information from resource owner

and fisher perspectives in the form of a presentation at the inception workshop and informal conversations during the workshop and fieldwork.

FIGURE 3. Group Interview with Fishers, Mbunai Village

(photo credit: Pongie Kichawen)



Data was collected from eight different PNG trading companies across Port Moresby, Kavieng (New Ireland), Alotau (Milne Bay) and Lorengau (Manus). The managers responsible for buying from PNG and owners from 30 Chinese trading companies and trade representative organizations were interviewed by Co-researcher Michael Fabinyi in Hong Kong, Guangzhou, Shanghai and Beijing.

PNG Government officers interviewed included two people from the PNG National Fisheries Authority (NFA), two from PNG Customs, and two from the Milne Bay Provincial Government in Alotau (the Fisheries Officer and the Governor).

Key informant interviews were mainly with consultants and researchers who have specialist expertise on sea cucumber fisheries and/or the trade in BDM. These included Steve Purcell, Hampus Eriksson, Jun Akamine, Cathy Hair, Paul Lokani, Ravinesh Ram, Yvonne Sadovy de Mitcheson, Calton Law, Marielle Dumestre, Theo Simos, and Allen To.

Non-governmental Organization (NGO) interviews were conducted with staff from The Nature Conservancy (TNC), Conservation International (CI) and the Conservation Strategy Fund (CSF). PI Barclay also discussed methodology with Wildlife Conservation Society (WCS), but she did not interview staff as such because WCS had not as yet worked on sea cucumber fisheries in PNG.

TABLE 6. Interview Numbers by Interviewee Type

Interviewer	Fisher groups	Traders	Key Informants	Government	NGOs
K. Barclay	4	8	8	6	3
M. Fabinyi	-	30	3	-	-

The inception and culmination workshops constitute part of the methodology. The inception workshop provided an opportunity to ‘mine’ the collective experiences of a knowledgeable group that are familiar with the fishery and the trade, and to piece together information from the published and technical literature as the basis for designing the project fieldwork. Participants included fisheries managers, representatives of NGOs and fishing communities, social and biological researchers, and a BDM exporter. A concurrent purpose of the inception workshop was to find out from the group what research design would be most useful in complementing the new NFA management plan. The culmination workshop was intended for discussion of how to refine the project findings, how to disseminate them more effectively and how the findings could best be taken forward in implementing the new Management Plan. Two culmination workshops were held, one with NFA staff in Port Moresby and one as part of a Council of Chiefs meeting to plan community based coastal resource management among the Mwanus Endras tribal network on the southern side of Manus Island.

The literature review portion of the project was led by Kate Barclay with input from co-researchers and key informants, and assisted by Research Assistant Shashi Sharma. Jeff Kinch provided large amounts of literature, including ‘grey’ technical reports, based on his long research of BDM in PNG and regionally. Mike Fabinyi included a brief literature review as it related to his fieldwork in Hong Kong and Guangzhou. Likewise Graeme Smith searched the Chinese language media, academic and technical literature and provided some references. Rick Hamilton of TNC provided literature on the biology of sea cucumbers that was relevant for understanding how they may be fished sustainably, as well as background information to the Mwanus Endras tribal network’s coming together for the purpose of coastal resource management.

EDO NSW undertook an extensive literature and legislation review, as part of their work for the Packard Foundation, which dovetailed with this BDM governance analysis. BJ Kim of EDO NSW attended the Inception Workshop in Kavieng, and since the start of the project he has had regular ongoing contact with Kate Barclay. This included sending multiple drafts of each section of the legal analysis to Kate Barclay throughout the second half of 2015, so that the EDO NSW review could inform the larger governance analysis while fieldwork was conducted in PNG and China and the larger report was drafted.

Initially, Stuart Green of the Packard Foundation suggested it might be useful to build on questionnaires for sea cucumber fisheries, including economic aspects, which had been conducted by researchers in other Pacific Island countries. Kate Barclay collected questionnaires that had been used for sea cucumber fisheries

in Pacific Island countries from CSF, WCS, the WorldFish Centre, and Jeff Kinch. She collated these questionnaires and looked at which questions might be useful for addressing the research project, namely, to analyze the factors affecting governance of sea cucumber fisheries all the way along the fish chain, and to assess the obstacles and opportunities for improving governance through NFA’s new fishery management plan.

After going through this process, Kate Barclay decided, in consultation with Stuart Green, that rather than re-using any of the questions in a questionnaire format, that a purely qualitative approach was most appropriate for this research, given the current relative lack of understanding about how village, provincial and national institutions interact with markets in the governance of fisheries in PNG. The questions from previous questionnaires were used, along with the literature review, to inform the interviews conducted with government representatives, traders, and fishers/resource owning villagers in PNG.

The questions for traders were developed into a structured interview that was used in the PNG fieldwork. At the Inception Workshop participants had suggested that NFA would benefit from knowing more about the perceptions and rationales of the traders. Kate Barclay’s own fieldwork was limited to Alotau, Manus and Port Moresby, so participants suggested that NFA staff or a consultant on behalf of NFA could conduct the structured interview with traders in all the major export ports for BDM in the maritime provinces around the country. Kate Barclay liaised with Luanah Yaman of NFA about this possibility and provided the structured interview for this purpose – possibly to be conducted at a future date.

The project was approved by the University of Technology Sydney Human Research Ethics Committee (reference number 2014000548) on 21 October 2014 for the duration of the project, subject to approval of annual reporting.

### 1.2.1 Conceptual Framework

The project employs the conceptual framework of ‘fish chains’ within the ‘interactive governance’ understanding of fisheries (Bavinck et al., 2013, Jentoft and Chuenpagdee, 2015, Kooiman et al., 2005, Khan and Chuenpagdee, 2014).

Interactive governance is a branch of the ‘new governance’ literature that emerged from the mid-1990s. From this perspective governance is much broader than just what governments do to try to regulate a particular sector. Governance is understood as involving: 1) *diverse* actors and institutions, including state and non-state (such as markets or cultural institutions), human and non-human; 2) inherently *complex* or ‘wicked’ problems that require multi-disciplinary analysis; 3) situations that are interactive and *dynamic*; and 4) operation across various *scales* from the local to the global. These four system properties – diversity, complexity, dynamics and scale – are a key parts of the interactive governance approach. Another key part is to sort the analysis into: 1) natural and social systems-to-be-governed; and 2) governing systems. Governance arises from interactions between the systems-to-be-governed and the governing system.

A third feature of interactive governance analysis of fisheries is the focus not only on the fishery itself as a natural and social system-to-be-governed but also on the entire supply chain through to consumers. In the interactive governance literature the term 'fish chain' is used because 'supply chain' implies an economic focus and starts at the point of harvest. Fish chains start in the ecosystem and are conceptualized within the multidisciplinary interactive governance approach. 'Fish chains' are informed by the literature on supply chain management, global commodity chains and global value chains but vary in that these other chain ideas are aimed at understanding how profits or economic development may be improved overall or at specific nodes of chains (Bair, 2008). Fish chains as used in the interactive governance approach are used to illuminate broader social and ecological concerns: 1) food security; 2) community wellbeing; 3) economic livelihood viability; 4) social justice; and 5) environmental sustainability (FAO, 2015, Jentoft and Chuenpagdee, 2015, Kooiman et al., 2005).

Finally, the interactive governance approach also involves assessment of 'governability'. This means an evaluation of the characteristics of the system-to-be-governed that make it more or less governable (Jentoft and Chuenpagdee, 2015). It involves identification of opportunities where governance can be improved in terms of the five concerns listed above, and the obstacles that make it difficult to improve governance.

The PNG BDM fish chain starts with catching by local fishers (no foreign fleets) and selling either directly or through intermediate buying to exporters based in provincial capitals or Port Moresby. Exporters deal with importers, mainly in Hong Kong but also in several other East Asian countries, with most of the end product going to markets in mainland China via smuggling from Hong Kong to avoid import taxes. In the PNG BDM fish chain, the main actor groups to cover include: 1) PNG government agencies for fisheries management at the national, provincial and local level, and for customs at the national and provincial levels; 2) fisher communities; 3) intermediate buyers between fishers and exporters; 4) exporters; 5) importers, wholesalers, retailers and consumers in end markets; 6) government agencies overseeing the importation and sale of seafood in end markets; 7) environmental NGOs concerned about overfishing of sea cucumbers; and 8) intergovernmental organizations dealing with international trade, fisheries management and conservation.

The PNG BDM trade has changed over time, being for many decades a low-level trade aimed for Singapore markets, then opening up from the 1980s as the Chinese trade increased greatly. At first the trade was concentrated on the high value species but as they became overfished low value species made up increasing proportions of the catch. The main contributions to PNG fishing communities was through cash incomes, which improved food security in terms of bought foods, and enabled other forms of consumption in clothing, housing materials, beer and fuel, but otherwise did not apparently lead to longer-term community wellbeing improvements. The only visible social justice benefit from the fishery was that it was so lucrative, meaning villagers (for a change) were making good income from an internationally traded commodity. BDM was a lucrative livelihood compared to other cash-earning activities for villagers, but the unsustainable nature of the

fishery meant the livelihoods were not viable in the medium to long term. Some of the main factors affecting governability in the PNG BDM fish chain were the high demand for the product – meaning strong incentives for traders and fishers to keep fishing beyond the point of sustainability. A challenging resource governance environment in PNG and the illegal nature of the trade from Hong Kong to China pose other obstacles to improving the sustainability of the fishery. Positive influences for governance lie in PNG's well-resourced and capable NFA and a bottleneck in the trade at the point of export that provides a feasible focal point for monitoring and controlling the trade.

Application of the interactive governance approach to fisheries arose out of the perceived failure of conventional fisheries management to fix problems in fisheries. There have long been calls for different approaches to overcome the shortcomings of conventional fisheries management knowledge generation, so far focused on single areas of jurisdiction and based in single disciplines (with a heavy emphasis on biology) when human behaviour is a very large part of what needs to be governed (McGoodwin, 1990). The conventional approach has patently been unable to maintain healthy ecosystems. The interactive governance approach was welcomed as one way to achieve improvements in fisheries management with the publication of *Fish For Life* (Kooiman et al., 2005). This was followed by a slew of studies employing the approach and a second book with some of those cases and further conceptual development, *Governance and Governability* (Bavinck et al., 2013). The field has continued to grow, with a large collection of cases from around the world recently published in *Interactive Governance for Small Scale Fisheries* (Jentoft and Chuenpagdee, 2015). The approach is akin to other approaches that also foreground the social and political aspects of fisheries management, and see that fisheries management can only be improved through cross-sectoral collaborative approaches, such as the human rights-based approach taken in the 2015 *Voluntary Guidelines for Securing Sustainable Small-Scale Fisheries* (FAO, 2015).

In adopting the interactive governance conceptual framework, this report uses the features described above. The report is structured in the following stages: 1) a description of the natural and social systems-to-be-governed; 2) an outline of the governing systems shaping the BDM fish chain and an assessment of their effectiveness in terms of achieving the five goals of fisheries interactive governance;<sup>2</sup> 3) an analysis of the interactions within the systems-to-be-governed and governing systems; and 4) the identification of opportunities for improving governance in the PNG BDM fish chain.

<sup>2</sup> The five goals are food security, community wellbeing, economic livelihood viability, social justice and environmental sustainability.

### 1.3 The BDM Governance Problem

Sea cucumbers are slow moving animals, so if they are in shallow, accessible areas they are very easily fished. Once processed, usually by boiling and drying, sea cucumbers are called *bêche-de-mer* (BDM) and are shelf stable for several months if dried properly. BDM have for hundreds of years been a delicacy throughout southern China and South East Asia as a health product and also as a prestige dish for special occasions (Akamine, 2005). The market for BDM has grown over the last three decades with economic growth in China, and prices have increased, leading to overfishing. As traditional sources dried up traders have sought new supplies throughout the world, resulting in serial stock depletions (Eriksson et al., 2015). Growing market opportunities led to changes in fishing practices related to the overfishing. From the late 1990s, the PNG fishery shifted from low-volume, high-value to high-volume, low-value (Kinch et al., 2008).

In PNG, BDM, dried sharks fin and shells such as trochus provide a very important source of cash income to rural coastal communities. This is because these commodities can be captured and processed locally with minimal external inputs needed, and then stored for extended periods of time until a trader comes to buy them or there is a transport run to a regional centre where they can be sold (Kinch et al. 2008a). PNG's development statistics put the nation in the lowest quartile internationally, with education rates, income levels and life expectancy having improved steadily but slowly since independence from Australia in 1975 (UNDP, 2015). Cash-earning opportunities are extremely limited in villages far from transport routes because of the expense of bringing inputs in and sending goods out.

Although sea cucumber fisheries traditionally follow boom and bust cycles, their high value, a lack of alternative income opportunities in fishing communities, the existence of BDM traders within reach, and the ease of processing and storing means that artisanal fisheries can continue to place considerable pressure on these fisheries well after stocks have been overexploited (Friedman et al., 2010). Several surveys in PNG conducted in the 2000s showed that sea cucumber stocks were severely overfished (Friedman et al., 2009, Hamilton and Lokani, 2011, NFA, 2007). Widespread collapses resulted in NFA closing the fishery in 2009.

The NFA was structured as a PNG statutory authority in the second half of the 1990s, and is now well resourced through fees paid for access to PNG's rich tuna fishing grounds. There was a sea cucumber fishery management plan with TACs and annual closed seasons, but it failed to prevent overfishing.<sup>3</sup> In 2009 the government instituted a moratorium on the fishery, banning exports. Since then NFA has carried out stock assessments to monitor the recovery of stocks and worked on its new sea cucumber fishery Management Plan to make the fishery sustainable when it reopens. The new Management Plan was gazette in September 2016 and the fishery will re-open in April 2017.

<sup>3</sup> The TACs were set at 70 percent of the estimated total possible catch for each province based on stock assessments where those were available, and catch histories where no stock assessments had been conducted.

Simply put, the governance problem is about how effective the new fishery management plan will be in making PNG's sea cucumber fishery sustainable. In most places around the world sea cucumber fisheries are not sustainably managed, and the criteria found by one study to be associated with sustainable management – enforcement capacity, few species harvested, vessel controls, limited entry controls, and rotational closures (Purcell et al., 2013) – are mostly not feasible to achieve in PNG. Through the moratorium PNG has arguably met the criteria of enforcement capacity, since the fishery has effectively been closed down, but it remains to be seen whether PNG has the capacity to enforce sustainability when the fishery re-opens. NFA has well-trained and experienced staff and the industry has a bottleneck at the point of export where fisheries management measures can be applied. The purpose of this project has been to analyze the various factors that will affect the governance of the fishery under the new management plan, from fisheries in villages through the international trade to end markets. As with most fisheries, the effects of these factors on governance is complex.

One way into the complexity of fisheries governance is to consider how the problem looks from the perspectives of key stakeholder groups (Jentoft and Chuenpagdee, 2015: 26-27). This contextualizes fisheries problems within the larger social frameworks affecting stakeholders, which are not specific to fisheries but affect the way fisheries operate and thus affect their governance.

Fishers and coastal communities expressed the governance problem in terms of cash income lost through closure of the fishery. As a fisheries governance issue involving environmental sustainability as well as food security, community wellbeing and livelihood viability, the role of BDM income in villages has several salient aspects that include extremely limited income-earning opportunities; who has access to the resource and thus the income and how they spend it; and perceptions of being exploited by traders.

Fisheries managers in NFA and provincial governments talked about making the fishery sustainable. They did not present the problem in biodiversity conservation terms, but more in terms of sustainable village livelihoods that focus on sea cucumber species. Key challenges fisheries managers see in improving the sustainability of the fishery include: how to achieve effective management in the face of strong political pressure on decision makers and strong pressure on implementing officers; how to concurrently institute devolution to provincial and local levels; how to curb illegal fishing and trading; and how to structure regulation to encourage compliance.

Well-established BDM traders in PNG who were interviewed for this project presented the problem as making the fishery sustainable so they can resume their business in this product. The challenges they see as important for achieving this include: regulating to exclude traders with unsustainable short-term approaches; fishers improving the reliability of supply and quality; improving the competence of fisheries management; and re-orienting government relations with traders to be more collaborative and less top-down. Traders echoed the perceptions of other stakeholder groups that Papua New Guineans, especially villagers, should be the primary beneficiaries of the trade, although they noted that since it is an export

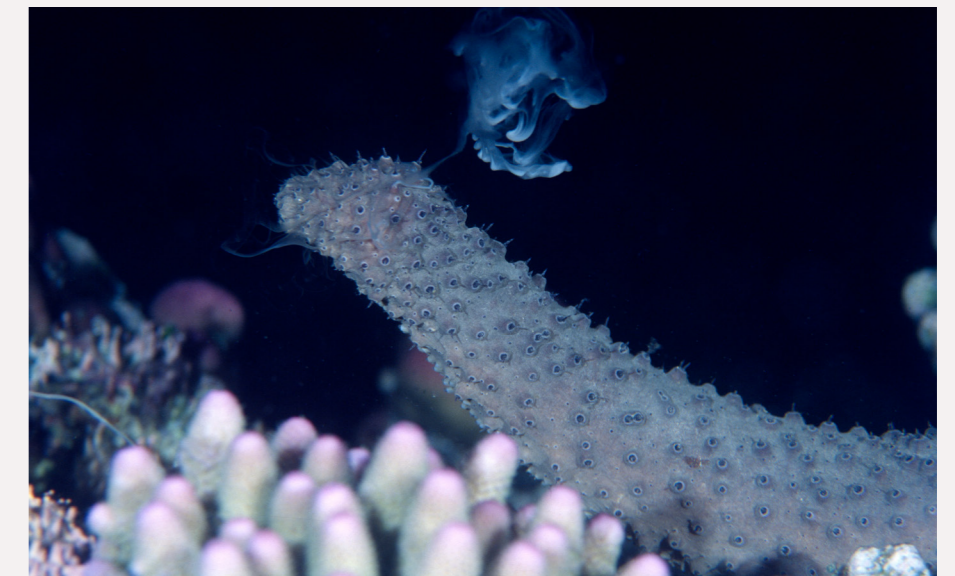
product it is also reasonable to expect that traders of non-PNG ethnic background be involved. To be viable, traders need market relationships and skills in finance, marketing, and product quality. Traders in Hong Kong and China had a different perspective on the problem – focusing not on ecological sustainability but on reliability of supply, and business success in a competitive and changing market, in which solid relationships and loyalty were important.

This brief overview of the governance problem from the perspectives of key stakeholders lays out some of the main themes to be followed through in this analysis, in particular inter-sectoral cooperation (rather than just fisheries management) being necessary for the BDM trade to result in development for PNG, and the importance of relationships along the fish chain for governance outcomes. There is broad alignment among most stakeholders, including the BDM traders, on why it is important to make the fishery sustainable for the wellbeing of PNG's small-scale fishers. From a governance perspective this shared image of the ideal aim for fisheries management bodes well for the legitimacy of management measures and thus compliance. The perceptions on the part of villagers of exploitation by traders, top-down approaches, and a need to improve the competence of fisheries management on the part of traders indicate areas of irritation within the fish chain that could affect governability. The strong need on the part of villagers to raise cash incomes, and the strong market demand for BDM, mean that the pressures to fish as much as possible will remain high.

## 2. SYSTEM-TO-BE-GOVERNED: THE 'FISH CHAIN'

When the fishery was open more than 22 species of sea cucumber were harvested commercially in PNG. Sea cucumbers eat microalgae and organic detritus, so have an important cleaning function in the different habitats in which they live, including sandy bottoms, silt sediments and reefs. Sea cucumbers are very slow moving, so they are easily fished, especially those species that live close to the surface, such as sandfish (*Holothuria scabra*). Other species that dwell deeper, such as white teatfish (*Holothuria fuscogilva*), are more protected from gleaning, but have been targeted by dive fishers and also suffered overfishing (Feary et al., 2014, Purcell et al., 2010).

FIGURE 4. Spawning Sea Cucumber (photo credit: Simon Foale)

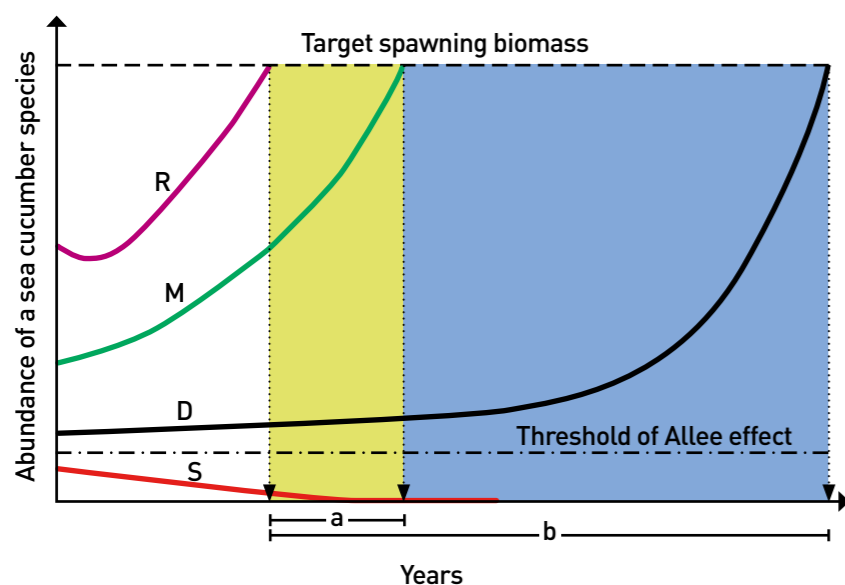


The biology of sea cucumbers is important to understanding the challenges involved in successfully managing the fishery. Different species have different growth rates, the larvae of some are dispersed widely while others tend to stay close to the original spawning location, and spawning seasons also vary by species (Feary et al., 2014, Purcell et al., 2010). These factors, as well as the different market values and accessibility for fishing mean that different species are more or less susceptible to overfishing.

Most sea cucumbers are hermaphrodites and they are pelagic spawners, releasing sperm and eggs into the water column where fertilization occurs. Synchronized spawning in sea cucumbers typically follows a lunar cycle and spawning is induced when the pheromones released from multiple sea cucumbers reach a certain threshold. This means the density of adult animals in an area has to be at a certain level before spawning occurs, a common characteristic for marine invertebrates. With overfishing, therefore, populations may be reduced to the point that even if fishing ceases they continue to decline and eventually disappear from that area. This is called the Allee Threshold (Bell et al., 2008). The same logic means that

even if populations do not reach the Allee Threshold, if their density is too low they may take years or even decades to recover under a moratorium (see Figure 5). The Allee Threshold has not yet been worked out scientifically for the tropical sea cucumber species fished in PNG, but experienced biologists can make educated estimations for most of the key species (personal communication Steve Purcell, June 2016). The Allee Threshold concept thus gives rise to a useful precautionary approach that is possible under CBRM, that is, to aim for an R strategy in protecting spawning biomass (see Figure 5). This way the cost and effort involved in restocking is avoided.

**FIGURE 5. Scenarios of Sea Cucumber Recovery Rates Under a Moratorium**  
Source: (Bell et al., 2008)



Schematic recovery profiles of a population for one sea cucumber species under different scenarios, assuming fishing is banned by moratorium. *R* represents recovery that has been fast-tracked by a restocking program to create additional groups of spawners. *M* denotes a moderately depleted population that recovers over many years, *D* represents a depleted population that may take decades to recover. *S* is a severely depleted population, where densities are so low that the Allee effect causes negative per-capita population growth and the population becomes extinct. Decisions to invest in restocking for *M* population will depend on whether income gained from catches during period 'a' outweigh the costs. For *D* populations the benefits gained from restocking during period 'b' are likely to exceed the costs and for *S* population there is no alternative but to intervene to form effective groups of spawners. Thresholds for the Allee effect (depensation) are unknown for tropical sea cucumbers, but we postulate these maybe between 10 and 50 individuals ha<sup>-1</sup>, depending on species and location.

NFA interviewees reported that their stock assessment work showed that by 2015 six years of fishery closure had enabled some species in some locations to recover, but that for other species in other areas the recovery was not sufficient to re-open the fishery. It is possible that in some areas and for some species stock depletion has so reduced the density of animals that recovery will not occur without stock enhancement or other intervention to increase the density, or will occur very slowly.

Prior to the fishery closure in 2009, BDM fishing was the main income earner for more than half a million fishers in coastal and island communities. BDM was by value the second biggest seafood export from PNG after tuna. PNG was one of the largest BDM producers internationally, accounting for 10 percent of Hong Kong imports (Kinch et al., 2008). Production figures (see Table 7) show how the fishery increased greatly in the years before the fishery was closed in 2009.

**TABLE 7. PNG BDM Production & Value 2000-2009, Compared with Tuna Production & Value**

	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009
BDM Harvest (tonnes)	563	503	398	492	484	611	666	795	522	533
BDM Export value (PGK'000,000)	17	18	21	23	23	30	36	52	38	36
Tuna harvest by PNG-based fleet (tonnes)	-	98,032	131,457	168,063	213,748	235,035	222,799	256,397	-	-
Tuna catch value of PNG-based fleet (PGK'000,000)	-	288	429	481	640	694	692	1,024	-	-

Sources: PNG National Fisheries Authority (NFA); (Gillett, 2009).

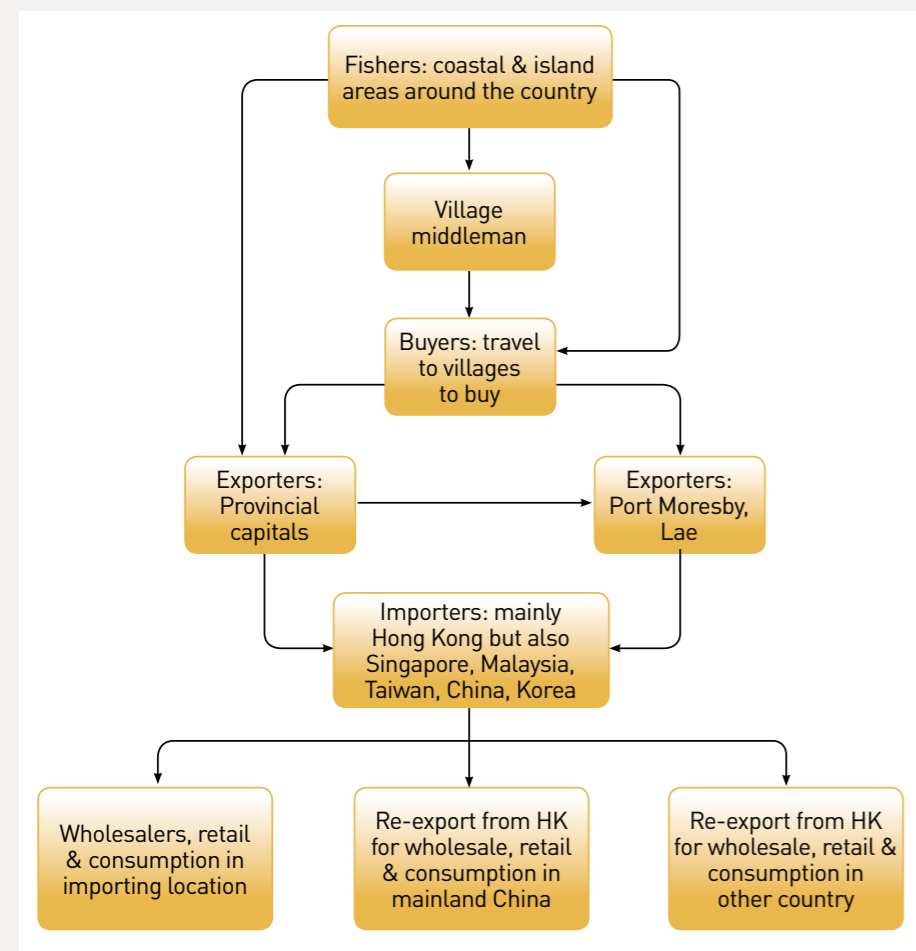
Note: In addition to the PNG-based tuna fishing fleet there is a large amount of tuna caught in PNG's waters by foreign registered vessels under fishing access agreements, which is not included here.

Places in PNG remote from transport routes and market centres have very limited cash-earning opportunities. This is sometimes called the 'tyranny of distance' (Gibson and Rozelle, 2002). All cash-earning activities from such locations are more expensive than from less remote locations because of the transports costs both for inputs and outputs. BDM is an unusually feasible cash-earning activity for remote locations because of its high value relative to weight and volume, shelf stability once properly dried, and production not requiring much in terms of externally sourced inputs. For this reason BDM has been really important as an income source for coastal and island villages around PNG since the mid-1980s. BDM has been exported in small quantities since the 1800s, but with relaxed trade barriers to China and increasing wealth in China from the mid-1980s, exports rapidly increased from well under 100 tonnes to over 600 tonnes by 1990 (Kinch, 2004a). Prices also increased as demand grew, with the prices paid to fishers over the period 1991-2004 increasing 1,000 to 3,000 percent for some species (Kinch, 2004a). Price increases of this magnitude enabled fishers to continue to improve

their incomes from BDM despite stock depletion. The decline in catch per unit of effort (CPUE) was also masked by the introduction of motorized dinghies that allowed fishers to travel to locations they had not previously been able to access using sail- and paddle-powered canoes.

Table 7 shows the volume and value of BDM compared to the larger tuna fishery. It is worth noting that although tuna is overall a much more valuable fishery to the PNG national economy, the benefits of the industrial tuna fishery are largely not felt by the majority of the population. The large revenues earned through tuna access fees have not resulted in improved services or development opportunities at the village level, whereas BDM did increase cash incomes for tens of thousands of coastal villagers (Hair et al., 2016).

FIGURE 6. PNG BDM Fish Chain



## 2.1 Village-Based Fishing, Processing and Trading

Once sea cucumbers are harvested they enter the human part of the system-to-be-governed. The PNG BDM fish chain starts with village-based fishers, going through several layers of traders to end up in retail markets overseas (see Figure 6). Sea cucumber fishers operate differently in different places due to a range of factors including the proximity of fishing grounds to living areas, proximity to buyers, and the type of species available – noting that the different species live in habitats ranging from sea grass to shallow reefs to deeper reefs.

For example, traders and other interviewees who had been to Daru in Western Province noted that its estuarine conditions with plentiful seagrass means there are sandfish (*Holothuria scabra*) available near to town in shallow waters.<sup>4</sup> Being in an urban area, customary marine tenure is not asserted, so the fishery was physically and socially accessible to everyone, regardless of their place of origin. Large numbers of ‘migrants’ – people from the Fly River and Bamu River areas – live in Daru. The main area close to Daru is Paramana on the mainland, and villagers from Paramana do not like people from Daru fishing in their areas. The migrants are involved in cutting mangrove wood at neighbouring Bristow Island to supply fishers and BDM traders with wood for processing (Kinch et al., 2007). Fishers who operate close to buyers in Daru were able to sell BDM after the ‘first boil’, rather than drying the product out. One exporter who had earlier worked in Kimbe in West New Britain said that when the fishery was at its peak some buyers went out on boats to the fishing grounds and bought fresh sea cucumbers directly from fishers, even before the first boil.

By contrast, fishers in locations more remote from markets had to fully process and dry their BDM so that it would keep while they waited for a buyer, or for a boat to take their product into town to sell. In some locations the fishing grounds were remote from villages, especially after stocks were depleted close by. Fishers from Brooker Island in the Louisiades in Milne Bay travelled approximately 30km away from their home island to fishing grounds, taking water, food and fuel and setting up camp for weeks at a time to fish sea cucumbers (Kinch, 2002).

The equipment needed for fishing was within reach of villagers, but to set themselves up well was a significant investment. Fishers interviewed in villages in south Manus could gather some sea cucumbers in shallow waters near their villages. The high value white teatfish (*Holothuria fuscogilva*), for which Manus is known, lives in deeper waters, often requiring travel by boat to fishing grounds and diving. Fishers free dived (with goggles or mask, snorkel and fins if they had them) and also used lead-weighted hooks on lines to get sea cucumbers deeper down. No interviewees talked of using underwater breathing apparatus, and we did not hear stories of people maimed or killed by ‘the bends’, but fishers in Manus did talk of deaths through free diving, and of divers having hearing damage. Hookah gear had been a significant problem in the Engineer Group of Milne Bay.

<sup>4</sup> This fishery in and near the town of Daru did not make up the bulk of the BDM supply from Western Province. The majority of Western Province BDM was fished from the Warrior Reef complex on the PNG-Australian border.

In sum, the equipment used for fishing includes: canoes with paddles or sail, dinghies with outboard motors, hooks, lines, spears, diving gear, and containers (ideally an ice-chest 'esky' with a lid) for storing sea cucumbers and other fish on the boat. Some fishers also talked about using a crowbar to break coral to get at snakefish (*Holothuria coluber*) hiding in the coral, and of using lamps and torches for night fishing.

FIGURE 7. Canoes Used for Fishing, Pere Village (photo credit: Kate Barclay)



Processing was done ashore. Different species required different methods for cutting the fish to let the viscera out and boiling and drying so that the finished product was even and straight (Purcell, 2014a, ACIAR, 2014). One trader in Manus had fishers use salt for processing white teatfish, but salt is expensive and often not used. The sea cucumbers were boiled and dried as many as four times. Equipment for processing includes: knives, salt, tarpaulins and/or flat sheets of metal for sun drying, boiling pots, wire mesh or racks for smoke drying, brushes for scrubbing the skin of some tough-skinned species, scoops for taking BDM out of boiling water. On large-scale fishing expeditions sea cucumbers were usually boiled in cut-in-half, 200-litre fuel drums, or large aluminum dishes of the type usually used for washing clothes. According to Manus villagers, who operated on a smaller scale, the aluminum pots from the inside of electric rice cookers are the best for boiling.

In addition to sun drying, BDM may be dried over a fire, or in specialist driers (see Figure 8). The driers enabled high quality processing, since the fire could be kept low for drying and reduce the risk of 'overcooking' it. People without access to driers used open fires, which resulted in less even drying and the risk of overcooking all or parts of the animal.

When exploitation is high, considerable quantities of wood are needed for the smoke-drying process and this can lead to severe deforestation in mangrove areas or on small islands where large quantities of wood may not be available. Deforestation from BDM processing has been documented in PNG (Kinch, 2002), Solomon Islands (Kinch, 2004b) and Fiji (Adams, 1992). One study found that 10 tonnes of firewood is needed to process one tonne of BDM (Preston, 1993). BDM processing also results in the production of 'stick-water', containing a toxin (holothurine) from the sea cucumber skins, during the boiling process. There is anecdotal evidence that if stick-water is poured directly into the sea it causes fish kills (PNG Government, 2013).

Fishers have demonstrated ingenious 'bush engineering' in working out how to most effectively catch and process sea cucumbers, although in many cases poor quality remained a problem. Fishers, utilizing extension activities from projects and advice from buyers, worked out how to use weighted hooks in diving and how to build and use fish driers. Another example, amberfish (*Thelenota anax*) are so large they are difficult to boil and dry evenly. Exporter B said that fishers on Mbuke worked out that a piece of wood with long nails on it could be banged into the sea cucumber, leaving lots of small holes that made processing quicker and more even.

FIGURE 8. Photographs BDM (and fish) drier in Southern Manus (photo credit: Kate Barclay)



The fieldwork for this project was too brief to gain a detailed picture of gender relations in BDM production, but we gained some insights. According to interviews and the literature, the deeper diving is done by young men, while women, old people and children catch sea cucumber closer to the surface. Exporters said that women and children, as well as men, sold BDM to them. Villagers interviewed in southern Manus said they often went fishing in family groups, with women looking after the boat and starting processing BDM on board while men dived. Other villagers said that in addition to family groups, small groups of friends went fishing, as did individuals. Women seemed to do a lot of the processing, especially the boiling, but it did not appear that this was a wholly female task. Jeff Kinch (Kinch, 2002) observed that in the fishing expeditions from Brooker Island that lasted for several weeks, men did the diving/fishing, and women looked after the camp, prepared food, and did some of the processing. Women attended and spoke up at all three of the group interviews Kate Barclay conducted in southern Manus. They pointed

out that women fishing in shallow areas did not make incomes as good as men who went diving because (apart from sandfish) most of the higher value species were deeper. Internationally it has been noted that sea cucumber fisheries tend to be egalitarian at the start when animals are easily accessed from shore, then as nearby stocks become depleted they become male-dominated dive fisheries requiring boats (Afkham et al., 2012, Choo, 2012).

There was some aggregation of BDM at the village level. Two of the three southern Manus villages said they had no middlemen; families accumulated their own product to sell. The third said they sometimes sold to a local buyer from another village who bought from them and took the product into town to sell. On Brooker Island fishers could sell to village middlemen (usually men), the canteen acted as one such buyer. Not all fishers sold to a middleman, some fishers accumulated their own product to sell to exporters. Most middlemen or local buyers in villages were aligned with an exporter. Exporters gave local buyers the money to buy from fishers. In exchange there were sometimes arrangements whereby local buyers were expected to supply certain species in certain quantities to their exporter. Exporter E bought from village middlemen, as did Exporter F. Exporter F bought from middlemen who had access to a boat with an engine or outboard motor and fuel. They brought the BDM to town to sell directly to exporters. According to Exporter B this system would sometimes lead to trouble if the boatman spent all the money in town after selling the BDM and had nothing to take back to give to the fishers. Another problem that could occur with taking product into town was the risk of rejection or low price for BDM being undersized or bad quality. It was therefore less risky to keep hold of one's own BDM till a buyer from an exporter visited one's village. In some cases, however, people wanted immediate cash, or wanted to try to get a better price by sending their product to town. Exporters usually paid a higher price for BDM brought to them in town, because they didn't have the costs and risks of travelling out to villages, and conversely the fishers or middlemen had taken on those costs and risks. The price was also lower going through a middleman, due to the middleman needing to take a cut.

Several interviewees expressed the belief that village fishers were exploited by exporters. Government official A said that exporters did not pay fair prices, thus cheating 'the people' of their rightful benefits from the resource. Several of the villagers from southern Manus said they felt fishers are at the end of a long chain and they receive low prices for their product. Indicative prices along the value chain are shown at Tables 11 to 16, but it is worth making the point here that, regardless of whether exporters were actually making unreasonable profits from trading in BDM, the perception that BDM exporters exploited village fishers are widespread. While some of this may arise from concrete experiences, it may also be seen as part of a predisposition to expect exploitation in dealings with outsiders through trade in PNG and other Pacific countries. The history of colonialism in the Pacific, along with a postcolonial situation in which the majority of citizens in countries like PNG remain disadvantaged in the world system, has given rise to a 'Third Worldist' discourse of exploitation by outsiders (Barclay, 2012, Barclay, 2013).

It is estimated that in the 1990s BDM accounted for just under 50 percent of the cash income on Brooker Island (Kinch, 2001, Kinch, 1999). The extent of the reliance on BDM is evidenced by the effort people from the islands in Milne Bay put into fishing for sea cucumbers. Until the 1990s, sea cucumbers were available close to where people lived, but once demand increased in the 1990s and close fishing grounds were fished out, it was necessary to go further afield. Parties of fishers travelled to uninhabited islands tens of kilometres from their home islands and stayed in huts to fish intensively for weeks at a time. Such islands were often no more than sandy cays, so drinking water and food had to be brought from home (Kinch, 2001, interview with Government official A, Kinch, 1999). Villagers from Manus also showed the economic importance of BDM to them. They said that during the fishing season each year, BDM production was the highest priority activity in the village because it brought in more money than any of their other income sources. They said, "When the BDM season was open we had food in the house and clothing". By contrast, during the closed season each year they struggled to make ends meet (see also Kinch et al., 2007).

Since the moratorium was declared in 2009, coastal village people have struggled economically, to the extent of sometimes not having enough food. Anthropologist Anders Rasmussen noted that hunger was a feature of life during the sea cucumber closed season in Manus in the 2000s (Rasmussen, 2015). Hunger was also a problem during the closed season on Ware Island in Milne Bay with a lot of people down to one meal a day and some reporting eating starvation foods such as banana suckers (Foale et al., in press). Labour uses in the Pacific are very flexible: one of the ways people have protected themselves against a problem in any one economic activity is to have several, and devote time to whichever one is working well at the time (fish when the fish are available, make copra when the prices are good, and so on). On Ware, and likely in other places too, this meant the BDM trade contributed to food insecurity because when the sea cucumber fishery was open people fished more, reduced their garden labour and bought more food. This meant that when the fishery closed their gardens were not as productive due to neglect. Some people dealt with that by leaving Ware, or sending family members to live with kin and affines on other, more food-secure islands (Foale et al., in press). A similar study in Solomon Islands, however, found that this plasticity of labour meant that the food and income production system in island villages, including BDM, was quite resilient (Christensen, 2011). Another way islanders have tried to cover the shortfall in income left by the closure of the fishery is by targeting other resources, notably shark fin and trochus, and where possible selling fresh or smoked fish. While the fishery was open, BDM buyer boats visited communities regularly, buying BDM for cash and also carrying cash goods such as food, tools, clothing, soap and kerosene that islanders could buy with their BDM income. Many villages on the islands in Milne Bay Province have wooden or fiberglass boats that go back and forth from Alotau. These have diesel engines rather than outboards because they are cheaper to run. They catch and sell shark fin and trochus shells to the same traders who previously bought BDM, and also fresh fish at the Huhu Local Level Government (LLG) market near Sanderson Bay. The Brooker Island workboat has two large ice chests. The men come into town, buy ice, go back to the island, fill up with fish and some lobster, come back and sell it. In some locations

other commodities such as copra can be sold when the prices are reasonable, but on Brooker there was very little land suitable for copra production.

The exporters interviewed in Alotau stressed the importance of BDM as an income source for people from the outer islands. The Milne Bay Governor, Hon. Titus Philemon,<sup>5</sup> told us he is under a lot of pressure from constituents to re-open the fishery because of the lack of other similarly viable income sources. NFA interviewees corroborated this statement by saying that throughout the period the fishery has been closed, the Minister for Fisheries has been under pressure from other Members of Parliament to lift the moratorium.

While interviewees were unanimous in saying that income from BDM was vital for fishing families, another picture also arose from interviews about the social effects of cash from BDM. When asked what BDM income was used for, interviewees from Manus villages said they used it for food, for education and other expenses for their children, and they saved some. But one man said sometimes the money from BDM was not used 'wisely' and that he hoped people would learn from past mistakes and learn to better manage their income when the fishery is reopened (see also Kinch et al., 2007). Other people at that meeting nodded as he made this comment. In separate interviews, Government Official A said when the BDM season was open fishing areas and nearby towns were like 'boom towns', and Official D said she felt the money from BDM was often 'misused' by young people. According to Exporter B, when BDM fishers received a big payment they tended to spend it on alcohol and gambling, and perhaps transactional sex. Similar points were raised by participants at the project Inception Workshop. Anthropologist Anders Rasmussen has discussed the tensions between old men who conventionally had more power and economic wealth than young men, and young men who were physically strong enough to dive and thus gain the income from BDM, and the uses to which young men put that income (Rasmussen, 2015). Comments from interviewees from Pere and Timoenai villages included:

*Me, I don't want the fishery to reopen. We are better off without all the problems it brings.*

*When the fishery reopens we need to learn from our mistakes about using cash.*

In PNG and other Melanesian countries, when cash has flowed into villages from logging, mining or fishing various negative social impacts have been noted, including binge alcohol drinking and socially disapproved of sexual liaisons (Banks, 2014). Company trade boats in Milne Bay sold alcohol to groups who went out to remote islands fishing for sea cucumber (Kinch et al., 2007). In Western Province in Solomon Islands, the majority of the money earned from BDM went on alcohol (Ramofafia et al., 2007, Kinch, 2006). During his fieldwork in the late 1990s, Jeff Kinch heard stories circulating in the Louisiade Islands (Milne Bay) of women and girls being paid for sex because young men had cash from BDM. Villagers also spent large amounts of BDM cash on fuel, dinghies and outboard motors.

<sup>5</sup> To protect the privacy of interviewees we have not used names, except in cases like this where the identity of the speaker is important to the point being made, and where the point is uncontroversial.

A similar BDM 'gold rush' mentality and patterns of spending were noted in Ontong Java in Solomon Islands (Christensen, 2011, Christensen and Mertz, 2010).

Economic and social relations, including gender, intersect with the biology of the fishery at this point. Several ideas can help contextualize these perspectives on how the fishery affects community wellbeing. Many PNG villagers have not learned either through their life experiences or from role models how to live from cash and thus need to collectively build their household financial literacy. Exporter B described this as 'learning how to manage cash'. A related idea is of economic 'scarcity', with researchers having noted internationally that when people are chronically short of cash they somewhat paradoxically use it not for their most pressing needs, but for apparently frivolous purposes (Mullainathan and Shafir, 2013). The third is the internationally noted tendency of men to not use cash income for family development purposes as much as women (Chaaban and Cunningham, 2011, UN Women, 2014).

As noted earlier, when sea cucumbers are available close to the surface and within easy distance of the village, the fishery may be democratic in terms of access and thus distribution of benefits. When the easy-to-access grounds are fished out and it becomes a dive fishery that requires boats, the fishery becomes dominated by men who own boats, and younger men who are physically fit enough to dive. When young men were earning most of the money from BDM they tended to use it for entertainment, and not for family uses. Problems arising from a lack of money for food, education and health fall disproportionately on women, due to the usual gendered division of household responsibilities, as well as women bearing the brunt of any domestic violence that may ensue. Another social problem that occurred from sea cucumbers becoming a young man's fishery was that older senior men felt challenged and resentful from young men controlling so much of the village income (Kinch et al., 2007, Rasmussen, 2015).

These kinds of issues are not normally considered part of fisheries management but there are direct connections to the five interactive governance concerns (food security, community wellbeing, livelihood viability, social justice and environmental sustainability). The lack of environmental sustainability in the fishery, in the PNG coastal village social context, contributed to problems for community wellbeing, social justice and livelihood viability. It is thus important to consider how fisheries management and development policies intersect with village social institutions. This approach is recommended in the FAO's *Voluntary Guidelines for Securing Sustainable Small Scale Fisheries* and regionally it is also recognized as necessary in the 2015 Heads of Fisheries outcomes document from the SPC *A New Song for Coastal Fisheries* (FAO, 2015, SPC, 2015). To enable a more holistic approach to achieving improved community wellbeing from the good income possible from BDM managers will need to collaborate with organizations from related sectors in community development (see Section 5.1).

Aquaculture was discussed by interviewees as a possibility to enhance the fishery at the village level. Exporters D and G both said they hoped aquaculture could be implemented to help make supply more reliable. Stock enhancement techniques have not yet been applied commercially in PNG but research on sandfish is ongoing

at the Nago Island Mariculture and Research Facility (NIMRF) in Kavieng. It is technically feasible to breed species such as sandfish in a hatchery, but it remains to be seen whether stock enhancement will work biologically and economically or in terms of the ways village-based fisheries operate (Hair et al., 2016). Not all environments are suitable for sandfish. Aquaculture using a hatchery requires a significant capital investment and ongoing costs for staff and maintenance. A more cost-effective approach than aquaculture is to implement precautionary management measures that are informed by the best available local and scientific knowledge. In Southern Manus the Mwanus Endras Asi Resource Development Network (MEAR) is implementing such measures through CBRM; including placing some stocks of adult sandfish that are in close proximity to communities under permanent protection, and planning to enforce minimum size limits for sea cucumbers once harvesting resumes (Feary et al., 2014, Manuai Matawai, personal communication May 2016).

## 2.2 Town-Based Buying and Exporting

There were two tiers of exporter companies: 1) those based in maritime provincial towns who bought mainly from the province in which they were located, and; 2) those based in Port Moresby who had subsidiary companies buying for them in provincial towns and also sourced through independent provincial town-based exporters. We can see the numbers of exporters involved nationally through the numbers of licenses issued by NFA that were required for trading in BDM (see Table 8).

TABLE 8. Numbers of Export & Storage Facility Licenses 2000-2012

	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
Export Licenses	31	25	64	70	82	74	68	81	104	84	34	2	3
Storage Facility Licenses	11	77	89	65	78	77	76	90	110	92	39	3	2

Source: NFA (project Inception Workshop 2015).

Exporters bought BDM from fishers either by going out to villages, or waiting for villagers to come into town to sell to them. The 'village' or 'island' price was correspondingly lower than the 'town price' because buyers took on the risks and costs of transport by going out to the villages. Exporters B and C in Lorengau and F and G in Alotau used trading boats to go out to buy from villagers and to also sell them store goods for the cash the fishers had just received for the BDM. This was useful for villagers because it saved them a trip into town to buy store goods. The largest operator we spoke to had 16 boats operating around Milne Bay at the peak of the fishery. Exporter G said his company's boats took up to PGK300,000 worth of cash and goods on each buying trip, whereas Exporter B said his trading trips took around PGK100,000-200,000.

These trading boats were attractive to pirates. Exporter F's trading boats had been robbed four times, losing around PGK500,000 in total. Exporter G said they used to have a police escort, but in future would engage private security firms. Exporter B's buyer staff on the trading vessel took guns for security. Exporter F was considering different ways of buying BDM in future to avoid the piracy problem. Unfortunately transferring money by mobile phone is not viable for many of the remote islands as they have no mobile phone reception, so Exporter F was considering offering cheques rather than cash, and encouraging fishers to bring their product to town more and rely less on the trading vessels. Another possibility is direct deposits into bank accounts, but many villagers do not have bank accounts and find it difficult to open them due to the identity documents required (birth certificates, passports), which are expensive and difficult for many villagers to acquire. There are also issues around trust that the buyer will indeed deposit the money as promised, which could be avoided if mobile banking services were possible, as they are with BSP in some areas in PNG.

Exporter A had already operated that way, not using trading boats but only buying product fishers brought to sell to them in town. The choices exporters were able to make about how they bought BDM were related to the prices they offered. Exporter A offered high prices, so fishers were willing to bring product to them. When Exporter B started operating in the same market, he said he could not meet the prices A was offering – they were higher than B's export price. Exporter B speculated that A's value chain must have been different to B's, possibly shorter, so that A's margin enabled him to pay such high prices for BDM. Another possibility is that A was taking a loss with these prices in an effort to put competitors out of business and create a monopoly. Exporter B had no choice but to use trading boats to go out to villagers, because otherwise no one would sell to his company.

Exporters also varied in how 'wet' they bought product. Exporter G had worked for a while in Kimbe in West New Britain Province where he said some exporters offered not only to come to the village to buy but went out to the fishing grounds and bought direct from fishers. In Kimbe, the fishing grounds were close to town so even those exporters not going out to the fishing grounds were usually buying wet product that had only been 'first boiled', and they had to do the rest of the processing themselves. Several interviewees, including Port Moresby-based Exporter D, said the fishery in Daru operated similarly: because the fishing grounds are close to town, fishers did not have to preserve the BDM but could sell it quickly after the 'first boil'. In this way fishers received instant cash and avoided the costs, risk and effort involved in processing the BDM (Kinch et al., 2007). Alotau and Lorengau, however, are distant from the fishing grounds so fishers had no choice but to process and dry their product so it was shelf stable and then wait for transport. Exporter B from Lorengau said he has no expertise in buying wet or first boil BDM; has he only ever dealt in dried product. Villagers also made choices about whether they would wait for buyers to come to the village or take their stock into town to sell. Villagers from Manus said if they did not want to wait for the next trading boat, which visited only once a month or so, they would take their product into town.

The capital towns of each maritime province had several licensed exporters who employed buyers who were the main interface trading with fishers. It was

the buyers who went out on trading boats, and worked as staff in exporter stores dealing with fishers who brought product to town. There were also free-floating buyers who did not have export licenses but who consolidated product and sold it on to licensed exporters (Government Official A).

In the previous management plan both the role of buyer and of exporter were reserved as occupations for PNG nationals only, and these are also designated thus in the new Management Plan. As far as our fieldwork enabled us to ascertain, most buyers had been ethnic Papua New Guineans, but many exporters were of non-PNG ethnic backgrounds, or were ethnic Papua New Guineans working in partnership with an overseas investor. Of the eight exporters we interviewed, one was of European background, two were of non-Chinese Asian background, one Southeast Asian of Chinese background, and one of Chinese background but not Cantonese or Putonghua<sup>6</sup> speaking, so his family's ethnicity did not directly connect him to the main BDM importing community. The remaining three were ethnic Papua New Guineans working with Chinese or Hong Kong investors. One of our interviewees was a long-term PNG resident without PNG citizenship and the employee of a PNG citizen who was the BDM export license holder. This interviewee arranged exports as part of his employment responsibilities, and because it looked like he was an exporter, the provincial government took him to court. It took several years and cost the interviewee tens of thousands of kina to go through the legal process, eventually being found not to have broken the law. The sense that exporters and buyers should be PNG nationals and by extension should not be 'foreign' or 'Asian' is very strong in PNG society. In the words of one exporter:

*We know there are plans to keep Asians out, but this is an Asian industry. It's not like timber or copra; Papua New Guineans don't eat it, or know how to process it... BDM can be money, food, medicine, business, tradition... The Asians understand this. They also know the different markets, from the richest man on down, and they have the warehouses overseas.*

It is normal in PNG, as in other Pacific Island countries, for the export node of seafood supply chains to be run by non-Indigenous businesspeople (Barclay, 2013, Barclay and Cartwright, 2007). The reasons for this are complex, including colonial systems having actively prevented Indigenous people from going into business and creating conventions whereby trading was dominated by migrant groups. Where Pacific Islanders are employed in seafood-exporting businesses they tend to be focused on the domestic aspects of the business, such as production, engineering, government liaison, human resources or community relations, rather than the export part of the business. This seems to be changing, and certainly interviewees strongly expressed the desire that Papua New Guineans should export BDM themselves.

When the fishery was open there were apparently a number of overseas investors who operated through PNG citizen partners, and who had left when the fishery closed, so we were unable to interview them for this study. Our interviews were all with ongoing marine-product trading businesses.

<sup>6</sup> Putonghua, or standard Chinese spoken language, is sometimes called Mandarin.

Whereas Papua New Guineans tended to see the involvement of any foreigners as illegitimate, these traders identified themselves as long-term traders, as being more legitimate than traders they identified as 'fly-by-nighters'. The fly-by-nighters were seen as mainly responsible for the demise of the fishery. Exporters D and E stressed that they wanted the fishery to be sustainably managed so that they would have reliable supply of product and not face another moratorium.

The traders deal in mixed marine products, usually sharks fin, trochus, black lip pearl oyster shells and BDM. Exporter B had been trying to buy fish maw, but it was not yet a familiar product in PNG so he was unable to find suppliers.<sup>7</sup> Exporters C and F also traded in fresh fish alongside the dried products. The fly-by-nighters were specialist BDM traders only, and they left PNG during the closed season. Because of the annual sea cucumber closed season, ongoing trading businesses had to have other activities to keep going throughout the year.

**FIGURE 9. Dried Seafood Products Including BDM & Fish Maw in Sydney Chinatown** (photo credit: Kate Barclay)



Indeed, for some of the traders we spoke to, BDM was more of a side business. In the provincial towns most exporters traded in non-marine products too, or ran trade stores or supermarkets. Exporter B said his main business motivation for trading BDM was not to make a profit from BDM per se, but to increase the amount of disposable income in the population, so that they would buy more groceries from his supermarket.

<sup>7</sup> Fish maw is dried swim bladder, and is another dried marine product usually sold with BDM and sharks fin throughout Southeast Asia, southern China and in diasporas of these ethnic groups internationally.

TABLE 9. Employees Working on BDM in Exporter Businesses

	Employees working specifically on BDM
Exporter A	8
Exporter B	16
Exporter C	7
Exporter D	75
Exporter E	20
Exporter F	85
Exporter G	15
Exporter H	16

Source: fieldwork interviews.

Note: It was hard to get clear figures on staff working on BDM only, as all of these exporters also traded in other products, so these staff were often not working on BDM only. In addition, several of the exporters said they hired additional casual staff during the season.

### 2.2.1 Value-Adding & Quality

Importers in Hong Kong and Guangzhou look for various features in assessing the quality of BDM (in addition to the species): a) dryness – the most important factor mentioned by many traders, related to this was the expansion rate when the dry product is reconstituted for consumption; b) the way the sea cucumber was cut; c) the saltiness (less salty is better);<sup>8</sup> d) size; e) shape (straight and symmetrical, not curly), and; f) any damage to the BDM (Appendix C).

The Inception Workshop participants expressed the view that it would be better for villagers to do the processing themselves, and learn how to do it well, so as to capture more of the value of the product. This has also been an aim behind regional fisheries development projects (Purcell, 2014a, Purcell, 2012). Inception workshop participants also perceived that some exporters preferred to do more of the processing themselves for the same reason, or to ensure products meet importer expectations, while other exporters did extension work with the fishers supplying them, so as to improve quality. Even exporters operating in areas distant from fishing grounds where BDM was dried before being sold to them said the processing was often not fully finished by villagers. Exporter B from Lorengau said importers want product that is 95 percent dried or more. Fishers supplied BDM that was around 75–80 percent dried, so he had to do about three days more processing before it could be exported, adding significant costs to his operations.

Fishers from the village of Timoenai in southern Manus noted that the prices they received for their BDM could improve if the quality was higher; they could get 'town price' in the village for high quality product. They were thus interested to learn about how to improve quality.

<sup>8</sup> Saltiness is particularly relevant for teatfish, which were sometimes salted as part of the processing for some exporters, and should have the salt washed out again before retail.

They noted also that exporters varied in the ways they evaluated quality, saying buyers from most companies sorted piece by piece but one exporter would select one piece from the bag and set the price for the whole bag based on the quality of that piece. The importance of quality in the drying process also varied by species. According to Exporter B, good processing is important for high value species such as sandfish and whiteteat, but it is not so important for lollyfish and other low value species.

One issue was that since Papua New Guineans do not normally eat BDM they do not have personal experience of better or worse quality, and indeed exporter E said it meant fishers did not see BDM as food but as 'money' and thus did not treat BDM with due care. Exporters talked of learning from their importers about what kind of quality the importers seek, then passing that on to fishers and working out with fishers how to achieve that quality with village-based processing. For example, Exporter B and fishers supplying him worked out how to scrub sandfish and whiteteat (which both have a tough skin) with pawpaw leaves (used to soften tough seafood such as octopus) when they were hot from boiling, to remove some of the outer layer of the skin. Villagers also talked of burying BDM overnight in the sand. Exporter B worked with fishers on how to prepare whiteteat well without using salt.<sup>9</sup> He also encouraged fishers to use sun drying or drying houses rather than drying over a fire, since drying over a fire could result in an overly smoky flavor, uneven dryness or cooking rather than drying. Exporter C said similar things. Villagers said exporters taught them about how to cut the animals for gutting differently for each species, and how best to boil and dry them. While sorting product for quality at buying time, buyers told fishers what was still too wet, what was overcooked, and what could be done differently. Villagers also said they learned by watching other fishers who got a good price, seeing how they processed BDM and learned from them. Fishers from one village in south Manus said they received some training in BDM processing from NFA, but the majority of extension activities seem to have come through the private sector.

One Port Moresby-based exporter said that they sometimes faced barriers in doing extension work with fishers. Extension advisors were often from importer companies and thus were not PNG nationals. A competitor company apparently reported to NFA that non-PNG citizens were buying or exporting so as to have NFA investigate or prevent the extension work.

While it will no doubt be useful for villagers to have the knowledge and techniques for high quality processing, the preceding discussion shows that choices about processing are influenced by a number of factors, and it is by no means certain that fishers will choose to process to a high level of quality. Access to equipment is a key factor, and fishers weigh up the extra costs and work associated with processing for the chance of a higher price against the benefits of a quick sale if that option is available. Moreover, we found no evidence that exporters want to keep processing work to themselves to capture value. The exporters we spoke to have already done extension work with fishers and also see processing as a cost they would like to avoid if possible. According to Exporter E, to get the best price

<sup>9</sup> Whiteteat may be dried with salt, which works for airfreighted product, but Exporter B used sea freight and if BDM had a high salt content while being shipped they would attract moisture and become soggy.

for whittet it requires seven or eight boils to clean the salt out, taking a lot of staff time and adding to energy costs. There is another point to consider regarding fishers improving quality: if they get higher prices for better product it is possible this will act as an incentive for them to try to harvest more.

### 2.2.2 Relations Between Exporters and Fishers

Internationally it has been noted that small-scale fishers in developing countries are often in debt relationships with the traders to whom they sell (Schwerdtner Máñez and Ferse, 2010, Ruddle, 2011, Firth, 1966, Nurdina and Grydehøj, 2014). This has some benefits for fishers, in that they are able to obtain credit and equipment that may otherwise be unavailable to them (Ferrol-Schulte et al., 2014). However, overall it is often found to be disadvantageous to the fishers because they are obligated to sell their catch to the trader who has assisted them, usually at a discounted price due to the credit or equipment extended previously (Padilla et al., 2003). In market power terms it means the fishers are unable to 'shop around' for the best price for their product. It should be pointed out that these situations can be dynamic. In one area in the Philippines fishers had started off financed by traders but over time they paid their debts and became free to choose among buyers (Fabinyi, 2012).

PNG sea cucumber fishers did not allow traders to dominate supply chains in this way. Exporters had attempted to create obligated supply sources through debt relationships but fishers often did not honor their obligations. Relationships were built between particular traders and specific fishing communities, but these arrangements could be fairly loose. Some interviewees told us exporters tended to divide up their efforts geographically, with some regions mainly selling to one exporter company, however, this was not an absolute rule. The villages of southern Manus we visited for fieldwork were said by Lorengau exporters to mainly deal with one exporter, but the villagers themselves said they sold to all of the exporters based in Lorengau. Brooker Island in the Louisiade Archipelago mainly sold mainly to Exporter F, but other buyers also came to their island (Kinch, 2001, Kinch, 1999). Exporter B said that rather than whole villages he made relationships with families. He could rely on some families to wait for his trading vessel to visit but other families sold to whomever offered the best price or arrived first if they wanted or needed the money right away. He said fishers compared the prices between buyers so it was not possible to offer prices much below the market rate.

*I only worked with the families I knew, that I trusted. That way I could be sure I would have supply.*

Traders have extended cash and in-kind credit such as equipment to fishers, but this did not create widespread relationships of exploitation that disadvantaged fishers. Villagers in southern Manus told us that while there were instances of equipment and consumables such as salt and fuel being extended by exporters, mostly they arranged inputs themselves. Indeed, we heard many stories of fishers having been extended cash or equipment on the expectation that they would sell their catch to the exporter at a discount, but fishers then sold at full price to a different exporter. Exporter H had supplied special boiling pots from his importer in Singapore, as well as training and other equipment to fishers, only to have them

sell to another exporter. He collected the equipment back but still lost a significant amount of money on the deal. Exporters C, D and G related similar stories about having extended cash, food, fuel, dinghies, fish driers, and diving equipment but losing their money. Exporter E had lost around PGK1 million in one deal in which fishers did not deliver product as arranged, as well as smaller amounts in many other trading arrangements. Some fishers also tricked exporters into giving them more money – by putting pieces of rock or metal into product to make them heavier (Exporters B and D), or ingeniously putting lower value sea cucumbers inside high value animals such as sandfish to increase the weight (Exporter B).<sup>10</sup> One importer interviewed in Hong Kong said sometimes PNG fishers made their BDM very salty to increase the weight of the animals. Interestingly, Exporter E indicated that the very high margins in the trade in the early 2000s meant exporters tolerated malfeasance more than they may have with narrower margins, saying that in the early years he could easily cover the costs of bad deals from his margin and still make a good profit.

Stories of malfeasance also included wrongdoing by exporters. Exporter F noted that the extension of credit or equipment could indeed constitute exporters 'scamming' fishers, and Exporter D said some exporters had been known to tamper with their scales so as to avoid paying full price. Interviewees also noted that buyers employed by exporters sometimes appropriated value in illegitimate ways. Exporter F detailed some of the ways exporters or buyers cheated fishers. If a seller had two bags, the buyer may offer a high price for the first bag, and say then that they would pay for the second bag when they sold it. Then the buyer disappeared without paying for the second bag. Or sometimes bags would be given without any cash, in exchange for promises that never materialized. Or buyers may return to pay, but rather than bringing the agreed amount in cash they would bring fuel or something of lesser value instead.

There were also stories of malfeasance between buyers and exporters. For example, Government Official E said that buyers that came to his home island always spent a lot of money on beer. He believed they paid fishers a lower price than they reported paying to the exporter and pocketed the extra. Exporters D and E both said they had lost a lot of money advancing it to buyers to use to buy BDM, who then failed to supply product.

Relations between fishers and exporters are illuminated by consideration of who bore the costs of losses due to malfeasance. Interviews indicated that these losses were accommodated in various ways; they did not inevitably fall on fishers. According to Government Official E, one trader had told him that when he made a loss due to malfeasance, he then reassessed the prices he could pay to fishers for the rest of the season, dropping his prices so that his overall profit was maintained. However, since fishers could choose among buyers, the extent to which an exporter could drop their price and still have fishers supply them was limited. Exporter E said that in the early days his profit rates were high and at that stage he absorbed the costs of bad deals, but as the fishery became depleted and more competitive

<sup>10</sup> Metal or rock may be detected through feeling the BDM, but another sea cucumber is much harder to detect.

his margins dropped and he was less able to absorb the costs. No interviewees said they displaced costs onto importers, but some exporters described themselves as price setters (see Sections 2.2.4 and 2.2.5), so it is possible that exporters may have displaced costs from malfeasance onto importers as well as fishers, in addition to absorbing the costs themselves.

It is important to note that overall there were low levels of trust between fishers and exporters. Exporter B said his approach was to work closely with particular families and build mutual trust that way. He loaned equipment, boats, and fuel against the BDM price to these families without fearing they would 'rip him off', but he did not trust other fishers. A related key point about relations between fishers and exporters was that fishers remained relatively independent of exporters, in contrast to similar kinds of fisheries around the developing world. This independence and ability to choose between buyers on the basis of price and other factors, such as a quick sale, is an important feature to consider in an analysis of the governance of the fishery, as it may affect livelihoods and community wellbeing.

Interviewee responses in one village pointed to another relevant consideration for relations between fishers and processors. When Kate Barclay asked if exporters ever provided inputs, the response was that exporters did not 'provide' inputs, they only extended them on credit against BDM sales. Barclay had expected that the provision of inputs would be on commercial grounds as a form of credit, but to villagers there were different expectations – that the exporters might give them the inputs for free. The history of colonialism, missionaries and post-Independence aid provision, in juxtaposition with Indigenous cultures, have led to a situation in PNG and other Melanesian countries wherein people expect that they will be given things by outsiders. Some have called this a 'cargo cult' mentality, but considering the history of engagement with outsiders, being given things is not an unreasonable expectation to have – it is one of the ways things have been done. Elsewhere, Barclay and Kinch have analyzed this as a form of 'project capitalism' (Barclay and Kinch, 2013). It is an important point to raise because a mismatch of expectations of how inputs should be provided possibly contributes to the mistrust that arises between fishers and exporters. If villagers expect that they should be given inputs for free and are not, they may feel less of an obligation to fulfill commitments (McCormack and Barclay, 2013). The current research did not establish that this was definitely the case for BDM, but it is worth noting that previous research has uncovered such problems, so it may be at play in the BDM trade, and it is thus worth considering as part of differences in expectations of honourable behavior between market chain actors.

### 2.2.3 Different Products for Different Markets

Research into international trade routes indicates that the vast majority of PNG's BDM, like that of other supplier countries, goes through Hong Kong as an entrêpot, and then most of that goes to China, with some going to southern Chinese ethnic communities internationally. In earlier decades Singapore was the main entrêpot, but this role has been taken over by Hong Kong, with Vietnam also emerging as another important destination in supply chains (Conand et al., 2014, Purcell, 2014b, To and Shea, 2012).

From the perspective of exporter interviewees in this study, however, the international trade looks somewhat different. Only one of the eight exporters we interviewed exported exclusively to Hong Kong, and two did not ship to Hong Kong at all (see Table 10). Most exporters shipped to several countries, and they talked of those other market countries as being important to their businesses. We did not elicit figures on volume or value of sales to different markets, but the interviews indicate that some of the non-China markets were high value. It is thus possible that the majority volume of their product was going to China but the value of small amounts of product going to other markets was significant to their overall business strategy. Further research would be needed to investigate what the implications might be for governance in the spread of markets exporters used. For example, since the trade figures indicate that Hong Kong is a bottleneck, it may seem that trade- or market-based conservation measures should be applied in Hong Kong. If, however, other markets are more important than the trade figures indicate, this strategy may need more nuanced thinking.

Exporters explained the different markets for different products in terms of species, size and grade, with wealthier mature markets only interested in the highest value ones, whereas China would take all species and all grades. Exporter E said of the 20 or so species he had traded in, importers for the Hong Kong local market and for Singapore would only buy five species – the most well known and valuable, such as sandfish and whiteteat. According to Exporter G, Southeast Asian markets also had historical supply chains from Southeast Asian islands, so had always been less dependent on PNG exports than Hong Kong. The Hong Kong local market was high value and mature, but the Hong Kong entrêpot market bought lower value product for re-exports to new markets in China. Exporter E said importers used grading systems that he translated to the scale used in PNG – A to F. He said there was a Super A grade that was for large, high quality sandfish, which only existed in Singapore and local markets in Hong Kong. For Chinese markets, importers recognized only A grade and did not pay higher prices within the A band. A is for high quality desired species, but the product could be smaller than for Super A. The prices for Super A and A grade are very high, but the market for these products is correspondingly small, so exporters did not focus only on these products. The market for lower grade products (other species and sizes, but not necessarily poor quality) is very large. Exporter E sold his premium product to Singapore because importers there paid the best prices. To Hong Kong he sold grades B to D, presumably mostly for re-export. To his Chinese importers he sold grades B to F. He sold curryfish to Korea for a while but found that market too fussy on quality, the airfreight involved was expensive, and the supply of curryfish in PNG was too low. Exporter D had a similar business model, selling a wide range and large volume to big importers in Hong Kong and China, then selling smaller amounts of specific qualities to importers elsewhere.

The importer Exporter C dealt with, however, wanted all grades and all species. He did not send specific types to different markets but dealt with one importer in Singapore who sent product on to a range of end-market countries. Exporter B, who sold exclusively to one importer in Hong Kong, said although it would be possible to send higher grade products to markets that pay more for them, such

as Malaysia and Singapore, the large importers in Hong Kong would not want to receive a shipment of only low grade product, they would want some high grade as well. Possibly the difference in perspective is because Exporters B and C were based in Lorengau and thus dealt in smaller volumes, whereas Exporters D and E were based in Port Moresby and dealt with large volumes consolidated from the provinces, and so may have had more options.

TABLE 10. Destinations to which PNG Exporters Sent BDM

	Hong Kong	Singapore	China direct	Malaysia	Taiwan	South Korea
Exporter A	-	1	1	-	1	-
Exporter B	1	-	-	-	-	-
Exporter C	-	1	1	1	1	1
Exporter D	2	1	3	1	1	-
Exporter E	1	1	2	-	1	1
Exporter F	1	1	-	-	1	-
Exporter G	1	1	1	-	-	-
Exporter H	1	-	-	-	-	-

Source: fieldwork interviews.

Notes: The numbers indicate the importers exporters dealt with at the time the fishery was open, continue to deal with for other dried marine products, and/or maintain contact with in preparation for the fishery reopening. Most exporters dealt with one importer at a time in any one market, but had changed importers over time. '-' indicates that exporter never exported to that country.

Researchers have documented the ways new markets have been created for new species (Akamine, 2005, Eriksson and Clarke, 2015). As noted above, in cases where more desired species have been overfished, fishers and exporters may ask importers to try out different species in the market, usually in areas of mainland China where newer consumers did not yet have fixed preferences. Akamine (2005) overviews one such case from the Philippines, showing the unpredictability of market reception. A Chinese market segment targeted by the importer initially greeted enthusiastically a new species due to its large size and thick body wall, which are associated with high value species such as sandfish and whiteteat. Quite quickly, however, for unspecified reasons this species fell out of favour and eventually was not sold for human consumption, but only at a low price for fertilizer.

None of the exporters we interviewed were considering trying out new markets in China for differently processed BDM, such as frozen, canned or vacuum-sealed packs of ready-to-eat BDM. Exporter F had investigated canning as an option and toured facilities in Queensland and markets in China, but said because markets for such products were so small and fragmented it was not worth setting up the infrastructure for processing. He would have had to process many different ways to meet the different market demands. Exporter E said that such products are only in the very high value segment, and exporters cannot make a business from high value only. Both exporters felt it was better to stay with dried product that could be sold widely.

#### 2.2.4 Relationships between Exporters and Importers

The exporters we interviewed were unanimous in saying that their relationships with importers were key to being able to operate as a BDM exporter, and to how well they did in the business. Two of the eight exporters (B and C) had only ever dealt with one importer, while the others had changed importers for different markets over time. It was normal, however, to only deal with one importer at a time in each market (that is, break off one relationship then establish a new one) (see Table 10). Exceptions to this were large exporters D and E who dealt with more than one importer at a time in the large markets of Hong Kong and China. Exporter E said he maintained trading relations with two importers in China to enable him to monitor market changes, and because he benefited from them 'fighting'. Exporter F, who had been in the trade longer than our interviewees, started off trading through Singapore and had been in and out of various markets in Asia over the years, changing importers from time to time. All of the exporters we interviewed maintained contact with importers, even though the fishery had been closed for six years. Some of them still had active trading relations with the importers for other marine products, but even those who were no longer exporting marine products had ongoing contact with importers in readiness for when the BDM trade starts again.

Exporter D said that learning the markets and developing mutually satisfactory relationships with importers was the biggest challenge in the BDM business. Exporter E said he was in the business five years before he could get a good price for BDM. He is not ethnic Chinese, but his wife is and his father-in-law speaks Putonghua and was able to help him establish trading relationships in Hong Kong and China. Even so, it took him years to learn what the market rates were and thus be able to charge the best price – importers previously paid him much less than other suppliers. He said that from around 2005 competition among importers from China reached the point that the market became more open for exporters. Mainland Chinese importers came to export countries and established direct relationships with exporters, rather than always going through Hong Kong importers. Exporter D said this was how their company established relations with importers in China.

Relationships with importers affected the prices offered. Once Exporter E had established his reputation as an exporter and had good relations with his importers, he benefited through better prices. Exporter G was a friend of Exporter E and E had disclosed his prices to G and introduced him to his Hong Kong importer. However, the importer would not pay Exporter G the same price for the same grade of product he paid to Exporter E. The importer knew E, had a history with him, and trusted him to reliably deliver product of a certain quality, so the importer looked after the trading relationship with E with better prices than he offered to exporters he did not know. One of the ways E had established his reputation as a reliable exporter was to take particular care with quality control. He removed any substandard quality pieces from the bags for export, putting them aside to bag up separately to sell at a lower price.

PNG had a patchy reputation for reliability in major importing markets such as Hong Kong. Exporter B related a story whereby a Papua New Guinean posed as an exporter and forged airway bills and other paperwork to convince an importer that a shipment of BDM was on its way. When the sham exporter had been paid, he promptly disappeared and later the importer realized the shipment had never existed. It is not possible to verify such anecdotes, but their existence indicates a perception of unreliability in the business (see also Appendix C).

The high value of BDM meant each shipment was worth hundreds of thousands of kina, which constituted a significant business risk that importers mitigated through their relationships with exporters. The exporters we interviewed said importers maintained ongoing contact, especially in the period preceding a shipment when there was daily contact by phone or email. Exporters C and D said their importers sent someone to visit for a few days before shipments to check on the packing process and quality as product was bagged up and put into containers.

### 2.2.5 Capital, Power and Profitability for Exporters

Exporting BDM was an extremely profitable business in the early 2000s when prices were high and the level of competition among exporters was still fairly low. This explains why exporters reported being paid lower than market rates for some years when they first started in the business: they were making good profits so they did not realize they could make even more. Exporter E said his margin before 2004 was around 40–50 percent. In 2004 and 2005 more exporters entered the market, the level of competition among exporters went up and margins dropped. Exporter E said in the period 2005 to 2009 his margin was around 15–20 percent.

Participants in the Inception Workshop described PNG's BDM trade as having been financed by importers, and said that importers were therefore powerful players in the industry. It is possible that the majority of businesses were reliant on importer finance, especially at the peak of the trade when overseas investors were more involved. The picture that emerged from the exporters we interviewed, however, shows variation in the level of financial dependence on importers, and also variation in how exporters described power relations between themselves and importers. Four exporters fit the description of financially dependent and thus subordinate partners; two said they were completely financially independent of importers; and two, while they used importer finance, explained that with astute trading in a sellers' market they were able to retain independence from importers. Interviews with importers in Hong Kong and Guangzhou also indicate that the importer-finance model is not the norm (Appendix C).

The literature on the BDM trade in Southeast Asia indicates the importance of suppliers being financially independent from their buyers. Akamine (2005) found that financial dependence within the supply chain became more of a problem in the Philippines as the prices of BDM rose over time. There are more layers of wholesalers and other traders between fishers and exporters in the Philippines compared to PNG, and exporters often extended credit to wholesalers. Some wholesalers were able to move between exporters to get a good price, but others were captured through debt to single exporters. Importers are reported as being the price setters in the Philippines, with Akamine (2005) noting that when new

sea cucumber species were explored commercially, fishers or exporters could initiate the venture, but it was the buyers in the end market who decided the prices. Michael Fabinyi has noted that for luxury seafood markets in China there were cases of credit chains extending all the way from Filipino fishers to Hong Kong importers (Fabinyi, 2016). He found that financial dependence put Filipino luxury seafood suppliers at a disadvantage, even though they also benefited from the lucrative trade. Comparing Filipino fishers with North American fishers, both supplying Chinese markets, he found that financial independence, along with stronger resource management and greater livelihood options for fishers in North America meant they gained better value from selling to Chinese markets than did Filipino fishers. The financial independence of exporters in PNG is thus one factor to consider for governance of its fishery, particularly in terms of livelihoods for fishers and economic viability.

Four exporters (A, C, G and H) said that they relied totally on importer finance and thus the importers 'called the shots' in the business. According to Exporter A, their company did not have the capacity to arrange importation or raise the capital themselves so they were unable to bargain on price and just accepted what the importer offered. Exporter G said when his family first started out in the trade they relied on one importer and were taken advantage of. They eventually learned the market, were shocked to realize the extent to which they had been underpaid, and sought new importers. Even with the ability to move between importers, however, Exporter G said without capital they were dependent on the importers they dealt with. The importer set the price and G worked backwards from that to work out his cost and profit structure. His long-term goal is to self-finance, but this is a significant challenge when each container-load of BDM costs several hundred thousand kina. The financial arrangement Exporter G had was formed in stages. At the start of a deal the importer advanced 30 percent of the total for the shipment and Exporter G used this to buy BDM. There was ongoing communication with the importer as stocks came in. At a certain point the importer advanced a second 30 percent to buy more product, then when more than half the shipment was stockpiled they advanced the final 40 percent to fill the container and ship it. Exporter C had a similar arrangement whereby his importer advanced him finance to buy BDM and then he sold his whole supply to that importer.

Among importers interviewed in China, the extension of credit to exporters in source countries was not a commonly cited practice. One importer who had advanced money to a PNG supplier had invested CNY1,000,000 (approximately USD150,000) with a middleman, who disappeared with the money and was never seen again. For most importers, this practice was seen as highly risky. In the words of one trader:

*We really prefer to just pay on receiving the goods, and keep the supply chain separate. If you pay first, you face a lot of risk and it is a lot more work. You have to go over there and make sure that they are processing the product properly, that they are not wasting your money. Many other traders have lost money this way.*

Only one of the importers interviewed in Hong Kong and Guangzhou was comfortable about advancing money to exporters in supplier countries such as PNG. This Hong Kong-based trading company, however, had a trusted partner as their PNG exporter, and regularly funded the buying of BDM from fishers. They invested between USD10,000 and USD50,000 at a time, and received the product between three and five months later. The long delay between investing the money and receiving the product was not a problem for this importer due to trust in the relationships. This importer claimed that trust was everything in the business, and for that reason he would not have multiple suppliers in the one country. He used the metaphor of a husband and wife, saying if one partner went off with someone else the relationship would be broken. He noted that because the PNG moratorium came into effect while there was still a balance owing, his company was still in fact owed money, but there was an open line of communication and trust and he was not concerned about the outstanding debt.

Two exporters (B and F), both of whom had large non-BDM businesses, said they financed their operations themselves and were thus quite independent of their investors. Exporter F said if you take an advance from an importer they 'control you' and will not pay the best price, so he used credit from commercial banks to buy BDM. He had tried various importers over the years until he found one who offered the best prices, and then stuck with him. Other importers sought them out and offered deals, so they were able to easily check market prices to ensure the prices their importer offered remained good. One of the interviewed Hong Kong-based trading companies operated along these lines – not financing their PNG-based exporting company, even though they had a long-term relationship with the PNG exporter and spoke very highly of them, but saying they had trust in the relationship.

Exporter E used a mixture of his own and investor finance and said that this along with his reputation for quality and reliability, his market knowledge and his ability to command a large volume of supply meant he had the upper hand in relations with importers. He expressed the opinion that the PNG BDM industry needs more power in the supply chain, and that being independent of importers is a vital source of power. Exporter D used importer finance but, like E, said that being able to supply a large volume, having a reputation for reliability, and knowing the market well meant importers did not dominate. Exporter D said:

*Small operators are price takers. Big players like us are price setters. We set the price with the importers because they want volume. They say we want X. We say that will cost you Y. Then the importer extends us the money.*

In supply chains, power relations are often expressed in terms of whether one is a price setter or a price taker. It is possible that Exporter D's assertion was a display of bravado on the part of the interviewee rather than an accurate representation of the trading relationship, so should be viewed with caution and assessed along with other information about trading relations presented here.

It is worth noting that both Exporters D and E worked with more than one importer in key markets in China and Hong Kong (see Table 10). Market knowledge and the ability to 'shop around' for the best price among importers while retaining a good

trading reputation seems to have enabled these exporters to take advantage of the sellers' market situation in world BDM markets.

Another important point about Exporters D and E is that they both stressed that having access to large volumes of product gave them power *vis-a-vis* importers. Exporter D said that small operators using advances would be price takers, but that their company's ability to deliver large volumes made them price setters. D and E were both Port Moresby-based operators who accessed supply from around the country. Most provincial operators were limited in terms of volume by provincial production levels, although operators in Milne Bay, with the largest provincial production volume, may have been able to achieve enough volume to tip the balance in relations with importers. It should be noted, however, that importers we interviewed were only willing to order large volumes from exporters with which they had established trust. When working with new suppliers they prefer to order small amounts. Once trust has been established over a long period of time importers prefer to order larger consistent volumes.

The different business models appear to have affected profitability. During the last years of the fishery when Exporter E reported having profit rates of 15–20 percent, Exporter C said he only made 10–15 percent, and Exporter G said he made 10–20 percent. Exporter E was a large-volume trader who had cultivated a reputation for quality and reliability among importers, was not reliant on importers for capital and sold to several different importers, all of which improved his prices. Exporter C had only ever dealt with one importer, relied entirely on capital from that importer and described himself as a price taker. Exporter G was also reliant on importer capital, but had shifted between importers seeking better prices.

These findings corroborate those from other studies that the financial dependence of importers reduces the profits available to exporters (Kinch et al., 2007, Kinch et al., 2008). In 2006–2007 some exporters paid between two and five percent of the export price minus the fish price to their financier as a profit on the financier's investment (see Section 2.4 for further details on fish and export prices). In other cases the PNG national holding the export license was paid a salary plus commission on exports, and in these cases the overseas financier took as much as 10–15 percent of the export price minus the fish price. From the remaining amount exporters covered their costs for processing, packing, freight, insurance, wastage, interest on any loans, power, transport, wages, fuel, travel, communications, and so on.

The length of the supply chain was an important factor affecting the margins for exporters, as well as the prices they offered fishers. With a shorter supply chain the margin was shared among fewer players. Exporter G pointed out that when he bought from village-based independent middlemen who had bought from or were selling on behalf of fishers, he lost some of his profit to this extra node in the chain. Exporter G also talked of mainland Chinese buyers he was in competition with in Kimbe. He thought they sold direct to a restaurant chain and thus had a much shorter supply chain, and more margin to play with, and thus could undercut him. Exporter F said he received the best prices from a Hong Kong importer who was also a wholesaler, believing that the shortened chain enabled the importer to offer better prices.

### 2.2.6 Getting into the BDM Export Business?

The tribal network of the Titan people Mwanus Endras sent representatives to the Inception Workshop for this project, and hosted Kate Barclay during fieldwork, because their network wants to upgrade in the value chain. They want not only to fish but to also export their own product. Interviews with Titan fishers in southern Manus made it clear that they believe they can gain more value by exporting BDM themselves rather than only fishing for it. Mwanus Endras asked that this project explore options for them moving into exporting, detailing lessons learned and business models such as cooperatives. It is worth considering here the lessons learned from the preceding descriptions of the BDM exporting business in PNG.

As noted earlier, general trading in PNG and other Pacific Island countries has been dominated by people of European and Asian backgrounds, and this is also the case in the seafood sector. The exporters we interviewed were of non-PNG or mixed ethnic backgrounds, or were operating in partnership with non-national investors. The ethnic face of the PNG business landscape is changing and more Indigenous Papua New Guineans are likely to move into trading in the future. For the purposes of this report, however, it is important to note that in PNG society there is a pervasive sense that it is not a good thing for business sectors to be dominated by 'foreigners', and that it would be better in various ways if Papua New Guineans were to take over. Principles and visions about how fisheries should be are important influences on governance (Song et al., 2013). As noted earlier, this may be characterized as a form of Third Worldist protectionism and in some cases a form of anti-Asian racism (Barclay, 2012, Berger, 2004).

Examples from our interviews of such sentiments included Government Official A stating that the benefits from BDM belong with the 'resource owners' not with 'foreign businessmen' who may send the profits overseas, and who may be taking an unfair level of profit. Government Official D felt that with more local control the BDM trade would be less likely to result in overfishing because the people who rely on the resource are more likely to look after it. While there is a certain logic to these statements, they may of course be quite untrue. For all practical purposes local people already controlled the fishery and it was them, not foreign fishing people, who overfished it. The point here is not whether such statements are empirically accurate; they are raised here as indications about the normative environment in which governance of the fishery operates. Government Official A said that the business arm of his provincial government intended to try to move into exporting BDM when the fishery re-opened, not as a profit seeking venture but so that more of the margins could go back to resource owners in better prices (it should be noted that government attempts to run businesses in PNG have an extremely poor track record. Exporter F described the business arm exporter idea as an attempt to appeal to voters). This normative context – plus the historical context in which governments and aid donors have supported attempts by local groups to establish themselves in businesses through cash, equipment and training – is important background for understanding the wish by bodies such as government business arms and fisher groups to move into the BDM export business.

The first lesson to learn from existing exporters is that all of the exporters we interviewed were already trading businesspeople before they moved into BDM, or they partnered with people who were already experienced traders. None of them started trading BDM with no business background. Second, even with a trading background it took the exporters several years to learn the BDM business well enough to be able to get the best prices. A big part of learning the BDM trade was developing networks of contacts in market countries and developing relationships with importers. Third, the BDM business is capital intensive. Exporters talked of needing at least PGK300,000 to start buying for a shipment. Exporters either have to rely on importers for cash or have it available and also be financially strong enough to sustain large losses when things go wrong. Exporter C also noted that the BDM only brought in income for part of the year, due to the closed season, and that that the costs associated with it – trading vessels, rent, processing equipment – have year-round costs. In the words of Exporter A, exporting BDM requires: a) knowledge about the product and markets; b) contacts, and; c) capital. He said it is not possible to do BDM exporting without these three things.

People have suggested working around the problem of requiring large amounts of capital up front by paying fishers after shipment, after the importer has paid the exporter. Government Official A said this is what his provincial government was planning for the business arm BDM export venture. This model was tried once before in Milne Bay, with disastrous results because the middlemen had been financed but could not get supply and thus could not pay back their 'loan'. As noted in the section on fishing, fishers often prefer cash immediately. In the experience of co-author Jeff Kinch, who has been researching sea cucumber fisheries in PNG and Solomon Islands for nearly 20 years, fishers need cash in the short term, and that is the way they are used to operating. So if buyers are offering cash BDM fishers will sell to them rather than another business that promises to pay later, even if the later payment would be higher; businesses offering to pay later, therefore, may be unable to secure supply.

On the other hand, the business world is constantly changing and it is possible that a new model may work. The exporter who was involved with the failed Milne Bay venture was one of our interviewees and said he is still interested to pursue a commission-based model where he facilitates the trade rather than buying and selling product himself. So with research and experimentation it may be possible to work around the capital problem (see notes on NFA's resource auction idea at Section 3.1.3).

Even if the capital problem is solved, Exporter A's points a) and b) will still hold, however – exporters need knowledge of the business and contacts. It is hard to see how a group of fishers or other stakeholders could succeed in exporting without these. Partnering with an existing trader in the short- to medium-term and investing human resources into developing business knowledge and contacts would seem the best way to proceed towards being able to export independently in the future.

Finally, it is worth considering whether exporting is actually more lucrative than fishing. Certainly exporters seemed to be wealthier than fishers, but there are thousands of fishers to each exporter, and it is not clear that exporters were gaining proportionally more profit from the value chain than fishers (see Tables 11 to 16 for further details). Exporter C said he felt fishers made a better deal out of BDM than exporters. He said he paid 70 percent of his export price to fishers. From the remaining 30 percent he covered all of his costs (petrol, wages, additional processing costs, freight charges, rent, boat maintenance). This statement is supported by a study of customs data from 2006–2007 comparing prices paid to fishers with the export price for the whole of PNG, which found that fishers received between 65 and 75 percent of the export price (Kinch et al., 2007, Kinch et al., 2008). Without detailed comparisons between the costs of exporters and fishers it is not possible to determine whether fishers achieved a better margin/profit than exporters. Even the information that fishers were receiving such a high proportion of the export price, however, causes one to question the assumption that fishers, at the raw materials end of the value chain, were not doing as well from that chain as exporters. It was a sellers' market, with high demand, high competition among buyers and thus high prices, so it is possible fishers had already been doing very well.

### 2.3 Overseas-based Importing, Wholesaling and Retailing

Researchers have noted that BDM has long been valued for its perceived health properties, particularly in Southeast Asian markets (Purcell et al., 2014a). Even in Southeast Asia BDM has also been valued as a luxury and prestige food, as a special dish for festive occasions. One PNG exporter who was originally Chinese Indonesian, related that during his childhood in Indonesia his own and other ethnic Chinese families he knew could not afford shark fin, but for lunar New Year and other annual family feasts to honor the ancestors they always had BDM on the table.

FIGURE 10. Sea Cucumber Pills Sold in Beijing (photo credit: Michael Fabinyi)



As noted earlier in the section on exporting, a key difference between BDM markets is that between established wealthy markets, and newer emerging markets, especially in China. The prestige aspects of BDM have been prominent in the growth of markets in China, as more and more people in China have become able to afford luxury goods, and as conspicuous consumption became part of the socio-cultural landscape. The luxury seafood banquet is part of this, having started around Hong Kong then spread around China (Fabinyi, 2016). Exporter G noted that Chinese buyers sometimes wanted really large BDM, not necessarily to eat but in some cases to display on a wall. Not that the best prices were always paid for the largest specimens (Purcell, 2014b), for some species the appropriate size for plating seems to be more important. Exporter E said that a feature of the newer Chinese markets is that customers were often not familiar enough with the taste of BDM to distinguish between high and low quality, and also they are more receptive to different species than the mature markets. Importers take this into consideration when marketing different grades and species of BDM around China.

FIGURE 11. Special Packaging for Spring Festival, Beijing  
(photo credit: Michael Fabinyi)

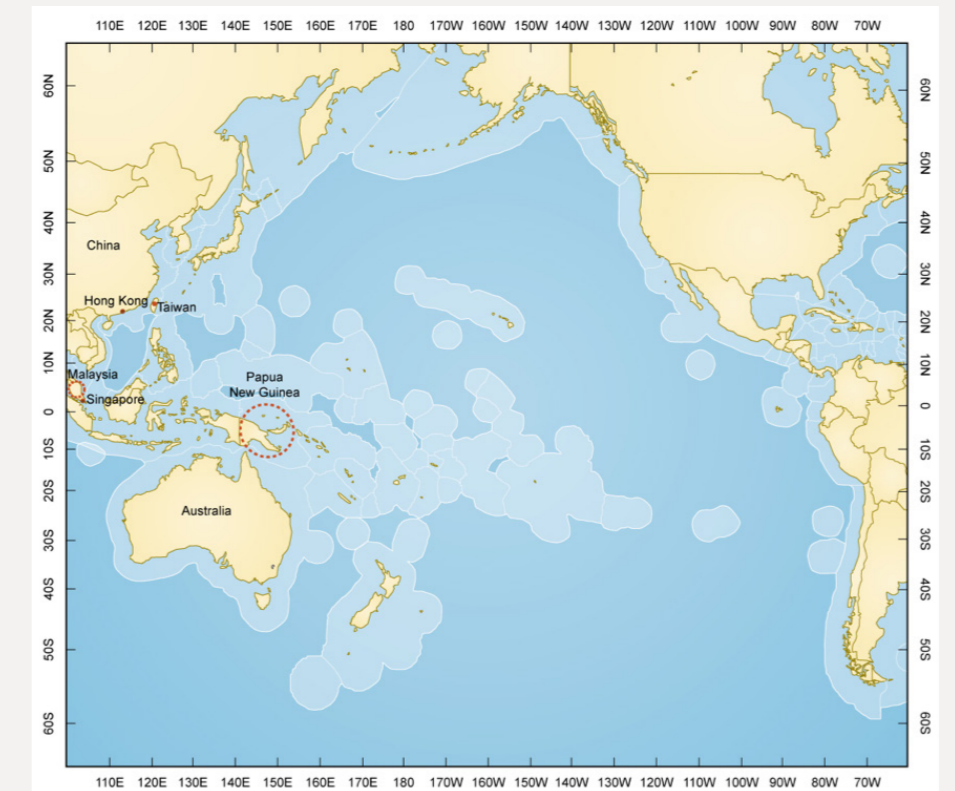


While the taste for BDM has spread around China, tastes for various species have emerged differently around the country. In Hong Kong and other southern Chinese regions that have long had tropical BDM as part of their food culture, sandfish and golden sandfish ('bald sea cucumber' in Chinese, *Holothuria scabra* and *H. lessona*, respectively) are highly sought after and fetch good prices (see Tables 15 and 16). In Beijing and northern regions of China, however, the temperate, Japanese spiky sea cucumber, *Apostichopus japonicus*, is most preferred and there is only a small market for tropical BDM. In Beijing sandfish is rarely sold and traders there noted that it is quite unpopular and viewed as low quality.

Shanghai traders also had a preference for *A. japonicus*, but it was estimated that there was a slightly larger proportion of BDM from tropical sea cucumbers being sold there than in Beijing. Shanghai consumes more seafood per capita than Beijing (Fabinyi et al., 2016), and there is slightly greater diversity in BDM trade routes and products in Shanghai. One type of sea cucumber that was particularly popular in Shanghai was *dawushen* (likely Panning's blackfish, *A. palauensis*).

For the purposes of this report, market preferences for food safety and quality and ecological considerations are discussed as part of the Governing System (Section 3.9).

FIGURE 12. Map of Pacific Ocean Showing Major Locations for PNG BDM Trade



### 2.3.1 Trade Routes

The sea cucumber fishery in PNG has been documented from 1878 but was probably exploited earlier than that (Shelley, 1981, Russell, 1970). Early BDM exports from PNG peaked in the 1880s then declined for a range of reasons including falling BDM prices and overfishing (Lokani, 1995). During late 1800s, the value of BDM exports from British New Guinea (Papua) was 70–95 percent of all exports (Lokani, 1995, Lokani, 1990). The early BDM trade from PNG was also affected in the first half of the 20th Century when the Chinese markets and Japanese trade routes were closed due to the Sino-Japanese War and World War II.

Singapore has for centuries been a regional and global entrepôt, deriving much of its wealth from the trade passing through it. Marine product traders in PNG had connections to Singapore and the long-term exporters we interviewed all started off trading with Singapore-based importers, who sold some BDM locally and re-exported the rest throughout Southeast Asia, Southern China and to smaller ethnic Southern Chinese markets around the world (see also Conand et al., 2014). One ethnic Malaysian exporter continued to deal only with one Singapore-based importer. All the other exporters, however, had over time shifted the emphasis of their business to Hong Kong-based importers, even if they still sold some high value product direct to Singapore (see Table 10). This is in line with studies on the

international BDM trade that show Hong Kong has been a major trading centre for BDM since the Opium Wars in the mid-1800s, re-exporting BDM globally throughout the Chinese diaspora (Akamine, 2005), and becoming the world centre for the BDM trade in recent decades (Conand et al., 2014, Purcell, 2014b, To and Shea, 2012). Hong Kong, like Singapore, has long been an entrépot, and as the economic gateway to China this role has increased in importance with the rise of the Chinese economy.

After the trade has gone through Hong Kong, Guangzhou is the major distribution market for sea cucumbers imported into mainland China, although Shenzhen also handles some trade. BDM traders in Shanghai and Beijing said they sourced from Guangzhou, stating that it was cheaper to buy from there than directly from overseas. Most of the dried marine product traders in both Beijing and Shanghai have family backgrounds in Guangdong or Fujian, and many have family or long-term links with traders in Guangzhou. The seafood trade as a whole in China is marked by the dominance of informal social norms related to trust and long-term social relationships (Cheung and Chang, 2011, Fabinyi and Liu, 2014a).

Interviews with Hong Kong importers plus information from PNG exporters indicate there was not a clear distinction between the layers of importing, wholesaling and retailing for BDM. This is possibly due to the ease of importation into Hong Kong, with its free port status meaning businesses do not have to invest special costs or administration into imports. The traders interviewed thus imported directly from some countries, bought some products wholesale from other importers and also operated retail outlets. Exporter H said that the entrépot traders in Singapore and Hong Kong merely redirected the sacks of BDM sent from PNG on to other markets, but some of the literature states that these traders not only distributed but also classified, cleaned, further dried and repacked BDM, all of which added value (Akamine, 2005).

FIGURE 13. Assorted BDM for Sale (photo credit: Michael Fabinyi)



Hong Kong was a free port under British colonial rule, and it has suited the Chinese government to keep it that way since it was returned in 1997. That means BDM is imported to Hong Kong tariff free, whereas if it is imported directly to mainland China it incurs a tariff of as much as 30 percent, depending on where it is from.<sup>11</sup> This is one reason the vast majority of PNG BDM has been sent to Hong Kong (see Figure 14). When asked, for example, about potential opportunities for PNG exporters to export directly to Guangzhou, China-based traders simply stated that this would be a more expensive way to do things, and that it was much cheaper simply to sell in Hong Kong in order to avoid the taxes.

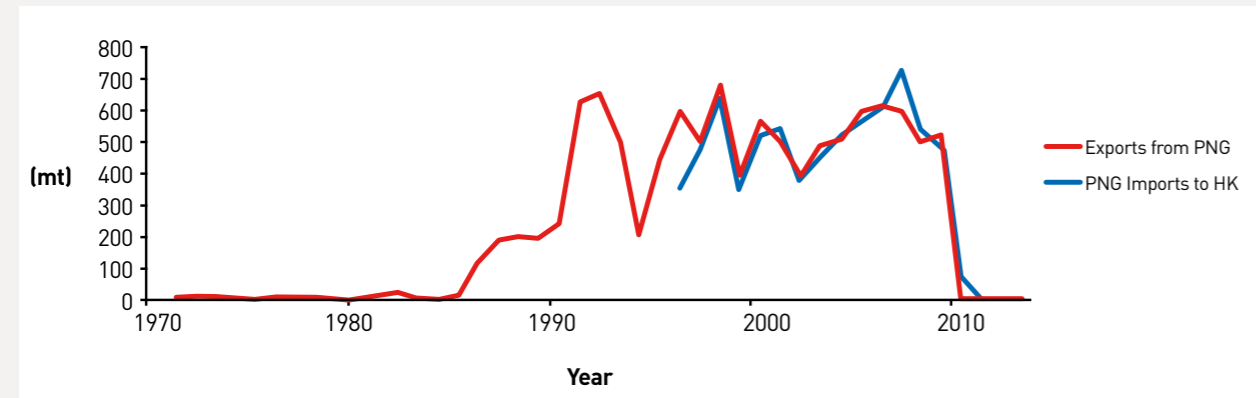
The lower taxes, however, are not the only reason Hong Kong remains a hub for seafood being imported to China. There are various practical reasons, including lower transaction costs, for mainland seafood traders preferring to buy through Hong Kong rather than direct from overseas suppliers. Large Hong Kong seafood trading businesses have historical trading connections in source countries throughout the world. Products are thus consolidated in those trading businesses and it is easier to buy from them than to establish relations with many suppliers in many different countries. The customs and quarantine procedures are also far more efficient, and the infrastructure for storage and transport better in Hong Kong than on the mainland (Fabinyi, 2016). Guangzhou-based traders pointed out

<sup>11</sup> We were unable to find out exactly what the tariff was for PNG BDM, although several interviewees mentioned a figure of 30 percent. Tariff levels vary according to trade agreements between the source country and China (see Appendix D Part D.3). PNG has 'most favoured nation' which would mean lower tariffs than countries without this status, but higher than countries with a free trade agreement (FTA) with China.

that they did not need to invest overseas because it was far easier for them to just go to Hong Kong and inspect the goods there.

*Why should we go overseas, with all of the risks, when we can just go to Hong Kong and check the product quality?*

FIGURE 14. PNG Exports/Imports to Hong Kong (mt)



Source: NFA export data and Hong Kong Customs import data (Jeff Kinch).

Even though the majority of PNG exports seems to have been going through Hong Kong – as noted in the section on exporting – several of the PNG exporters we interviewed had established trade connections directly with importers on the mainland. Interviews with traders in Guangzhou and Hong Kong supported this perception, noting that direct trade to the mainland seemed to be growing in importance. A minority of mainland China trader interviewees reported importing directly from overseas. Dried seafood such as BDM is far less perishable than live or frozen seafood, so possibly some of the logistical issues important for other seafood are less important for the dried marine product types including BDM.

It is not entirely clear how direct trading might overcome the competitive disadvantage of paying tariffs. Tariffs may have been reduced or abolished for areas covered by the rapidly proliferating Chinese free trade agreements (FTA), such as with the Association of Southeast Asian Nations (ASEAN) (Godfrey, 2015c). At the time of writing PNG did not have an FTA with China. It may be that removing the Hong Kong node from the value chain compensated for the tariff. Two PNG exporters (B, G), who noticed that their competitors paid higher prices to fishers for BDM, speculated that they must have shorter supply chains direct to China to be able to offer such prices. Two Hong Kong traders said Guangzhou-based traders who had traded with PNG directly offered higher prices than the Hong Kong traders. Another Hong Kong-based trader noted that while he used to import BDM from Fiji, he could no longer do so as mainland Chinese traders dominated the supply routes there. Comparative research on export prices for BDM bears this out, with the prices for Fiji being noticeably higher than for the other Pacific Islands countries (see Table 11) (Purcell, 2014b).<sup>12</sup>

<sup>12</sup> Sandfish was an exception to the higher prices noted for Fiji for other species. This makes sense because sandfish was less desired in mainland Chinese markets than Hong Kong (see Table 16).

One reason to avoid Hong Kong is that it is illegal in China to avoid the tariff by importing via Hong Kong. Goods imported that way were then smuggled to the mainland. Some traders advised that BDM was hidden within other cheaper types of seafood that would be subject to lower taxes. A recent report on humphead wrasse found they were taken by speedboat from Hong Kong to Shenzhen (Wu and Sadovy de Mitcheson, 2016). Others noted that vehicle transports into mainland China are only rarely inspected in any detail. There is also the possibility of 'parallel goods trading', which involves the practice of transporting small quantities of goods across the border in very high frequencies (Chan, 2015). The illegality of this trade route has not so far prevented it being the main way products such as BDM have entered China, but in recent years there have been some prosecutions (Godfrey, 2014, Godfrey, 2015a), making the risks associated with going through Hong Kong higher. One Hong Kong trader interviewed did not sell into mainland China because of the risk of prosecution, instead concentrating on the high-end market in Hong Kong, specifically targeting five-star hotels. This practice of importing into Hong Kong to avoid taxes, and then transporting over the border to mainland China is called the 'grey trade'.

FIGURE 15. Seafood Trading Alley (photo credit: Michael Fabinyi)



### 2.3.2 The Grey Trade

All of the Guangzhou traders interviewed said they usually bought their BDM from Hong Kong in order to avoid import taxes. Interviewees from the trade association for BDM and other dried marine products explained that it advised all of its members to do business legally, but acknowledged that it did not control this. Traders did not want to discuss in detail how BDM is imported into Guangzhou, or the regulations that are supposed to govern the cross-border trade. This is understandable, given recent high-profile prosecutions of seafood traders in Guangdong Province, and crackdowns by the central Chinese government against smuggling (Godfrey, 2015a). In 2014 eight offenders in Guangdong Province were sentenced to between three and twelve years in prison for smuggling shark fin and BDM (Godfrey, 2014).

Hong Kong-based traders said that when mainland buyers bought from them, transport to China was their responsibility. In the words of one trader:

*Once we have sold the product to them, everything, including both the physical logistics of getting the product back to China, and the legal implications, is completely their responsibility. We don't ask too many questions. Every country has its own way of doing business, and that is how they request for us to do business.*

These responses are similar to those found in previous studies of trading seafood products to China via Hong Kong (Fabinyi, 2016). For their part, Guangzhou-based traders refused to answer questions about customs reporting requirements, changed the subject, or said these were handled by external 'logistics companies'. Traders who imported directly into Shanghai also said customs reporting was the responsibility of external logistics companies.

The route via Hong Kong to Guangzhou is not the only grey trade route into China for avoiding taxes. Vietnam is another route by which BDM and other agricultural products are imported (To and Shea, 2012, Eyler, 2014). Some of the imported seafood in Beijing, for example, comes via Vietnam, and then overland through Nanning in Guangxi Province (Fabinyi and Liu, 2016). There may be some BDM also passing through Guangxi, but traders interviewed advised that BDM coming from Vietnam was distributed via Guangzhou, not Guangxi. One PNG exporter we interviewed said one of his Chinese mainland importers had him ship his product to Hong Kong, then once it arrived in Hong Kong arrangements were made for it to go to mainland China via Vietnam. Studies of trade statistics, including re-exports, indicate that the route via Vietnam has in recent years become much more significant (Conand et al., 2014, To and Shea, 2012). Traders interviewed for this study were reluctant to answer questions about the trade passing through Vietnam. Most of the Guangzhou traders interviewed said they bought their BDM from Hong Kong and they did not think that Vietnam was a significant market. It is possible, however, that if Vietnam is just a transit route for trade still originating in Hong Kong they may not think it worth mentioning, even if a significant amount of product goes through Vietnam.

Figures on Chinese BDM imports vary greatly. For example, estimates of how much BDM was imported into the Peoples' Republic of China in 2012 range from 1,695 tonnes (the Chinese Statistics Bureau), to 5,500 tonnes (the United Nations Food and Agriculture Organization, FAO), to over 8,000 tonnes (Seafood Distribution and Processing Industry Association) (Zhang, 2013). Apart from the grey nature of the trade obscuring such statistics, the re-packaging, processing and re-selling that goes on between nodes of the supply chain makes it hard to keep track of volumes.

The murky legal situation for imports to China makes this node of the chain challenging in terms of improving governance. As well as private sector measures for labeling, traceability is required for state measures such as import documentation schemes to ensure imports have been legally harvested.<sup>13</sup> Currently there is no traceability through the point of importation into China and it is in the current interests of most of the players to keep it that way. The likelihood of increased transparency and accurate reporting is very low in this situation. It could change in different circumstances, for example, if key species were to be CITES listed and traceability thus became a requirement (see Section 3.7.2). Guangzhou-based traders were particularly sensitive when talking about details of the trade between Hong Kong and Guangzhou. Although a stricter application of the rules may mean increased compliance costs for traders, higher standards should ultimately be of benefit to the industry (Godfrey, 2015a). If the Chinese government continues with recent attempts to reduce grey trading, more transparent trading practices adhering to legal norms could emerge.

### 2.3.3 Wholesale and Retail Prices

Prices for BDM vary greatly according to species and quality (see Tables 11 to 16). There is no formal system of grading in the wholesale markets, and different traders grade their product according to their own preferences, usually according to the species, size, and quality. PNG's 'A-B-C-D' grades are not used in importer markets (Appendix C). During fieldwork in Hong Kong, prices for sandfish and golden sandfish varied from less than USD85 per kilogram for small, curly, ill-processed specimens, to over USD350 per kilogram for larger, straight, high quality pieces.

Hong Kong and Guangzhou market prices across the species appear to have mostly increased six- to twelve-fold over the 10 years to 2014 (Purcell, 2014b). Since a 2013 nation-wide crackdown on corruption, however, a downward trend in prices has been noticed (Fabinyi, 2016). The hosting of luxury banquets and other forms of conspicuous consumption by government officials has been greatly reduced as part of Xi Jinping's anti-corruption drive. While BDM is not exclusively eaten at such banquets in China, a considerable proportion of it is. The luxury banquet scene as a whole has shrunk since 2013. Even when government officials are not directly involved in such banquets, the anti-corruption crackdown has been so intense that it has meant reduced consumption of such products across the board, not just by government officials. BDM is less affected than other higher-price prestige seafoods, but prices have still dropped (Fabinyi and Liu, 2016).

<sup>13</sup> 'Traceability' means the capacity to track a product back through the supply chain to its point of origin, identifying the route it has taken, including the names and contact details of companies through whose hands it has passed.

**FIGURE 16. Closed Down Shops in Seafood Trading Market**  
(photo credit: Michael Fabinyi)



A second reason for reduced demand for BDM is the Chinese economy. Aiming to transition to a slower but more sustainable economic growth pattern, in the past several years the Chinese economy has been slowing (Inman, 2015), with consequences for luxury goods sales. One report suggests BDM prices have fallen because Chinese buyers, now forced to pay taxes on their imports due to the grey trade crackdown, are requesting lower prices (Godfrey, 2015a). However, this was not corroborated in interviews with traders in China.

One Hong Kong trader advised that the price of most kinds of BDM had dropped by 30 to 50 percent in the past year or so; others did not give specific figures or estimates but noted that demand had dropped, especially from mainland China. Guangzhou-based traders similarly noted that pineapple sea cucumber (*T. ananas*) had dropped in price from USD159/kg to USD96/kg, while Japanese spiky sea cucumber had dropped from USD1892/kg to USD1260/kg. Seafood trade media corroborates the fall in prices since 2013 (Gao, 2015). An exception to falling prices for BDM noted by traders interviewed was *nanmeishen* (South American sea cucumbers *I. badionatus* and *I. fuscus*), which had instead witnessed a rapid increase in prices over the last year.

Hong Kong traders of dried seafood widely reported struggling with business over the past two to three years. A high proportion of addresses of traders supplied for this project by the PNG National Fisheries Authority had closed down and been replaced by other non-seafood businesses. Beijing traders also reported significant declines in sales over the past several years (Fabinyi and Liu, 2016). One Beijing trader spoke of an 80 percent drop in sales; another described a 70 to 80 percent drop in sales.

PNG BDM exporters were aware of the falling prices in mainland Chinese markets, especially since several of them continued to trade other marine commodities such as shark fin to China and have seen falling prices for those products. Exporters F and G imagined that due to lower prices when the sea cucumber fishery reopens in PNG, the trade may be quite different to how it was pre-2009. Exporter F hoped lower prices will mean the 'fly-by-night' exporters will not be attracted back, which he speculated could improve governance of both the fishery and the trade.

### 2.4 The Global Value Chain

Having now overviewed the System to be Governed – the fish chain – from fishing through to retail, it is worth considering this as a value chain before moving on to look at the Governing Systems. This study did not include detailed economic data collection, but we have pieced together from fieldwork and the literature information on prices over time at various nodes of the chain. From these prices we can see the proportions of the final retail sale price captured at each node in the chain.

**TABLE 11. Prices Paid to PNG Fishers 1991 & 2004 (USD/kg)**

COMMON ENGLISH NAME	SCIENTIFIC NAME	1991	2004
Sandfish	Holothuria scabra	11.41-17.12	9.29-37.14
White teatfish	H. fuscogilva	7.61	15.48-30.95
Black teatfish	H. whitmaei	7.61	9.29-18.58
Curryfish	Stichopus herrmanni	1.23	11.45
Lollyfish	H. atra	3.80	1.86-2.32

Source: Selected species from Kinch (2004), using Milne Bay company prices.

Note: The price ranges cover different quality and sizes. The source material was in PGK. 1991 exchange rate is the average for the year ended in June 1991, from ato.gov.au (PGK:AUD 1:1.3454, AUD:USD 1:0.7852). 2004 exchange rates are from oanda.com for May 2004 (PGK:USD 1:0.3095).

Exporter B said that when he started buying BDM in Manus in 2003 he was paying fishers as low as PGK3 (USD0.84) a kilo for low value product, and up to PGK55 (USD15.31) for high value, noting that another trader operating in Lorengau at this time was paying much higher prices.<sup>14</sup> This is in line with the information found by Kinch (Kinch, 2004a) (see also Table 12), since Kinch's prices were for Milne Bay, which were on average higher than for other provinces.

How do these prices exporters paid fishers compare with the prices exporters received from importers? For 2004 we can compare prices from Tables 11 and 12. The lowest price paid to fishers (Table 11) amounts to 62 percent of the lowest import market price (Table 12). The highest price paid to fishers was 71 percent of the highest import market price.

<sup>14</sup> The exchange rate for PGK:USD for January 2003 was 1:0.2784 (see oanda.com).

TABLE 12. Market Prices Hong Kong & Singapore 1993 & 2004 (USD/kg)

COMMON ENGLISH NAME	SCIENTIFIC NAME	1993	2004
Sandfish	<i>Holothuria scabra</i>	14.30-25.30	25-53
White teatfish	<i>H. fuscogilva</i>	14.30-25.30	12-43
Black teatfish	<i>H. whitmaei</i>	8.40	15-21.15
Curryfish	<i>Stichopus herrmanni</i>	10.60-11.70	6-18
Lollyfish	<i>H. atra</i>	1.30-2.60	3-6

Source: selected species from Kinch 2004 (p.33), from various sources, including INFOFISH.

Notes: The range of prices are based on variations in size and quality. The same prices were paid for sandfish and white teatfish in 1993.

We can make a similar comparison for 2009 prices. By the time the moratorium came in 2009, Exporter B was paying PGK19 (USD6.70) for low value and PGK250 (USD88) for high value.<sup>15</sup> Exporter E said in 2009 he was receiving between USD10 and 120 per kg across the different grades. This was corroborated by one of the traders interviewed in Hong Kong who said that in 2009 he was paying his PNG exporter USD100 per kg for good-sized, high quality teatfish and USD110 to 120 per kg for good-sized, high quality sandfish. Fishers thus received 67 percent of the export price for low value and 73 percent for high value.

These anecdotal pictures are consistent with a more systematic nation-wide comparison of this nature carried out between prices paid to fishers and export prices, as recorded on customs declarations from 2006 and 2007 (Kinch et al., 2007, Kinch et al., 2008) [see Table 13]. That study found that on average across all species, fishers received 65 percent of the export price, with certain species having greater returns than others. The customs declaration data on export prices (excluding freight costs) was corroborated by prices given from exporting companies and one Hong Kong-based importer, who said around 75 percent of the price importers paid was returned to the fishers (this price was C&F and thus slightly higher than the prices on the customs declaration forms) (Kinch et al., 2007). Certain species had greater returns than others, but the proportionate return to fishers was not very variable (s.d. = 8.7 percent) (Kinch et al., 2008).

<sup>15</sup> The exchange rate for PNGK:USD for May 2009 was 1:0.35247 (see oanda.com)

FIGURE 17. Assorted BDM & Other Dried Seafood on Display  
(photo credit: Michael Fabinyi)



The fact that since the early 2000s fishers were receiving a high proportion of the export price of BDM runs counter to popular perceptions of the value being received by villagers. Fishers from Mbunai village in Manus said: "We are at the end of a long chain. We get the least money". Fishers in Timoenai village put it slightly differently: "When the fishery reopens we want higher prices. We want to do all the processing ourselves and export directly to get more benefits".

From a governance perspective it is interesting to note that fishers received a higher proportion of the export price for high quality product (see Table 13). Clearly this tendency had not caused the fishery to become sustainable, or even to lift PNG's overall quality level out of its reputation for variable and low quality. It does, however, constitute an economic incentive that could possibly be utilized in devising measures to improve governance in the future.

TABLE 13. Fish Price as a Percentage of Export Value 2006-2007

Common English Name	Scientific Name	Grade	Percentage
Sandfish	<i>Holothuria scabra</i>	A	69.2
		B	65.1
		C	54.4
White teatfish	<i>H. fuscogilva</i>	A	85.6
		B	77.6
		C	68.8
Black teatfish	<i>H. whitmaei</i>	A	73.4
		B	59.4
		C	46.7
Curryfish	<i>Stichopus herrmanni</i>	A	65.4
		B	66.6
		C	53.2
Lollyfish	<i>H. atra</i>	-	56.4

Sources: Kinch et al 2008; Kinch et al 2007; 2008.

Note: The grades affecting prices are used domestically in PNG for buying and for fisheries management classification, with A being the highest. They relate loosely to grades used for pricing with importers. Prices here are indicative only.

The next nodes of the chain are importing, wholesaling and retailing. Since the PNG fishery closed in 2009, and we were unable to find detailed information about prices at this node of the chain for the pre-2009 period, consequently we have used more recent export figures for other Pacific Island countries to compare with wholesale and retail prices in Chinese markets.

The main value seems to be accrued in the importer, wholesale and retail nodes of the chain, with the retail prices far exceeding the export prices. One recent study comparing export prices for four Pacific Islands countries with wholesale and retail prices in Hong Kong and Guangzhou found that the retail price is on average across the species 2.7 times the export price for the same species and sizes from those countries. The highest increases were for sandfish (4x), golden sandfish (3.8x) and curryfish (3.7x) (Purcell, 2014b) (see Tables 14 and 15). Table 16 rounds this picture out, distinguishing between wholesale and retail prices in Hong Kong, and adding wholesale prices also for Shanghai and Beijing.

TABLE 14. Export Prices Pacific Islands BDM 2014 (USD/kg)

COMMON ENGLISH NAME	SCIENTIFIC NAME	New Caledonia	Tonga	Fiji	Kiribati
Sandfish	<i>Holothuria scabra</i>	95-125	-	70	-
Golden sandfish	<i>H. lessoni</i>	80-90	95-130	130	-
White teatfish	<i>H. fuscogilva</i>	65-90	70-100	120-130	60-80
Black teatfish	<i>H. whitmaei</i>	50	65-95	100-110	50-70
Curryfish	<i>Stichopus herrmanni</i>	35-40	35-55	80-90	-

Source: Selected species from Purcell (Purcell, 2014b).

Note: The numbers for this table have been translated from graphs in order to enable easy comparison with the other tables presented, so are indicative only.

TABLE 15. Prices BDM Hong Kong &amp; Guangzhou Stores 2014 (USD/kg)

COMMON ENGLISH NAME	SCIENTIFIC NAME	Hong Kong average price	Hong Kong highest price	Guangzhou average price	Guangzhou highest price
Sandfish	<i>Holothuria scabra</i>	303	1668	137	200
Golden sandfish	<i>H. lessoni</i>	385	787	-	-
White teatfish	<i>H. fuscogilva</i>	192	274	120	165
Black teatfish	<i>H. whitmaei</i>	180	230	68	116
Curryfish	<i>Stichopus herrmanni</i>	197	214	121	159

Source: Selected species from Purcell (Purcell, 2014b).

Notes: This article says the Hong Kong stores sold retail quantities whereas the Guangzhou stores sold in wholesale quantities (see Appendix C on the lack of clear distinctions between import/wholesale/retail). Golden sandfish was not found for sale in Guangzhou in this study. See original for standard deviations.

TABLE 16. Wholesale & Retail Prices BDM Hong Kong, Guangzhou, Beijing, Shanghai 2015 (USD/kg)

COMMON ENGLISH NAME	SCIENTIFIC NAME	Hong Kong wholesale price	Hong Kong retail price	Guangzhou wholesale price	Beijing wholesale price	Shanghai wholesale price	Conservation Status
Japanese spiky sea cucumber	<i>Apostichopus japonicus</i>	528-1636	506-1851		948-1892 (from Japan)	316-1264	Endangered
Sandfish, golden sandfish	<i>Holothuria scabra</i> , <i>H. lessoni</i>	196-338	84-359	64-156	128-220	96-252	Endangered
White teatfish, black teatfish	<i>H. fuscogilva</i> , <i>H. nobilis</i> , <i>H. whitmaei</i>	191-319	166-294	96-156	128-156	96-152	Endangered / Vulnerable ( <i>H. fuscogilva</i> )
Probably curryfish	Probably <i>Stichopus herrmanni</i>	-	-	-	24-32	24	
Blackfish, hairy blackfish	<i>Actinopyga spp.</i>	-	-	10-15		9	
Probably blackfish, hairy blackfish	Probably <i>Actinopyga spp.</i>	-	-	-	32	32	

Source: M. Fabinyi fieldwork September 2015 (see Appendix C for further details).

Note: Although Hong Kong traders were also often wholesalers for mainland China, the higher prices here compared to Guangzhou indicate these products were likely for the local Hong Kong market.

These store prices, both retail and wholesale, show a huge jump from the export price. If we considered prices for rehydrated product being sold in restaurants, the jump would be even greater. Our research, however, was unable to clarify whether one of the nodes gains a huge profit to account for this price jump. We know little about the cost structures of importers, wholesalers and retailers. There would be rent, wages, power and storage costs, and possibly there are large costs associated with smuggling product into China, although presumably these must be less than the 30 percent tariff.

BDM traders in Hong Kong and Guangzhou interviewed were unwilling to discuss prices and profit margins in detail. They said, however, that they did not make a major profit. Some said their mark-up was 10 percent of the value of each sale, from which they covered their costs as well as took a profit. They said they were price takers rather than price setters, simply passing on the price they received from their buyers to the next link in the chain. Traders said their buyers 'controlled' BDM prices, with prices originating from what consumers all over mainland China were willing to pay. The traders perceived that the Hong Kong market was too small to influence overall market prices.

Figure 18. Sign for a BDM Trading Business (photo credit: Michael Fabinyi)



As noted earlier, exporters reported that shorter supply chains enabled businesses to increase margins and offer better prices. For this reason some of the exporters had considered trying to cut out the importer 'middlemen' and sell direct to retailers in markets such as Singapore and Hong Kong. Exporter F related a story of approaching a shop manager in Hong Kong and offering to sell direct, with them both receiving a much greater margin. The shop manager would not speak to him but quickly 'shooed' him out of the shop. Exporter B related a similar story. They opined that the importer businesses are very strong, and retailers do not want to bypass them. However, as noted previously, trust built through relations over time is key in seafood trading in China, so possibly retailers simply felt unable to trust exporters approaching them in this blunt manner. Exporter F had heard of a rich Indonesian businessman who had tried to set up his own retail store selling BDM in Hong Kong without using the importers. Every day a different government official came to inspect his fire safety, his health certification, eventually causing him to close the shop. Apparently in Hong Kong using government connections to focus intense scrutiny on a rival business is a well-known strategy for making rival businesses close down (Moiseiwitsch, 2014).

The importers we interviewed evinced no interest in cutting out exporter companies and going direct to fishers. The Hong Kong-based traders interviewed felt it was necessary to go through PNG exporters because of the need for what they cited as relationships with the fishers. In addition, only PNG citizens could hold an export license. According to traders, the fishers needed strict management to produce quality product, and the PNG exporters were able to provide this. Other traders spoke specifically of the difficulties of working in PNG – one advised that the security situation was very poor so he was not keen to invest there, while several more simply stated that they had heard stories of traders being cheated there

and that they did not trust the local people. Even buying through local exporters, however, required building up trust first, without trust such an undertaking was almost unanimously viewed by traders as too risky and dangerous. This point was emphasized by almost every trader interviewed. As one trader said:

*We have a trusted partner [in South Asia] who we buy from, and we finance him. He has a good relationship with the people on the ground, he knows the government, he knows the local people and the local traders. He is much better suited to working with these matters. But we have been working with him for years. If you were to come into my office and propose this sort of thing straightaway, that wouldn't be possible after just five minutes.*

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This concludes the section of the report detailing the PNG BDM fish chain Systems-to-be-Governed. The following section now builds on this to describe the Governing Systems, made up of government, market and social institutions in PNG, regionally and in market countries.

### 3. GOVERNING SYSTEMS

The preceding sections of the report show that the BDM social System to be Governed is spatially spread across PNG, Southeast Asia and Northeast Asia. It also operates at multiple scales from local through to global. Systems governing the BDM fishery similarly exist all the way along the fish chain and operate at multiple scales. In this section of the report we consider the range of institutions, state and non-state, which affect decision-making along the chain, and therefore constitute the governance of the fishery as it has existed to date (see Table 17). This lays the foundations for the analysis of factors that will affect the governance outcomes of the new Management Plan. We examine factors that have affected the governance of sea cucumber fisheries along the fish chain, and consider their relative effectiveness in achieving the five interactive governance aims (food security, community wellbeing, livelihood viability, social justice and environmental sustainability), which align with the factors included in 'responsible fisheries and sustainable development' for the 2015 FAO Voluntary Guidelines on Securing Sustainable Small Scale Fisheries (FAO, 2015). Through this assessment we illuminate obstacles to, as well as opportunities for, improving governance.

TABLE 17. Multi-Scale Assessment of Governing Systems Performance Against Governance Goals

KEY: a) **Green**: existing measures/instruments/influences; **blue**: potential ones.  
 b) Interactive governance goals – food security (FS), community wellbeing (CW), livelihood viability (LV), social justice (SJ) and environmental sustainability (ES)  
 c) '+' indicates a positive effect on the governance goal, '-' a negative effect

Scale	Measures/ Instruments/Influences	Governance Effects	
Village	LLG-based resource management plans	Minimal resources/capacity to develop resource management plans, implement & enforce them. Weak potential to improve without government or other assistance. Gender & intersectional distributive and decision-making justice may be addressed if LLGs interested.	+FS, LV, ES  +CW, SJ
	NFA Communication Strategy	Potential to improve awareness of regulations at village level, and possibly compliance.	+FS, LV, ES
	LLGMACs	Weak potential to improve without addressing lack of resources/capacity. Gender & intersectional distributive and decision-making justice addressed by women and youth representation.	+FS, LV, ES +CW, SJ
	Village Courts & Local Land Courts	Could be used to enforce LLG-based management plans and/or CBRM	+ES
	Conservation NGO/Charitable foundation-supported CBRM	Does not exist in most BDM fishing communities, externally supported CBRM cannot be scaled out to cover the whole fishery. Potential to improve especially if community and/or supporter are interested in gender and other equity issues.	+FS, LV, ES, CW, SJ
	Independent CBRM	CBRM only exists to date with external support.	-ES
	Strong need for cash, dearth of other cash earning opportunities	Strong incentive to keep fishing unsustainably. Food production and other income earning opportunities neglected during fishing season?	-ES -FS, CW, SJ
	High prices offered by buyers/exporters	Strong incentive to keep fishing unsustainably. Brings significant income into villages.	-ES +FS, CW, LV
	Distribution of income patterns	Problems with young men controlling much of the income, using mostly for recreational purposes.	-CW, SJ

KEY: a) **Green**: existing measures/instruments/influences; **blue**: potential ones.  
 b) Interactive governance goals – food security (FS), community wellbeing (CW), livelihood viability (LV), social justice (SJ) and environmental sustainability (ES)  
 c) '+' indicates a positive effect on the governance goal, '-' a negative effect

Scale	Measures/ Instruments/Influences	Governance Effects	
Province	Provincial Governments	Lack resources & capacity	-FS, CW, LV, SJ, ES
		Tendency to prioritize fisheries lower than other concerns, appropriate fisheries funds for other purposes	-FS, CW, LV, SJ, ES
	PFOs	Resources & capacity bolstered by NFA. Able to administer export regulations in old & new Management Plan, but it was not effective in preventing overfishing last time.	-ES
		Effective in new Management Plan (+ES). Stock assessing responsibilities in new plan. Engagement with fishing communities to enforce regulations, support compliance & community development	+ES +FS, CW, LV, SJ, ES
	PMACs	Multi-stakeholder group advising on BDM Management Plan ongoing implementation. Resource owners, women & LLGs represented.	+SJ
	Customs	Able to administer export regulations in old & new Management Plan, but it was not effective in preventing overfishing last time.	-ES
		Effective at preventing overfishing in new Management Plan.	+ES
	Province-based exporters & importers/ financiers/ technical advisers operating at the Provincial level	Strong influence through market power on how/ where fishing is conducted, but high demand and no evidence of efforts to improve sustainability.	-ES
		High prices, extension on quality. Potential influence through incentive for maintaining reliable supplies, investing in aquaculture.	+FS, CW, LV + ES
	Conservation NGOs	To participate in PMACs, effectiveness unknown.	+ES?

**KEY:** a) **Green:** existing measures/instruments/influences; **blue:** potential ones.  
 b) Interactive governance goals – food security (FS), community wellbeing (CW), livelihood viability (LV), social justice (SJ) and environmental sustainability (ES)  
 c) '+' indicates a positive effect on the governance goal, '-' a negative effect

Scale	Measures/ Instruments/Influences	Governance Effects
National (PNG)	<i>Fisheries Management Act</i>	Provides legal framework for fisheries management. +ES
	New BDM Management Plan	Strengthened measures from the old Management Plan. +LV, FS, ES
	NFA Board	Maintained moratorium effectively. +ES
	NFA	Well-resourced, high capacity, but unable to prevent previous overfishing. +ES, -ES  Could facilitate broader fisheries governance through community development, gender & intersectional discrimination awareness, and Communication and Education Strategy. +FS, CW, LV, SJ
	NMAC	Worked with NFA to improve Management Plan and strengthen devolution (+ES, SJ). Old Management Plan did not prevent overfishing. -ES  Multi-stakeholder representation, but not women, youth or resource owners. +/-SJ
	Customs	Able to administer export regulations in old & new Management Plan, but it was not effective in preventing overfishing last time. -ES  Effective in new Management Plan. +ES
	Other Agencies	Quarantine for food safety certification? +ES, LV?  Conservation and Environment Protection Authority for sustainability certification? +ES?
	Port Moresby-based exporters & their importers/financiers/technical advisers	Strong influence through market power on how/ where fishing is conducted, but high demand and no evidence of efforts to improve sustainability (-ES). High prices, extension on quality. +FS CW LV  Potential influence through incentive for maintaining reliable supplies, investing in aquaculture. + ES
	Conservation NGOs & Foundations	Liaising with NFA. Participates in NMAC. Effectiveness unknown. +ES?

**KEY:** a) **Green:** existing measures/instruments/influences; **blue:** potential ones.  
 b) Interactive governance goals – food security (FS), community wellbeing (CW), livelihood viability (LV), social justice (SJ) and environmental sustainability (ES)  
 c) '+' indicates a positive effect on the governance goal, '-' a negative effect

Scale	Measures/ Instruments/Influences	Governance Effects	
Regional	SPC Coastal Fisheries Programme	BDM Information Bulletin +LV	
		Extension for BDM processing quality +FS LV	
		Regional traders database +ES, SJ	
	SPC New Song approach to coastal fisheries	Increase profile & whole-of-government approaches to coastal fisheries, harmonize policies +FS, CW, LV, SJ, ES	
	MSG Roadmap for Coastal Fisheries	National Roadmaps being developed +FS CW LV SJ ES	
	Traders operating regionally	Not studied for this project but likely to be similar as above for national, provincial and village scales. +/- FS, CW, LV, SJ, -ES  Potential influence through incentive for maintaining reliable supplies, investing in aquaculture. + ES	
	Regional importers	Not studied for this project but likely to be similar as below for China/Hong Kong. +/-ES	
	International	Customs codes	Use to trace suppliers and end markets for BDM, the state of BDM fisheries globally +ES  Could be even better with improved data +ES
		CITES	Could stimulate improved management of fishery in PNG +ES
			Could improve data through required trade records. +ES
May alienate traders from other stakeholders and prevent collaboration to improve governance. -ES			
Global BDM trade		Serial depletions. -ES	
CBRM support by international NGOs & Foundations		Small proportion of sea cucumber fishing communities implementing CBRM. Varied effects in different locations but generally positive. +FS, CW, LV, SJ, ES	
		Developing understanding of scaling out CBRM, having CBRM less dependent on resource-intensive external support. +FS, CW, LV, SJ, ES	
NGO campaigns on sea cucumber overfishing	Could build awareness of ES problems among consumer audiences. +ES		

KEY: a) **Green**: existing measures/instruments/influences; **blue**: potential ones.  
 b) Interactive governance goals – food security (FS), community wellbeing (CW), livelihood viability (LV), social justice (SJ) and environmental sustainability (ES)  
 c) '+' indicates a positive effect on the governance goal, '-' a negative effect

Scale	Measures/ Instruments/Influences	Governance Effects	
<b>National (China/Hong Kong)</b>	Customs	Imperfect data on imports of BDM.  Could be much improved data if the grey trade was significantly reduced and Customs information clarified.	-/+ES  +ES
	Quarantine	Could operate as regulation of food safety, encouraging high value production. No indication of this so far.	+LV
	Fisheries agency	Could implement international/regional IUU regulations at the point of importation. No indication of this so far.	+ES
	Importers/wholesalers/retailers	Food safety & quality focus among some traders targeting high-end markets. Governance effects would require further research.	?
		Could require meeting environmental criteria, no indication of doing this so far.	+ES
	Retailers/consumers	Food safety & quality concerns in some high-end markets. Governance effects would require further research.	?
Environmental concerns.		+ES	

### 3.1 PNG government

The PNG government's capacity to control activities such as sea cucumber fisheries and the BDM trade is mixed. PNG has a population of around eight million people. Its large land mass and population make PNG's economic possibilities greater than that of most other small island developing states in the Pacific. Mining, oil, natural gas and logging, have brought vast amounts of wealth into the country, especially over the last decade, but unfortunately this has not 'trickled down' to the majority of the population. PNG's Human Development Index (HDI) status is 158th out of 188 countries, with education, income and life expectancy having improved steadily but slowly since independence in 1975 (UNDP, 2015). Corruption perception surveys ranked PNG 139th out of 169 countries in 2015 (Transparency International, 2015). Government services to protect the environment and to regulate and foster economic activity in general have much room for improvement.

For fisheries management in particular, the NFA is stronger than other government departments. In the mid-1990s the fisheries agency was extensively restructured into a statutory authority that self-funds through tuna fisheries access fees (Barclay and Cartwright, 2007). The NFA has thus been able to attract and retain well-qualified staff, and resource their activities appropriately with computing systems, administrative support, travel allowances and so on.

The NFA's governance structure through its Board has also added strength to NFA policy directions, making them less susceptible to arbitrary change through Ministers of Parliament or other powerful individuals. For example, in Solomon Islands depleted sea cucumber stocks have also been addressed by closing the fishery and exports, but the decision to reopen the fishery can be made by the Minister and senior public servants. Solomon Islands' ban is lifted fairly regularly, especially following natural disasters, allowing continuing stock depletion (SPC, 2011).

In PNG, by contrast, where the moratorium must be lifted by the NFA Board, the fishery has remained closed since 2009 to allow for stock recovery, despite ongoing strong political pressure to reopen it (Ten, 2013). Interviewees and the desk research conducted by EDO NSW (Appendix D) indicate that possibly the Board is less impartial than it was. The membership of 10 specified in the *Fisheries Management Act* (1998) included representation for provincial government and a non-government organization (NGO) as well as two representatives of the Fishing Industry Association. Subsequent amendments to the Act have removed the representation for provincial government, one of the two people nominated by the Fishing Industry Association and the NGO representative. Two unspecified Ministerial appointments have replaced these three positions [see Appendix D Part A, 3.1 Issue 1; Part B 3.1.4]. Furthermore, since the single industry representative on the Board has always been held by a tuna industry member, and the industrial tuna fishing and processing sector has vastly different concerns and interests to the village-based BDM sector, it is reasonable to ask how informed the Board has been about BDM fisher and trader concerns and interests.

Notwithstanding these concerns about representation on the Board, insofar as the moratorium has remained in place until sufficient stock recovery has been demonstrated and a credible new Management Plan is finalized, it may be said that the NFA Board system positively influences BDM fisheries management.

Fisheries management for BDM is centered in the NFA, but also operates through other government agencies, largely Customs. It also operates through the provincial governments' departments for Customs and Fisheries. Some of these other wings of government are less well resourced and have different priorities than the NFA. The new Fishery Management Plan for BDM includes input also from local level governments (LLGs), which are even less well resourced than provincial governments. The discussion below on the old and new BDM Fisheries Management Plans includes details of interactions between different parts of government as they affect governance for BDM.

Theoretically the PNG Conservation and Environment Protection Authority (CEPA, formerly the Department of Environment and Conservation) may also be an important government player for the governance of sea cucumber fisheries. In practice, however, this arm of government has not been productively engaged. Participants in the Project Inception Workshop said one difficulty was that CEPA tends to take a strict International Union for Conservation of Nature (IUCN)-based line to conservation policy, and will not engage with the small, less biodiversity conservation-focused and more community development-focused types of protected areas seen by stakeholders as feasible and relevant for BDM. For example, CEPA supports NGO Locally Managed Marine Areas with biodiversity conservation protection goals, but it actively prevented a mid-2000s review of the Fisheries Management Act from allowing communities to establish their own fisheries management areas. The section below on Community-based Resource Management (CBRM) considers community-based conservation efforts and how they intersect with government in more detail. The lack of real engagement of CEPA outside supporting various NGOs in managing marine biodiversity, and the apparent inability to use their systems for the purpose of BDM conservation mean CEPA has not been considered in depth as a governance actor for this report.

### 3.1.1 Old BDM Management Plan

Sea cucumber fishing increased greatly from the mid-1980s, leading to reduced catches in high value species and increased catches of low value species for which markets had opened up in China (Kinch, 2004a). By this time the NFA had established itself as an effective, well-resourced agency, and in 2001 a revised *National Béche-de-Mer Fishery Management Plan* was launched (Kinch, 2004a). This built on earlier attempts to restrict catches, especially a 1992 regulation with minimum dry size limits, and prohibitions on the use of underwater breathing apparatus, such as hookah and scuba, lights for night fishing and large ships for harvesting (Kinch, 2004a). Contemporary Fishery Management Plans are created under the *Fisheries Management Act* (1998, amended 2015). Management Plans are endorsed by the NFA Board, submitted to the Minister for approval and then published in the National Gazette to become legally enforceable.

Under Management Plans, total allowable catches can be set, licenses can be issued (by the Board), and arrangements made for Monitoring Control and Surveillance (MCS) for fisheries. The legal capacities of Fisheries Officers are established, so that they can engage in enforcement activities including searching, arresting, and gathering evidence for court actions. Fishery Management Plans also allow for the NFA Managing Director to require information from fishers and related businesses that will help with fisheries management, such as catch and sales records (see Appendix D Part B 3.1.5).

In the following sections we consider how the old Management Plan both worked and failed in order to assess the likely effectiveness of the new Management Plan. The 2001 BDM Management Plan specified that the fishery would be managed nationally, by NFA. The old Management Plan specified a National Management Advisory Committee (NMAC), and also allowed for Provincial Management Advisory Committees (PMACs), with membership to cover the spread of provinces and include stakeholder representation from fishers, trading businesses ('industry'), conservation NGOs. The instruments for fisheries management laid out in the plan were around export licensing regulations (including size limits) and a total allowable catch (TAC) used to set the season closure annually. Although NFA was the main agency responsible for the old Management Plan, implementation activities were also delegated to Provincial Government Fisheries Office (PFO) staff. The following sections of the report detail how the three main pillars of the old Management Plan, namely, a) TAC and closed seasons; b) export regulations, and; c) devolution, operated in practice.

#### *Total Allowable Catch (TAC) and Closed Seasons*

The *bêche-de-mer* fishery in PNG is a multi-species fishery, and species-based regulations have been restricted to size limits against each species and TACs against high and low species value groups. The main instruments used to limit harvesting of sea cucumbers in PNG under the old Management Plan were TACs with closed seasons. The NFA set TACs for each province due to the different coastal environments and therefore different BDM resources in each province. TACs were set from historical export figures and where available stock assessment work that was extrapolated across the province. The TAC was set at 70 percent of the total estimated biomass (Kinch, 2004a). There was a national closed season from 1 October to 15 January, based on knowledge of spawning seasons that was based on spawning research in other parts of the South Pacific. Fishing seasons were closed for each value group in each province when they reached their TAC, or if they had not reached the TAC by 1 October when the season was closed anyway (Kinch, 2004a).

The TACs were mostly not scientifically based because MSY had not been calculated for all provinces. TACs were in some cases set at 70 percent of the total harvestable estimate by converted dry weight, based on previous stock assessments if available, or historical catch record if not (Kinch, 2004a). NFA had been unable to conduct stock assessments for each province annually prior to 2009.

NFA monitored catches against the TAC through purchasing data from the Monthly Summary Reports provided by exporters as part of their license requirements (further details below). NFA staff estimated when TACs would be reached, then closed the seasons a little ahead of when it was estimated the TAC would be reached, to allow all harvested product to enter exporters' hands.

In 2004 an analysis of the export data showed that the TACs were being breached frequently, particularly with high value species. Milne Bay Province had exceeded its TAC several years in a row. In 2003, several provinces all went over their TACs (Kinch, 2004a). The old Management Plan specified that if a province exceeded a TAC by a considerable amount (more than 5 tonnes), that excess amount would be deducted from the next season's TAC. The repeated breaching of TACs indicates this measure was not effective.

### Export Licensing

The 2001 Management Plan focused efforts on just two types of licenses for BDM – exporting and storage facilities. It was intended that close enforcement of export licensing regulations could be used to obtain data on catches to implement the TACs, and enforce the minimum size limits and the prohibition on trading of BDM after the season closures. Through the export licensing system, therefore, exporters became the main source of information for the fishery and the trade (Kinch, 2004a). Exporting is a bottleneck in the fish chain; it is a formal business that consolidates product harvested via informal fisheries across thousands of locations throughout the coastal areas of the country. It is therefore much more efficient to monitor and regulate BDM exporting than fishing.

There were two main types of reports exporters submitted to NFA as part of their license requirements. One was monthly summary reports on purchases and product held. This set of reports was what NFA used to monitor TACs and decide on season closures. The second type of report was applications for export. Preceding a shipment, exporters reported to NFA the amounts of different species (by 40kg bags) and value, and NFA approved export shipments based on this information. Problems with disparities between the two sets of reports were reported, including companies using irregular methods of reporting and non-standard trade names (Kinch, 2004a). Another problem included exporters not accurately recording how much BDM they still held at the closure of a season – for the purpose of checking during random inspections in the closed season. Widespread harvesting in some provinces during the closed season showed that this reporting system was not working to enforce the closed season (Kinch, 2004a). This raises questions about the accuracy of the monthly reports upon which the TAC monitoring was based. There were delays in inputting and analyzing data from the monthly reports.

Other problems with the accuracy of the exporter reports for TAC monitoring arose from difficulties with converting the wet weight of animals fished to the dry weight used in the reports. As noted earlier, in some locations BDM was purchased wet or after the first boil, and even product sold as 'dried' was sometimes still quite wet, so accurate and precise conversion rates would be needed to make sure the dry weights recorded in the reports were useful for monitoring the TAC (Kinch, 2004a). This is complicated by the fact that the conversion rates vary between the species,

with some species losing much more of their body weight in the drying process than others (Purcell et al., 2009).

In addition to information about catches, exporter license requirements were also used to enforce two of the prohibitions listed in the old Management Plan: minimum size limits and inter-provincial transfers of product. One recent study highlights that better enforcement of minimum size limits in sea cucumber fisheries could help maximize economic benefits of wild stocks because very small animals are low value, and for some species like sandfish the price is vastly better for larger animals, although this study also found that for white teat (*H. fuscogilva*) in particular the price dropped for very large animals, possibly due to preferred sizes for plating (Purcell, 2014b). As noted earlier (Sections 2.2 and 2.4), exporters offered price incentives for higher quality product, in which size was a key factor, but this did not mean fishers avoided undersized animals. They often preferred to obtain some cash now rather than wait for the animal to grow and be worth more cash later (Kinch, 2004a), and the old commons problem of wanting to catch something now rather than letting someone else catch it may have been an issue. So maximum size limits were regulated in an effort to protect the more fecund larger animals and contribute to future abundance. This regulation was not implemented in fishing areas, but only through inspecting exporters' stock and enforcing the rules at that point. The rationale was that exporters would refuse to buy undersized product and therefore fishers would stop catching it. Fishers interviewed in southern Manus said that sometimes buyers refused to buy undersized product from them, but sometimes they bought small pieces. Exporter C said that when fishers came to him needing cash, and the undersized animals were already dead, it felt wrong to refuse to buy them. In 2002 one company in Milne Bay dumped 800kg of undersized BDM (Kinch, 2004a).

Interviewees reported that one of the problems with getting fishers to stop catching undersized BDM was that they had no easy way of knowing whether the animal they caught wet would end up legally undersized after it was dried. Although the live minimum lengths and dry minimum lengths by species were included in Schedule 1 of the old Management Plan, there was very little extension work on appropriate collection techniques offered to fishers, and they largely did not know the recommended wet lengths (Kinch, 2004a, Kinch, 2002). As for weight, the amount of length lost through drying varied by species, with white teat reducing only by about 30 percent, whereas curryfish shrank by around 70 percent (Exporter C). The result was both a loss of income and the depletion of future stocks through indiscriminate collection and subsequent rejection of undersized BDM – a very poor governance outcome. Since exporters have an interest in selling high value product, and in continued supply, there is a role for the private sector as well as government in improving extension to fishers on size limits at the village level (Kinch, 2004a).

The reliability of the information about catches in the exporters' Monthly Summary Reports was reduced by inter-provincial transfers. This refers to product that is not exported direct from the province from which it was harvested, but traded across provincial borders for various reasons. It was hard to keep track of these transfers in terms of checking the Monthly Summary Reports against the exports data for

monitoring the provincial TACs. Some amounts traded across provinces were not put back on to the Province of Origin catch for the season, so these shipments were missed from the provincial TAC monitoring. Purchases from other provinces were recorded in the monthly summary reports but not in the export reports. For example, in 2003 Milne Bay Province was recorded as exporting nearly 220 tonnes. Of this 20 tonnes came from Oro and 15 tonnes from Central Province, but these amounts were not reported as exports for the Province of Origin (Kinch, 2004a). It was not feasible to monitor transferred product separately as it was often re-processed by the buyer then sorted and bagged with product from other locations for export. This was particularly an issue for Western Province, for which most BDM was exported via Port Moresby rather than from Daru (Kinch, 2004a).

### Devolution

Devolution of government from the national level through to the provinces and local level government (LLG) has been a key theme of public administration in PNG over the last couple of decades. The main legislation for this is the *Organic Law on Provincial Governments and Local Level Governments* (1998), hereafter referred to as the Organic Law PGLLG. Section 42(1) of the Organic Law PGLLG allows provincial governments to make laws on fishing and fisheries. LLGs do not have any direct authority to make laws about fishing and fisheries, however, they do have authority to make laws on a number of topics which may overlap with fishing and fisheries, such as laws on the local environment (s 44(1)(p)). This authority is subject to provincial government law (s 44(1)). Furthermore, as the Fisheries Management Act declares that fisheries are a matter of national interest it will prevail over any law authorized by the Organic Law PGLLG (s 41(6)) (Kinch, 2004a) [Appendix D Part B 2.3.3].

The National Government has broad powers under section 50 of the Organic Law PGLLG to delegate through an Act of Parliament its powers and functions to a provincial government or LLG. Similarly, a provincial government may delegate its powers to an LLG (Appendix D Part B 2.3.3). The provincial and local-level administrative system is set out under the Organic Law PGLLG (Appendix D Part B 2.3.4).

The NFA is, therefore, empowered under the Fisheries Management Act to delegate powers, functions, duties and responsibilities to the provinces or LLGs. The 2001 BDM Management Plan explicitly included some devolution in the form of advice to the NFA from PMACs. In addition, the Plan allowed for provinces to devise specific schedules for fishing for themselves, as long as these were consistent with the old national Management Plan. New Ireland and Milne Bay Provinces set up PMACs and Milne Bay set up its own Management Plan. Implementation of the old Management Plan also involved devolution through the activities of PFOs. NFA also entered into Memorandums of Agreement with several provinces such that the NFA provides assistance to PFOs with equipment funding and payment for duties that would usually be undertaken by the NFA. For BDM this included inspection of storage facilities and inspection of product ready for export certification or inter-provincial transfer, certification of exports and surveillance activities (Kinch, 2004a).

Provincial Fisheries staff and provincial government Customs staff were interviewed during fieldwork, and they explained the process they undertook to certify exports. When exporters were ready to export a shipment they informed the PFO, who then checked their stock so the exporter could lodge an application to NFA, with documentation on the species, weight and value of their shipment. When NFA approved the export for that documentation, the PFO staff inspected the shipment again before it went into the container. They counted the numbers of 40kg bags to confirm the weight and randomly opened some bags to check the species were as they should be. If the shipment was as per the certification documents, the PFO and Customs staff approved it and sealed the container ready for export. Customs officers were also responsible to check shipments of BDM because it was listed as a 'prohibited and restricted' (P&R) item. Customs staff were not able to identify species, so they worked together with Fisheries staff for this process, conducting the inspections together. The role of Customs staff was to check that the exporter had a permit and that what they were exporting matched their permit. Customs kept a copy of the exporter invoices used for the permit for their records.

Delegation to PFOs makes sense in terms of efficiency and using staff based out in the provinces where much of the exporting of BDM has taken place. There were, however, problems with this system in that provincial governments are much less well resourced than NFA, so there have been capacity issues in dealing with problems of overfishing in valuable fisheries such as BDM. For example, ideally such officers should have tertiary education degree-level training, but most, if not all, do not (Kinch and Carnie, 2011). Although PFOs have had additional training for BDM responsibilities, interviewees expressed doubt that all PFOs are able to accurately identify the species of BDM they are tasked with checking in exports. Provincial staff interviewed also said that with limited numbers of staff between Customs and Fisheries available for export inspections, sometimes they covered for each other, filling out each other's forms.

### Failure of the Old Management Plan

Despite a management plan being in place, overfishing occurred, and BDM stocks were depleted to the extent the National Government put a moratorium in place in 2009. There are three main ways in which the old management plan failed to contain fishing as intended: a) the TACs were exceeded due to factors such as delays in Monthly Summary Reports and NFA not strictly enforcing the TACs; b) the prohibitions in the plan were not enforced, and; c) there were amounts of BDM kept outside the official system and smuggled out of the country (how significant these amounts were is unknown).

As noted previously, there are questions about whether the TACs were set at the appropriate level. Even if they had been, the fact that they were regularly exceeded meant that the system was not working. The flow of information about the fishery used to calculate catches for the TAC was problematic. Monthly reports from exporters were received by the PFOs and it took time for the data from the reports to be entered into the system, so there was quite a time lag between the product being fished and NFA having a record of its catch for calculating the TAC. Additionally, for the purpose of the TAC it is important to know about BDM that

was rejected by exporters, for being too small or broken (both prohibited) or of insufficient quality. This information was not captured by the Monthly Summaries of purchases.

The prohibition on size limits could be enforced as part of exporter licensing requirements, and there is evidence it was enforced at that point, although there is also evidence that the enforcement at the point of export was not having the desired effect of preventing fishers from catching undersized animals. Moreover, the other prohibitions in the old Management Plan that required enforcement at the village level, such as for underwater breathing apparatus, night fishing and fishing after the end of the closed season, seem not to have been enforced at all. There were reported cases of the use of hookah in Milne Bay Province and scuba in Oro Province. Villagers continued fishing during the closed season (Kinch, 2004a). Interviews conducted with fishers for this project showed a lack of awareness about and compliance with fishing regulations, although it is possible that fishers downplayed their knowledge of regulations in order to avoid acknowledging their responsibility for overfishing. Fishers in one village said they used crowbars to break corals to get snakefish sea cucumbers that hide in coral, and in all the villages visited they said they used lamps and torches for night fishing.

There were also supply chains going outside the legal TAC system. Information about the extent of illegal sales is not available but there were ongoing cases of unrecorded catch found while the fishery was open, and BDM has continued to be smuggled out of PNG since the moratorium was instituted. During fieldwork in Hong Kong and Guangzhou for this project no product labeled as being from PNG was seen. However, Ms Luanah Yaman of NFA has photographs of BDM on sale labeled as being from PNG in these markets during the moratorium. Interviewees in both PNG and China said they had heard of BDM being smuggled out in logging shipments, saying it would be easy to hide BDM amongst heavy logs that Customs inspectors could not move to check. It is also likely that BDM has been smuggled across the border areas with Indonesia on the north and south coasts, and from Bougainville to Solomon Islands.

### Moratorium

The moratorium on BDM fishing and trading put in place in 2009 was extended for a further three years in 2012. When it came to an end in 2015 the moratorium continued unofficially while the NFA Board deliberated on the draft of the new Management Plan. Interviews with NFA staff and documents from NFA shared for this project show that stock assessments concluded that sea cucumber population recovery during the moratorium had been patchy. Nevertheless, all interviewees felt it was likely the moratorium would be lifted in 2016. One reason was that there are national elections in 2017, so the political pressure to open the fishery, which is ongoing, will become even stronger in the lead up to the election. Another reason is that ongoing drought and resultant food shortages since 2015 in some areas have created another strong reason to open the fishery and allow people to generate an income.

The question is what will happen once the moratorium is lifted. In the Pacific region Tonga's BDM experience is cautionary. Tonga had a moratorium on sea cucumber

fishing for 10 years, but within two years of lifting the moratorium stocks were depleted again (Pakoa et al., 2013). PNG's governance challenge is to not follow Tonga's lead.

### 3.1.2 New BDM Management Plan

A recent study of the management of BDM fisheries worldwide has found that overall BDM fisheries tend to be poorly managed (Purcell et al., 2013). Where management has been more successful several factors were identified as contributing:

- > enforcement capacity
- > few species harvested
- > vessel controls
- > limited entry controls
- > rotational closures.

Some of these factors would be quite difficult or impossible to employ in the PNG situation. With an extensive and informal fishery, vessel controls and limited entry to the fishery are not feasible. Enforcement capacity at the fishery level is a long way from being achieved, but enforcement capacity at the point of export was already quite well established. Reducing the species harvested and rotational closures could be considered but these would constitute major changes to the way things have been done. Limited entry into exporting is part of the new Management Plan.

The new Management Plan is similar to the old one in that its key instruments remain a TAC with closed seasons and regulating exports rather than the fishery directly. These have been strengthened in various aspects, however, as have the devolution and co-management aspects of the old Plan.

The new Management Plan has as its objectives:

- > To manage the sea cucumber fishery for the long-term economic benefit of coastal and island communities throughout PNG.
- > To ensure the use of sea cucumber stocks is biologically sustainable and that sea cucumber populations are maintained at levels that will allow them to continue to play their role in the marine ecosystem.
- > To ensure the co-operative implementation of this Management Plan and associated governance involves the support and input from relevant government, industry, resource owners, other civil society actors and research institutions.

The dual aims of conservation with economic development is in line with the *Fisheries Management Act*, which specifies that an ecosystem approach to fisheries management (EAFM) be taken in applying the Act. Neither the Act nor new Management Plan, however, is clear about how an ecosystem approach is to be defined or applied (Appendix D Part A 3.7, Issue No.10). According to NFA interviewees, EAFM, as it is interpreted in PNG, is largely based on conventional

fisheries management tools, adding on a more holistic approach to stakeholders and wider ecological issues. Price information is now collected in the exporters' data collection, enabling a picture of income returned to fishers or village-level traders supplying exporters. Socio-economic assessment is now included as part of the research specified in the new Management Plan. Although it is not mandated who must do it, for what area or when, it is suggested and encouraged for the provincial and local levels. If socio-economic assessment were to be done, this plus the prices information could feed into an ecosystem approach to fisheries in which societal objectives for the fishery could be monitored and considered in an evidence-based way for reviews of the Plan and its implementation.

This highlights a really important challenge for the governance of BDM in PNG: How to achieve development from the commodity, with development usually defined as improving the incomes, services, life choices, etc. for villagers? One study comparing the benefits for fisheries supplying Chinese markets from the Philippines and North America found that the benefits for fishers from selling their products seems to depend on them first achieving a range of social development outcomes (Fabinyi, 2016). Fishers who are supported by effective regulatory institutions, who have better financial resources and other income options that reduce their reliance on single commodities are better able to take advantage of Chinese markets to 'upgrade' their products and roles in value chains. It is ironic that while it is developing countries that most need the opportunities posed by global markets, developed countries are better able to take advantage of those markets in ways that most benefit their societies. They have better infrastructure and services, including for finance, and are more familiar with capitalist market economies and understand their own opportunities within them. Lack of development constitutes an obstacle to realizing sustainable and equitable gains (Fabinyi, 2016).

Interviewees recognized not only the problems posed by their heavy reliance on BDM as their main source of cash, but also the need to diversify. People wanted and needed the money, so when the season was open they fished hard. Fishers in Mbunai village in Manus noted:

*Our need for money causes overfishing. It's like a gold rush. When it's on fish all day, every day, people can't get enough.*

A similar tendency has been noted for sea cucumber fisheries elsewhere in the Pacific (see, for example, Christensen, 2011). Government Officials A and B said their provincial government had been trying to foster alternative livelihoods to reduce the reliance on BDM, using funding under the Capacity Building Grant from the National Government to develop aquaculture for seaweed and tilapia. Compliance with conservation rules may improve when there are alternative livelihood options (Arias et al., 2015).

According to NFA interviewees, there is a two-pronged approach to making the new Management Plan more effective than the old Plan: 1) strengthen enforcement capacity, and; 2) improve education and communication about the new BDM Management Plan. Some aspects of these are built into the new Plan, while others will have to be developed around the way it is implemented.

### *Strengthening the TAC and Closed Season System*

The key point for strengthening the TAC and closed season instruments is to make sure the TACs are set at the appropriate levels for each province, and to make sure fishing stops when the TAC is reached.

In 2015, the NFA estimated new TACs based on stock assessments, which have been carried out in each province since 2009. The new Management Plan requires the PFOs to conduct regular stock assessment and adjust the TAC annually as necessary. TACs may also to be monitored and adjusted as necessary via information from exporters. The new Management Plan includes new directions about the gathering of this information to improve its reliability. The stock assessment process may also be informed by other science to evaluate negative ecosystem impacts from the fishery.

The fishing season has been reduced, with the fishery closure date remaining at 1 October each year but the starting date for fishing moved later in the year from 16 January to 1 April. Where TACs are set too low to allow for a viable fishery, the province concerned will be recommended to have an extended closure of the fishery to allow for stock recovery. When 70 percent of the TAC is estimated to have been reached via a strengthened buying information system, the closure date for that province will be set and publicized via the media. The previous Plan did not specify how or when the closure dates would be set, so it is hoped this new direction will effectively address the problem of provinces regularly exceeding their TAC.

As in the old Plan, when a province exceeds its TAC in a season, their TAC for the following season is to be reduced by the amount that was exceeded. This penalty was not enforced under the previous Plan. An important question to consider is whether NFA has the political capacity to enforce it under the new Management Plan.

One way the improvements to calculation and review of the TACs could be developed further is through enhancing the TAC verification with external review (Appendix D, Part A 3.6 Issue 9). This could be some of the 'other science' specified in the new Management Plan, and could be connected to innovations in monitoring control and surveillance (MCS) (Appendix D Part A 3.3 Issue 5 and Part A 3.8 Issue 11). That is, communities could become involved in monitoring their own stocks, in collecting data as contractors or voluntarily as a form of citizen science, and reporting on breaches of the new Management Plan to enforcement agencies. It should be noted, however, that this kind of process has not yet been successfully achieved in PNG, even in NGO-supported Locally Managed Marine Area (LMMA) Networks. Both of these would require the devolution aspects of the new Management Plan to come to fruition.

One of the problems identified with the old Plan for working out when to close the TACs was that inter-provincial transfers of product as these shipments were not transferred back to the Province of Origin. In both the old Plan and the new Management Plan, inter-provincial trading is banned except with express authority from NFA. Interviews with exporters confirmed that, particularly for the Port

Moresby-based exporters, inter-provincial transfers are necessary to make their businesses viable, particularly in terms of generating enough volume to have a good bargaining position vis-a-vis importers. As noted in Section 2.2 on exporting, traders saw it as important for the PNG industry for exporters to assert themselves in relations with importers, and amassing large volumes was one way to do this. Furthermore, Exporter G noted that for fishers on the borders of provinces it is sometimes more expensive and difficult to get their product to their own provincial capital, so for these fishers prices are improved if they can sell to exporters in a nearer capital of a neighboring province.

It is to be expected, therefore, that despite the nominal ban on inter-provincial trading that it will continue to occur with NFA authorization. The new Management Plan improves on the old Plan for this eventuality by specifying that 'full details' of approved inter-provincial transfers must be submitted to NFA. Presumably this will allow NFA to include the amounts in their calculations of catches for monitoring progress towards reaching the TAC for each province.

NFA may also like to consider whether TACs and closed seasons are the best measure possible for limiting the fishery. The science for TACs is expensive to do well, especially for multiple species across multiple geographies, and NFA may struggle to resource it sufficiently. Will the TACs be adequate if they are not done annually for each stock? It may be more feasible to undertake periodic surveys for assessing status of fisheries. Other science that could be easier to collect data on and use as the basis for management tools includes determining the spawning seasons by species and geography. Closed seasons could then be based on breeding cycles. If communication and compliance at the village level can be improved then other options include strengthening the size limits and protecting spawning biomass.

### *New Export Licensing Measures*

The new Management Plan retains the principle of using export controls due to the export node of the fish chain being a pinch point where product is consolidated from extensive fisheries, and where the business is formal so government has some regulatory control. This system is strengthened in various ways in the new Management Plan, meaning it now addresses many of the points raised in the literature about using the point of export in this way (Carleton et al., 2013b, Kinch, 2004a, Kinch et al., 2007), including:

- > using license conditions for buyers and exporters to collect information and to influence fishing practices
- > improving the way export data is collected to avoid under-reporting
- > making sure information collected from exporters covers important data for fisheries management purposes (such as, weight, grade, prices paid to fishers, numbers and sizes of product)
- > ensuring export data is input into monitoring systems reliably so it can be effectively used for fisheries management.

The types of license have increased from just two under the old Management Plan (exporter and storage facility) to six under the new Plan (exporter, storage facility, buyer, collector vessel, processor, aquaculture). There is also a certificate of authorization from NFA required by restaurants serving BDM, and for storage for that purpose, to close an apparent loophole by which restaurants had stockpiled BDM ostensibly for domestic sale but actually exported it. More types of licenses means more points of enforcement and more potential sources of information about BDM that can be used to improve management.

The old Plan had suspended buyers licenses that had been used prior to 2001 because they were administratively expensive, but it was noticed that when the buyer's licenses were suspended the relationships between buyer and exporter dissolved, resulting in an increase in illegal movements of BDM (Kinch, 2004a). If there are large undocumented amounts of BDM, this has serious implications for the effectiveness of the TAC, which is monitored through documented sales. In the new Management Plan buyer licenses are connected to exporter licenses, meaning freelance buying will be illegal.

The new Management Plan license system also aims to encourage compliant and developmentally beneficial practices on the part of exporters through a new criteria-based license screening process (Schedule 1 of the Plan). This involves a points system that prioritizes certain kinds of businesses over others. For example, businesses that invest, such as in aquaculture for BDM, get more points. Community cooperatives and community-owned businesses also get more points. There are negative points for having failed to submit required information properly in the past, and outright rejection for businesses that have been convicted of breaches under the Fisheries Management Act. In addition, NFA is planning to issue standard scales for weighing BDM to be used by all exporters and their buyers to reduce the possibilities for exporters cheating fishers. The points-based license screening process is likely to have real effect because the numbers of export licenses per province are now to be limited and set by the NMAC.

In limiting the numbers of exporters, it will be important to take care not to reduce the competition among buyers to the point that fishers lose the price benefits they had previously in a sellers market. If there are too few exporters the prices, or the proportion of the export price, fishers receive is likely to decrease.<sup>16</sup> For example, in the past when there were only two exporters in Alotau the prices for fishers were fixed, but prices increased when the number of exporters increased.

Another key improvement associated with licensing in the new Management Plan is a reorganization of the purchasing data exporters are required to submit to NFA, which NFA then uses to monitor catches over the season against the TAC so as to be able to close the season when the TAC is reached. The effectiveness of the TAC and the closed season instrument requires this data to be reliable, and to be collected and entered in a timely manner (Appendix D Part A 3.6 Issue 8). The purchasing data forms will now be submitted weekly instead of monthly and sent to both NFA and the PFO. The new form (Schedule 2 of the Plan) includes price data as well as weight and species.

<sup>16</sup> Steve Purcell, personal communication, October 2015.

The old purchasing record form had only 'dry weight', which as noted earlier was a problem because so much BDM was sold wet or first boil, and the use of non-standard conversion rates therefore reduced the reliability of the weight data. The new form has an additional cell for product 'type' – presumably here the exporter can note whether the product is dried, wet or first boil – and then 'weight'. This should enable NFA to then use standardized conversion rates to get better estimates of catches.

Another new feature in the new Management Plan is a compliance bond of PGK50,000 to be paid by all licensees. The bond is to be held by NFA and rolled over annually if there is no infringement. If a licensee is found to have infringed BDM regulations the bond will be paid to the PFO to use for fisheries management purposes. It is hoped in this way both to deter wrongdoing, and also to help offset the considerable MCS costs associated with the fishery, which hitherto have not been offset by management fees.<sup>17</sup>

A key point to consider regarding increased fees is that they will increase the cost of BDM. The drop in prices for BDM will reduce margins in which the extra costs may be absorbed. Who along the supply chain will bear the increased cost – producers, exporters, importers, wholesalers, retailers, or consumers? Earlier discussion of the value chain and who sets and takes prices (Sections 2.2 and 2.4) helps consider this question. Exporters say their margins had already been squeezed by competition among exporters. Importers say they only had a margin of around 10 percent, although there is a huge increase in prices between export and retail, so unless the costs of importation are very high it seems there is still a lot of profit in that area of the chain. Fishers have some power through it being a sellers' market and competition among exporters, so it is possible they may continue to receive good prices, although it also seems probable that fishers will be made to absorb at least some of the increased costs of the new Management Plan. All licenses remain available for PNG citizens only. Non-nationals involved in financing and technical advice for BDM exporters must be registered with NFA.

The rules about holding stores of BDM in the closed season have also changed. Under the old Plan exporters declared holdings at the end of the season and NFA 'may' specify that holdings must be exported by a certain date, but otherwise it seems that declared holdings were permitted for the duration of the closed season. With the season opening on 16 January under the old Plan, such holdings were used by some companies to make sure they had ample stocks for the peak season for festive foods around lunar New Year celebrations usually occurring in February. Under the new Management Plan declared holdings must be exported within three weeks of season closure and no holdings will be allowed over the closed season.

As noted previously, size limits were enforced at the point of export under the old Plan and are similarly included in the new Management Plan. Unfortunately buyers seem to have been inconsistent in their refusal to buy undersized BDM, meaning that large volumes of undersized animals were still harvested.

<sup>17</sup> According to participants in the 2015 Inception Workshop, NFA is concerned about the large MCS costs associated with BDM and would like to institute cost recovery if feasible.

The new Management Plan does not clearly address this problem. NFA plans for education and communication (Section 3.1.3), which are not specified in the new Management Plan, could help address it through improved awareness and compliance at the village level. Village and exporter interviewees for this study said villagers are not easily able to tell whether an animal is the prescribed size. However, co-author Jeff Kinch, who has conducted extensive fieldwork with fishers, believes they knew the size limits but chose to ignore them. The challenge here then is not simply to disseminate information about the size limits, but to convince villagers that catching undersized animals is a bad idea. Recent research shows that community-level awareness of size limits for sea cucumbers is low in four other Pacific Islands countries (Purcell, 2014b). The problem could also be addressed through stronger PFO and village-level management, which is set out in the new Management Plan, but it is not clear how this will be resourced or made to happen now when it did not in the past. Nevertheless, it seems not very difficult and potentially useful to broadly publicize Schedule 4 of the new Management Plan, which has wet and dry lengths for each species, and facilitate ways to measure animals while out fishing. One study recommends a maximum size limit as well as a minimum one, in order to protect the most fecund breeding animals (Purcell, 2014b).

For optimum advantages in regulating exports to manage the fishery, previous studies highlight the importance of also being able to use international trade data (Carleton et al., 2013b, Conand et al., 2014, To and Shea, 2012). As noted earlier, NFA and PFOs worked with Customs at the national and provincial levels to administer the export process. Fieldwork revealed, however, there is room to improve interdepartmental collaboration for monitoring and enforcement of BDM exports. Interviewees at the provincial level said that although Fisheries and Customs officers did the inspections together, they did not actively collaborate or discuss the overlap in their areas of work for the purpose of improvement, with interdepartmental meetings, for instance. They both 'fulfilled our own agency's policies under our own Acts'. Interviewees at the national level said there was more active interdepartmental coordination, but even here there was some evidence that further coordination could be useful. For example, data provided by the Trade and Revenue Administration in Port Moresby showed BDM exported under Chapter 16, defined as a 'smoked' seafood product (code 16056100). However, according to the codes applied in Hong Kong for imports, and trade studies internationally tracing the BDM trade via customs codes, BDM as it was produced in PNG is a 'dried' product, and therefore the relevant codes are in Chapter 3 (code 03081990) (Conand et al., 2014). Provincial Customs officials interviewed said they always recorded BDM under Chapter 3 as a dried product. This apparent inconsistency in categorizing BDM as a product for export reveals some of the weaknesses in trade data as a source of information about volumes of sea cucumber being fished.

As noted in Section 2.1, there is ongoing research into breeding high value sea cucumber species at the NFA Nago Island Mariculture and Research Facility in Kavieng, New Ireland Province. Exporter, importer and fishing community interviewees for this study all expressed interest in aquaculture to improve

supplies. With the new Management Plan formal commercial activities along these lines will require licenses.

### *Strengthening Devolution*

Devolution is an important political principle in PNG that is promoted by the Organic Law PGLLG (Appendix D) and underpinned by pervasive norms. According to Government Official B,

*Devolution is necessary, it [BDM] is an inshore resource so the resource owners should have the responsibility for it.*

And fishers from Pere village in Manus put it this way:

*The government must release the power to the people to manage their resources.*

The old Plan did not have the principle of devolution deeply ingrained; the fishery was to be managed by NFA. It included stakeholder representation in the NMAC and allowed for PMACs, but very much in a consultative role, with no decision-making powers. Notwithstanding the lack of specified roles for provincial governments or LLGs in the new Management Plan, under the Organic Law PGLLG lower levels of government did have the power to create their own management arrangements in relation to fishing and fisheries, as long as these did not conflict with the national management arrangements. A provincial government could have delegated functions related to fishing and fisheries to LLGs. As well, the National Government had broad capacity to delegate its powers and functions to a provincial government or LLG (Appendix D Part B 2.3.3).

The new Management Plan explicitly delegates authority to provincial governments and LLGs to make their own fisheries management arrangements under the umbrella of the national Plan and Act. The new Management Plan says the fishery is to be 'jointly managed' by NFA, provincial governments, LLGs and resource owners. Insofar as the Act and the National Plan remain paramount the devolution is quite limited, however. The NFA and its Board remain very much the senior partners in all of the management arrangements.

In clause 5, maritime provincial governments and maritime LLGs are held responsible for implementing the new Management Plan at their levels through methods including: a) lower TACs than that set by the NMAC for the province; b) higher minimum size limits than those in the National Plan; c) longer closed seasons; d) advising NFA on licenses, and; e) supporting resource owners in their management actions. Clause 5 specifies resource owners as being also being responsible for implementing the new Management Plan at the village level, and developing their own management strategies with the support of the province or LLGs, or civil society actors (Appendix D Part C 1.2.1).

The NMAC membership composition is mandated in the new Management Plan, similarly to under the old Plan, with representation from NFA (one of whom will Chair the NMAC), relevant science, traders, a conservation organization, and Chairs from PMACs (who are specified to be Provincial Fisheries Advisers or their delegate). The PMAC membership is also specified, with representation from LLGs, resource owners, exporters, women's groups and conservation groups.

Local level government Management Advisory Committee (LLGMAC) composition includes LLG members, representatives from women's and youth groups, and a staff member from the Provincial Fisheries Office.

A significant change in the new Management Plan is that the NMAC now has some important decision-making powers. There is a long list of review and advice roles specified for the NMAC, and additionally the NMAC is charged with setting:

- > the TAC each year for the provinces, based on advice from NFA (previously the NMAC advised NFA on setting the TACs)
- > the numbers of licenses for exporters per province. Given that the NMAC has representation from the provinces, this decision-making role adds a qualitatively new aspect to devolution under the new Plan.

The PMACs and LLGMACs have been given some decision-making power, in terms of reviewing and endorsing license applications (Appendix D Part C 1.2.4). However, licenses are finally approved by the NFA Board, as are all fisheries licenses under the Fisheries Management Act. Exporter F described the PMAC as being 'on paper only', to make the provinces feel they are involved, while all the important decision-making power about when the fishing is closed and giving out licenses sits with the national government. The EDO NSW review for this project by of the new Management Plan, Fisheries Management Act and other relevant legislation shows that without further steps being taken in support of implementing the devolutionary measures, the National Government will still hold most of the authority for fisheries in terms of management planning and implementation (Appendix D Part A 1).

Provincial governments and LLGs have been given 'the option' in clause 5 of establishing a PMAC and LLGMAC respectively 'if they feel that this will enhance the legal and management framework at those levels for the sea cucumber fishery'. This implies that if a provincial government or LLG does not see that a PMAC or LLGMAC will be helpful for managing BDM in their locality they need not have one, but then they will have no representation on the NMAC and management of their province will sit with the NFA.

The Background Section of the new Management Plan states that decentralizing management to the provinces, LLGs and communities will improve management of the fishery. NFA staff interviewed said it was hoped that devolution would enable enforcement capacity to 'widen up across sectors'. However, given that this was all possible under the previous Plan, it is not clear in the new Management Plan whether provincial governments and LLGs will have the capacity or prioritize BDM management highly enough among their many other concerns to make devolved BDM resource management a reality.

### **PROVINCIAL GOVERNMENT ISSUES**

Provincial governments in PNG are generally resourced poorly. Although PFOs have had support from the much better resourced NFA through the delegations of responsibility under MoAs, there have been ongoing capacity issues at the PFO level. Since the 1990s fisheries MCS has become increasingly complex and demanding. Various MCS powers and functions are designated to PFOs, which

maintain mandated enforcement officers. The delivery of MCS services also requires liaison, cooperation and collaboration with other government agencies, including the PNG Defence Force, Police, Customs and the State Solicitors Office. At the provincial level, the roles and functions of designated Fisheries Enforcement or Compliance Officers who are expected to perform a range of functions are not always clear (Kinch and Carnie, 2011). While PFOs usually have Job Descriptions, it is unlikely these are used systematically to clarify their roles and responsibilities, for example, through performance evaluations (Govan, 2015). In addition to resource support provided by NFA, many PFOs have had extensive training over the years in an effort to boost their effectiveness. In most cases, however, services have not improved greatly as a result. Improving the capacity of PFOs may require more than just specific resources and training for fisheries management, but may also require a generalized bureaucratic reform process, to improve the drive for effective service delivery among public servants.

PFOs were already administering the fisheries management process at the provincial level under the old Plan, and in many senses the new Management Plan implies a continuation of the same kind of work; collating purchasing data, participating in the export process, as well as the enforcement aspects of MCS in investigating suspected cases of wrongdoing. Interviewees, however, raised questions about how effectively PFOs were able to carry out these activities. In particular, they noted an extremely low rate of success in having cases prosecuted, saying that PFO staff were often not skilled enough in the proper processes for collecting evidence to enable cases to proceed through the courts, or were not well enough versed in the relevant law to make good decisions about which cases to pursue. Corruption is another possibility.

The EDO NSW analysis of the legislative and policy environment for BDM management in PNG notes key issues around clearer articulation and resourcing and capacity building for PFOs so as to ensure provincial governments can fulfill their responsibilities for a whole range of tasks that will need to be carried out to ensure effective implementation such as:

- > building provincial government capacity to make laws for fisheries that may be useful for carrying out their responsibilities under the new Management Plan
- > MCS, preventing unauthorized inter-provincial transfers, making sure exporters comply with regulations and processes
- > implementing the stock assessments and purchasing data collection that underpin the effectiveness of the TAC and closed season system
- > undertaking technically skilled administrative and criminal enforcement tasks such as collecting and presenting evidence
- > raising community awareness of prohibitions
- > enabling the effective use of Penalty Notices where appropriate rather than resorting to court enforcement. (Appendix D Part A Issues 4, 5, 8, 12, 13, 14, 16)

A related issue is the articulation between the national Plan, PFOs and enforcement at the village level. One PFO staff interviewee said his office had done outreach

in fishing communities about the regulated sizes for BDM per species and gear restrictions. Some of the Manus villagers interviewed said 'NFA' (possibly PFO) staff had visited their village for outreach work along these lines, while others said they had not had such visits. As noted earlier, clearly overall PFO involvement at the village level had not resulted in workable levels of compliance with the regulations.

#### LOCAL-LEVEL ISSUES

A key difference between the old fishery management plan and the new Management Plan is introducing a third layer of devolution with LLGMACs and in specifying resource owners as partners in joint management of the fishery. Moreover, Customary Rights are recognized in clause 11 of the new Management Plan (insofar as measures are consistent with the National Plan). There is also a 'resource owner' representative on the NFA Board, but in practice it is very difficult for a village-based fisher to engage meaningfully with governing bodies such as a Board, which is entirely outside their normal life experiences. Moreover, it is almost impossible for one person to adequately represent small-scale fishers who come from hundreds of different language and culture groups.

Unlike at the national and provincial levels where governments are the main relevant institutions, at the village level there are both LLGs and other tribal or landowning groups under which governance of the fishery could occur. In LLG areas there may be migrant groups who are not considered to have customary rights to coastal marine resources, and the groups who do have rights to use and make decisions about coastal resources may exist across several LLG areas. The new Management Plan accommodates this complexity through talking about resource owners and Customary Rights as well as LLGs. PMAC membership composition as specified in the new Management Plan includes the LLG Council Presidents as the resource owner representatives. At the LLGMAC level, the Ward Councillors are the resource owner representatives.

The new Management Plan envisages parallel processes going on at the village level in that groups practising customary management are encouraged to notify NFA and to incorporate their management plans into PGMAC and LLGMAC strategies. One NFA interviewee also noted that under the old Plan, customary arrangements for BDM management were accommodated where they were raised with NFA, such as different season opening or closing dates, as long as they did not contravene the national closure.

In clause 5, the BDM Management Plan has new provisions on joint management:

Resource owners will be responsible for implementing the Management Plan at their respective levels, as well as developing management strategies at their level or with the support of the LLG and Provincial governments or other civil society actors.

It can be understood that this provision relates to devolution of management to the village level and gives support to the concept of Community-based Fisheries Management (CBFM). The EDO NSW analysis of legislative arrangements for the new BDM Management Plan notes several issues that relate to devolution of management to the village level. For example, there are no small-scale fisher representatives on the NMAC, raising questions of how small-scale fisher voices may be heard in this important decision-making body (Appendix D Part A 3.1 Issue 1). Furthermore, it is not clear how LLGs will coordinate with provincial governments in managing the fishery at the village level, in terms of respective roles and responsibilities (Appendix D Part A 3.4 Issue 6).

As noted earlier, under the old Plan prohibitions that could not be addressed at the point of export but must be managed at the village level were largely unenforced. These included harvesting undersize animals, use of underwater breathing apparatus, use of lights and night fishing, and fishing after the season has been closed. These practices remain prohibited in the new Management Plan, which implies that they will be dealt with through provincial government, LLG or other village management systems that are yet to be developed. It is not clear how the necessary capacity building and resources will be provided to PFOs and LLGs and customary owners for undertaking these management tasks. The Provincial Fisheries Grants exist as a resource, but PFOs must be proactive in using these funds, and that is where the capacity problem seems to lie. There is little drive to improve management coming from the provincial level. The EDO NSW legal analysis identified key issues around articulating village-based management systems with government systems, and clarifying the roles and functions for communities in enforcement, such as reporting offenses (Appendix D Part A 3.8 Issue 15). Exporters D and E both said they felt it was important to stop illegal fishing, which goes on at the village level, seeing it as a major contributor to the overfishing problem.

Interviewees from Pere village in Manus suggested it would really help them manage their resources themselves if they had some help from the PFO or NFA to understand size regulations better. They suggested that if some villagers were to receive training direct from government fisheries people, then they could train others in their villages in their own language. As noted regarding the old Plan, however, the problem may be more about convincing people to follow the size regulations than lack of knowledge about the limits. Villagers in Manus also noted that fishers might not follow size limits even if they know them, and use techniques to stretch animals out during drying to avoid size limits. Furthermore, they noted that fishers had continued fishing even when they could see most of the big sea cucumbers were gone and there were only little ones left, saying they needed government to close the season sooner to prevent that happening. This contradicts other normative statements by villagers and other interviewees that management responsibility should rest with the resource owners. The governance picture emerging is thus complex, with a desire for self-management on the one hand, and a lack of willingness to take responsibility for it on the other. Moreover, there are clearly great challenges for cash-poor villagers to refrain from catching sea cucumbers, in a social context in which saving for the future is not an established

practice, and where there are no other equally lucrative sources of cash. In practice, villagers were already controlling most sea cucumber fisheries in the past, but they did not use that control to prevent overfishing.

Several coastal communities around the country have established local-level marine resource conservation rules (see below and Appendix D Section B 4). Such arrangements around the Pacific, however, often struggle with enforcement (Govan et al., 2009, Govan, 2009), although there are examples from Melanesia where this type of CBRM has been highly successful (Kereseka, 2014, Hamilton et al., 2011). Some forms of customary authority are enough for food fisheries, but when resources have commercial value, and in the case of BDM the commercial value is extremely high, village-level authority systems are often not enough to enforce community-based conservation measures. There are, however, examples of communities achieving this, such as managing high value trochus by establishing LMMAs, and where short periodic harvests of high value invertebrates from within these LMMAs are providing economic benefits for communities while also enabling these LMMAs to achieve their biological goals of maintain spawning biomass of these high value resources (Hamilton et al., 2015). There is detailed discussion at Section 3.4 on Community Based Resource Management as a non-government system of governance. Here discussion is limited to how government systems may support measures based on customary rights, such as is envisaged in the new Management Plan.

For example, how may a breach of a locally managed BDM fishery rule be taken to court? There are Village Courts in PNG, but they do not deal with evidence or procedure in the ways higher-level courts do, and indeed their proceedings are largely not recorded in written form. They cannot give long prison sentences, but most commonly give community service, which can result in prison if the wrongdoer fails to comply. Most commonly Village Courts mediate disputes rather than make arbitration rulings, which may be difficult for enforcing rules about high value BDM fishing. Furthermore, Village Courts may not deal with cases relating to land ownership, which could arise in BDM cases if customary ownership of fishing grounds is disputed. In such cases the dispute would be handled by the Local Land Court, or possibly the Provincial Land Court (Appendix D Part A 3.9 Issue 18, Part B 2.4.4).

Without prison or large enough pecuniary fines available as sanctions in Village Courts, EDO NSW suggests that other kinds of sanctions may be appropriate and that consideration be given to creating additional sanction options known to be effective at the community level. This process could form part of the process of expanding the jurisdiction of Village Courts (Appendix D Part A 3.9 Issue 19).

Innovative thinking around village-level sanctions is certainly an idea worth pursuing. Despite the moratorium still being in place, one community openly harvested and dried BDM in 2013, saying the moratorium must be lifted because they need the income and they intended to sell their current illegal stockpile (Ten, 2013). For further details about possibilities and limitations of the Village Court system for BDM management at the village level see Appendix D Part B 2.4.4).

As noted by NFA interviewees, education and communication programs with village fishers will be key to improving compliance with the new Management Plan. NFA intends to develop and make available key messages about fisheries for the general public using print, electronic and visual media. Interviews with fishers showed that community awareness of BDM regulations was patchy, particularly to do with the use of torches and lamps for night fishing and size limits. Another possibility is that fishers did know the rules but ignored them because they were not enforced at the village level. Imparting information about rules is fairly easy to achieve, it will be more of a challenge to convince people to follow the regulations. At the time of writing the plan was not yet drafted.

### 3.1.3 Other Policies

In addition to the new Management Plan and policies supporting it, NFA has some other policies to try to improve management of the fishery when it reopens.

#### *Increasing the Value of the Fishery*

According to NFA staff, improving and controlling quality in BDM processing will enable producers to shift to a high value low volume fishery, thus maintaining livelihood opportunities while improving the sustainability of the fishery. This idea underpins ongoing research into improving quality in Pacific Islands BDM fisheries (Purcell, 2012). NFA staff who visited end-market countries found that high quality processed products fetched better returns, and that BDM labeled as being from PNG (which was either illegally exported or was mislabeled, see Appendix C) was mostly of a poor quality. Although some BDM that had been exported when the fishery was open was of high quality, much was not, which dragged down the reputation of PNG product. Exporter E said that Indonesia had the worst reputation for BDM quality in end markets, with PNG mixed, and Australia the best reputation. Fieldwork in Hong Kong and Guangzhou corroborated this assessment (Appendix C).

Fieldwork in PNG, however, highlighted several issues to consider along with a policy to move to a high value fishery. Several exporters pointed out that their businesses were viable because they traded a mix of high and low value product; high value markets were too small to focus only on those. Exporter G noted that with overfishing it was mainly only low value species that were available for women and children close to shore in shallow waters. Focusing only on higher value species, therefore, may have unanticipated negative social justice impacts in villages.

Nevertheless, it may be possible to focus on high quality, even for lower value species, so as to improve the reputation of PNG product overall and be able to improve prices across the product value range. In the past, fishers evinced patchy interest in improving the quality of BDM. Exporters noted that some fishers did listen to their advice about what constituted quality and applied effort to improving their product, while others were more interested in an easy sale and even actively reduced the quality of their product through wetting it or putting metal or rocks in it to make it heavier in order to improve the price.

Furthermore, if quality improvements can be made, and prices thus improved, it by no means follows that fishers will then choose to catch less. In the context of very

high reliance on the income from this fishery, it is likely that fishers will continue to try to catch as much as they can even if they are getting better prices. For the foreseeable future government regulation will be necessary to limit the fishery. Higher prices would enable regulators to cap the fishery at lower levels with less overall negative impact on livelihoods, but socioeconomic research would be needed to work out what the localized and gendered social justice implications might be.

One final point to consider for a strategy of improving value and quality in the fishery is how extension for this should occur. Interviews for this study noted that the private sector through buyer and exporter contact with fishers over the buying process had already been engaged in transferring knowledge to fishers about quality and how to achieve it. There also has been some involvement of NFA and PFO staff in extension work for some communities. Considering the already stretched nature of government capacity to carry out management responsibilities, and considering that the private sector is likely to have stronger expertise and interest in improving quality, it may be better to leave extension work to the private sector. The license criteria points system in the new Management Plan could enable government to encourage such extension, without having to devote government resources to it. Reducing malfeasance between fishers and traders may be important for such a policy, however, because it is a disincentive to provide extension work for fishers if those fishers then sell their product to a competitor company.

#### *Innovations in Resource Allocation*

NFA is aware of the resource implications of the new Management Plan, with devolved responsibilities for provincial governments and LLGs, and the lack of existing resources at those levels of government for increased fisheries management involvement. There are existing ways for NFA to fund PFOs through the Memorandums of Agreement, and through other channels such as Provincial Fisheries Grants, but no established channels for funding for LLGs for fisheries management. One idea that has been floated is to innovate with the ways the resource is allocated, such as an auction system that would enable provincial governments and LLGs to charge fees.

In 2015 some thought had been put into a Resource Auction, whereby fishers could sell their BDM to exporters in an auction. Possibly provincial governments could host the auction and charge an attendance fee, although how LLGs could raise revenue from this system is not yet clear. As yet the idea is still at the conceptual phase and there are many practicalities to work out before it could be implemented. For example, it has been noted that many fishers prefer to sell immediately rather than wait, so unless the auctions were daily fishers may not be interested enough in an auction system to make it work. Innovations like this could be considered further as a way to help generate the resources needed to manage the fishery. It may be useful for NFA to seek specialist advice for gestating such ideas.

### Export Levy

At the time of fieldwork NFA was also considering instituting an export levy. This would not only help offset the considerable costs of MCS for BDM, which hitherto has not been recouped through access fees as it has been for the other valuable PNG fishery for tuna, but could also be used to further encourage more sustainable practices within the sea cucumber fishery.

For example, whereas a levy based on percentage of the value of an export may encourage underreporting of the value of exports, a levy per piece may encourage exporters to seek larger, higher value pieces (Carleton et al., 2013b). Alternatively a flat levy per weight exported rather than percentage of value would also not contain an incentive to underreport (Kinch et al., 2007). Such incentives could align with management measures to reduce harvesting of undersized animals and efforts to gain more economic benefit for less wildcatch. It may also encourage Customs officials to weigh and measure exports more carefully, which may improve the accuracy of data about catches.

Exporters interviewed had varied reactions to the idea of an export levy. Exporter D said bluntly that it would lead to transfer pricing or to exporters passing on the cost to fishers. Exporter B said exporters might try to underreport exports to avoid the levy, although they would have to be careful in their relations with importers to make sure they would somehow receive full payment for the actual amount and value shipped. That is, if exporters undervalue their exports, they risk being paid only for the value on the invoices. A special collusion relationship would thus be needed with importers to enable transfer pricing in this way.

Exporters B and E both said they felt an export levy would be accepted by the industry if they believed it were being used to improve management and thus support the industry (implying that industry members may perceive otherwise). Exporter E agreed with the idea of a levy based on species and weight, because it would be easy to administer.

## 3.2 Property Rights and Governance

In fisheries economics it has long been held that problems of overfishing can be reduced if property rights are instituted, because fishers then come to have an incentive for stewardship of the resource (Gilmour et al., 2012). What scope is there for instituting property rights that operate this way in PNG's BDM fishery? In New Zealand individual transferable quotas based on catch history were introduced into the sea cucumber fishery as a way to limit access. The national TAC is divided into TACs for each species, which is then broken up into the quotas held by fishers. If quota holders are found to have exceeded their quota the excess catch is confiscated and a fine imposed (Kinch, 2004a).

It is hard to see how such a system could be implemented in PNG. The institutional framework for quota fisheries has been set up in New Zealand since the 1980s and government and industry have become accustomed to this way of operating (Bess, n.d.). In PNG, coastal fisheries are by contrast underpinned by the principle of customary tenure, and rights to fish would not be accepted on the basis of quota having been bought. It may be more conceivable to have quota in the right to buy

product, rather than the right to fish. So exporters could be required to buy quota and then seek fishers to supply that quota. The Resource Auction idea that has been floated in NFA could be a way of implementing quotas through exporters. The impacts of such a system would need to be carefully thought through. For example, once companies with smaller quotas fill their quotas each season the companies with large quotas have less competition and would be able to drop the prices they offer fishers (Kinch, 2004a).

Although a fisheries quota system akin to the New Zealand example appears to have little applicability in PNG, the question of whether or not customary marine tenure can provide a management framework that incentivizes resource stewardship has been widely discussed in the literature (see, for example, Almany et al., 2015). This idea is explored further below (Section 3.4). To summarize briefly: customary tenure in PNG has hitherto operated as a protocol by clans and tribes for exerting exclusive access rights to a fishery, with conservation outcomes typically being a byproduct of these practices. Nevertheless, these tenure systems can clearly provide an existing cultural management framework that limits the number of fishers who have access to a given resource in a particular area. It has been demonstrated that if CBRM initiatives develop as intended, and if their restrictions on fisheries are effectively enforced, *then* this form of property right can promote conservationist goals (Hamilton et al., 2015, Waldie et al., 2016, Hamilton et al., 2011).

## 3.3 Exporter Interests in a Sustainable Fishery

Five of the eight exporters we interviewed explicitly stated that they wanted the sea cucumber fishery to be managed better in order to make their business more viable (D, E, F, G, and H). Exporter G expressed frustration that the TAC had been exceeded so often and the fishery was in such a poor state that a moratorium was required. He sees a more sustainable industry as important for his family's business, and for that reason wants to contribute to the NMAC and PMAC processes, so as to try to make sure that the new Management Plan works better.

## 3.4 Community-based Resource Management (CBRM)

The new Management Plan and associated policies make up the government system for management of the sea cucumber fishery in PNG. The fish chain outlined earlier in this report details some of the main non-state governance influences, through markets. This section now details another important non-government system of governance, that of community-based resource management (CBRM).

Work done in the 1980s and 1990s, especially that associated with Bob Johannes, showed that while government systems in many countries in Oceania were not effectively protecting marine ecosystems, customary allocation of resources and patterns of resource use, based on local ecological knowledge, had the potential to do so (Cinner, 2005). In many places in Oceania, customary marine tenure operates and tradition-based systems of authority are often the main form of governance, because formal government services are weak or non-existent in rural village areas.

CBRM has thus come to be seen as the most appropriate basis for coastal zone conservation and resource use at the local level. It is the first Guiding Principle of the Melanesian Spearhead Group (MSG) regional Roadmap for Sustainable Inshore Fisheries 2014-2023. PNG is a leading member of the MSG and is devising a national Roadmap as part of this process. A version of CBRM called community-based ecosystem approaches to fisheries management (CEAFM) is the central principle of the regional approach to coastal fisheries management that was decided on at the 2015 SPC Heads of Fisheries meeting in Noumea (SPC, 2015).

Interviews indicate that CBRM based on customary tenure is widely accepted by the general public in PNG. One of the key principles underlying ideas in PNG about how fisheries governance 'should be done' is that coastal resources belong to the people of that place and that these people should be the ones managing those resources and benefitting from their use. This sentiment is reflected in the wording of the new Management Plan where 'resource owners' are included with the three levels of government as part of the 'joint management' of the fishery.

Notwithstanding widespread acceptance that CBRM is the appropriate model for local level governance of coastal fisheries including for BDM, CBRM is not a panacea that easily fixes the complex problems posed by coastal resource management in the Pacific. First, the resources were already effectively under the control of communities, who overfished them, so something would have to change in the governance context for CBRM of sea cucumbers to work in PNG. Second, the literature evaluating the achievements of CBRM internationally points out various sticking points that have limited the positive governance outcomes.

The WorldFish experience in Solomon Islands has found CBRM to be very resource intensive and geographically confined to small areas, so is not scaleable in its current form. WorldFish researchers are thus trying to see if CBRM can be done in a less resource-intensive way and still be effective (Bennett, 2014, Abernethy et al., 2014). In Choiseul and Isabel Provinces, Solomon Islands, some communities have implemented CBRM without NGO support, and the success of some CBRM sites that are lightly supported by NGOs has incentivized CBRM activities in many more communities throughout the provinces (Kereseka, 2014).

Without careful attention to social relations within village contexts, CBRM, as with any other kind of intervention, may exacerbate gender and other inequalities. Problems may arise if there are conflicting motivations for CBRM between villagers and supporting NGOs (such as livelihoods versus conservation). When partnership funding is involved communities may be 'captured' by the funding and fail to keep their CBRM going after the project funding ceases (Barclay and Kinch, 2013). Although the authors have also observed that when things work well in CBRM they tend to spread independently, with other villagers taking them up. Such instances highlight the need for NGOs and communities to be upfront about their objectives from the outset (Walter and Hamilton, 2014). Although there are examples where CBRM is achieving both biological and economic objectives (Hamilton et al., 2015), importantly for BDM it is far from clear that CBRM works in cases where the commercial value of commodities is very high, and where economic incentives can override conservation ethics (Cohen et al., 2015, Cohen and Steenbergen, 2015).

The establishment of LMMAs for CBRM using LLG laws has hitherto only occurred in PNG with external assistance from NGOs. Pere village in Southern Manus has one established under the LLG (Appendix D). There are Marine Environment Management Laws for Hoskins Rural LLG, Biiala Rural LLG and Talasea Rural LLG. The Louisiade LLG in Milne Bay passed an Environment Bill (Appendix D Part B 4.2.2). Functioning LMMAs in PNG include those supported by TNC in Kimbe Bay, one supported by Conservation International (CI) in Milne Bay, one supported by Wildlife Conservation Society (WCS) in New Ireland, and those supported by World Wildlife Federation (WWF) in Madang. There are also some local NGO examples of the conservation of certain species, such as the protection of leatherback turtles in Madang. Many Wildlife Management Areas, such as Kamiali in Morobe, have also been established in PNG but these have been less than effective in achieving conservation outcomes (Kinch, 2006).

Clearly intact CMT systems can provide a framework for excluding outsiders, and in this respect can act to limit open access, a common problem in fisheries that is often referred to as the tragedy of the commons. It would, however, be erroneous to assume that CMT developed for conservation purposes. Indeed, in many intact CMT systems across the Pacific customary owners have successfully kept outsiders out, only to overfish resources themselves, an internal tragedy of the commons. Interviews with villagers in southern Manus for this project and Jeff Kinch's earlier fieldwork in Milne Bay (Kinch, 2001, Kinch, 1999) revealed that while BDM fishing grounds were held under customary tenure, such that disputes arose if people were seen to be fishing in areas to which they did not have rights, this did not necessarily lead to a conservation outcome. Rather, the issue at stake was ensuring that anyone who fished in an area was either a customary owner or had followed the relevant protocols with the customary owners to allow access. It could be argued that it was a limitation on the fishery, but it was not enough of a limitation to protect from overfishing. CMT alone, therefore, is unlikely to be an effective tool, although in combination with community determination to ensure resources are used sustainably and support in this endeavour from external influences such as government, markets, NGOs and donors, it is one contributing factor for CBRM.

In PNG the practice of closing areas for fishing (*tambu*) has been practised in many regions, particularly following a death. After several months or years the fishing ground is reopened. Fishers are aware of the stock replenishing benefits of these practices, and they are no doubt a culturally appropriate way to approach the introduction of conservation measures at the village level. When there has been heavy economic pressure, however, the gains can be short lived, and if depletion goes far enough the *tambu* closure may fail to have beneficial effects. For *tambu* closures to be useful for BDM conservation, greater understanding is needed among village-based fishers of the effects of fishing and how breeding stocks may be maintained, along with strong local control over access to fishing grounds and willingness to forgo short term income for better income in the long term (Kinch, 2004a). Demonstrating that CBRM can have local benefits can also be critical for convincing local resources owners of the value of protecting spawning stocks on their traditional reefs (Almany et al., 2015; Kichawen, 2016). It has been recommended that NFA staff require training for working effectively with CBRM,

but such training has not yet been undertaken (Kinch and Carnie, 2011, Kinch et al., 2007).

For CBRM for BDM to be effective, it will require support by government systems, such as is envisaged under the new Management Plan. An example of this kind of government-supported, village-based management of marine resources occurred in Vanuatu, where villagers undertook enforcement activities because they were invested in ensuring management was successful (Johannes, 1998).

Some of the socioeconomic research specified in the new Management Plan could thus be usefully devoted to working out how CBRM can be supported by government systems. For example, there could be a review of management strategies and cases studies to see how participatory management can be used (Kinch, 2004c). As noted earlier in discussing how the new Management Plan may be implemented at the village level, working out how government systems can assist with enforcement is one key issue, another is learning from LLG marine conservation initiatives that already exist (Appendix D Part A 3.4 Issue 6; Part B 4.2.1, 4.2.2).

Finally, one more challenge to consider for using CBRM as part of the governance for BDM in PNG is how it may work in non-rural contexts, or rural contexts where custom no longer has authoritative power, for example, through migration.<sup>18</sup> Is CBRM appropriate for places such as Daru in Western Province, where there is a high level of participation by migrants in the fishery? If not, what other kinds of management can be effectively extended into small-scale fisheries there?

The rest of this section considers the possibilities of CBRM for BDM in PNG through two case studies. One is the Mwanus Endras tribal network in southern Manus that TNC has been working with on BDM and other coastal fisheries for some years. This group has established some CBRM, and is planning to apply it to BDM when the fishery reopens. The group also has a long history of engaging with outside researchers and using scientific knowledge systems to further community aims. The other case is of Brooker Island in the Louisiade Archipelago in Milne Bay, where co-researcher Jeff Kinch undertook extensive fieldwork while the fishery was open. On Brooker there was some customary marine tenure involved with the fishery but no CBRM, and no similar approach to engagement with outsiders that could easily lead to the development of CBRM. In this case a lot more groundwork would be needed for CBRM to operate in the way envisaged in the new Management Plan.

### 3.4.1 Case Study Mwanus Endras Tribal Network

The Titans are a seafaring people from the southern islands off the main Island of Manus. They originally came from an area called the Circular Reef (or Custer Reef), which apparently until around 500 years ago was inhabitable, but environmental change sank the islands and the Titans moved to the Manus mainland.

<sup>18</sup> The ACIAR- and DFAT-funded PacFish project is exploring this question in Kiribati and Radefasu in Solomon Islands.

But land was more of a base for them, they lived and moved around on large outrigger canoes most of the time. They did not have rights to much land so they caught fish and bartered with land dwellers (formerly head hunters) for vegetables and other land-grown goods. Their first village on the Manus coast was Pere village, which has been relocated twice, but they have gradually spread out to several villages on the coast and islands. The regional division of labour has remained intact, with Titans being fishing people trading seafood for land food with land-dwelling people, although these days through the medium of cash and markets rather than barter.

FIGURE 19. Maritime Area Claimed by Mwanus Endras Tribal Network



Source: [Almany et al., 2015].

The Titan tribes thus have a shared history, ethnic identity, way of living and set of seafaring livelihood skills, and the Titan language. But they had also formed clans and subgroups over time and so there were divisions within the Titans. From 1946 the Titans were brought together again under the aegis of the Paliau movement, or *Win Nesen* movement (Wind Nation, relating to the breath and spirit ideals). The charismatic leader of a Christian cult, Paliau, established his base in Mbunai (Otto, 1992, Schwartz, 1962). The movement was not exclusively Titan. Paliau was not Titan himself, and the movement included also people from outside the Titan tribe. So Mbunai village, which at the time of fieldwork had a population of around 1000 people, had around 200 to 300 Titan people and the rest were inland people who had originally moved to the coast to join the Paliau movement. The movement dominated religious life for the Titan and in neighboring coastal villages for some decades, but from the 1980s other churches established or re-established their presence, including the Catholic Church, Manus Evangelical Church, and the Seventh Day Adventist Church. *Win Nesen*, however, gives a fairly recent blueprint for how the Titan tribe, separated across multiple villages, could come together as one. It was cited by interviewees as a common faith that helped bind the Titan people together, although not all Titan people still follow that faith.

Tribal authority has declined among the Titan people as it has in many places in PNG in recent decades (Dalsgaard and Otto, 2011). According to interviewees, some of the results of this were increased lawlessness and social disruption by young people. For example, there was less 'community cohesion' and increased crime, alcohol abuse and playing of loud music at night (which in a village environment can be very disruptive). In 2011, Dr Pongie Kichawen, who had been living in Port Moresby for some decades working as an academic at the University of Papua New Guinea (UPNG) and then as a public servant, came back to live in his village Timoenai, and campaigned for the 2012 election. He was not elected to office, but continued political involvement in other ways through facilitating his local Tawi Asi Council of Chiefs, to reestablish chiefly authority and work together for community development.

A decade prior to this movement to reestablish chiefly authority systems, some of the Titan groups had been working with the conservation NGO The Nature Conservancy (TNC) to research and manage the marine resources they rely on (Hamilton et al., 2004; Hamilton and Matawai, 2006; Hamilton et al., 2012).

The people of Manus and the Titan people in particular have a long history of engagement with researchers and with modern knowledge systems. Social scientist Josh Cinner has worked extensively on Manus. Titan people have worked with anthropologists including Margaret Mead, Ton Otto, Anders Rasmussen and Steffen Dalsgaard. Manus people have also sought educational qualifications then worked outside the Province for much of their adult lives, remitting money back to family as a way of sustaining the economy and cultural life there. This practice of outward labour migration and remittances is found throughout the Pacific, but it has been a more prevalent practice in Manus than other parts of PNG (Rasmussen, 2015). Manus people, more so than many other peoples in PNG, see modern systems of knowledge as potentially useful for them, and they have actively sought partnerships with external researchers and others as part of their strategies to sustain their culture and livelihoods.

TNC work involved five Titan communities on the south coast of Manus Island to determine the larval dispersal from a spawning aggregation of squaretail coral grouper (Almany et al., 2013). Initially local fishers and scientists collected genetic samples from adult squaretail coral grouper at a spawning aggregation site within the Locha communities marine tenure estate that has been under CBRM since 2004 (Hamilton et al., 2004). Following this, genetic samples were collected from juvenile squaretail coral grouper across five Titan communities' marine estates along the south coast of Manus. These samples were then analyzed using genetic fingerprinting parentage techniques, in order to establish whether and how communities benefit from small managed areas for marine resources. This larval dispersal research (Almany et al., 2013) revealed that a significant proportion of juveniles found in a Locha CMT area that is open to fishing, were produced from parents that spawned at Lochas protected spawning aggregation site, meaning the community was getting benefits from the protected area. Because some larvae dispersed over greater distances and into other communities' tenure estates, the work also suggested that communities would benefit from managing their coral grouper fisheries as one stock because they would each get individual benefits, plus communal benefits from a network of reserves.

Members of the communities who participated in this research saw the benefits of collaborating, but at that time in 2011 there were no institutional frameworks in place to support collective management among the Titan tribe (Almany et al., 2015). The tribe, made up of around 10,000 people spread across a third of Manus Province was divided into eight Council of Chief areas. Within the tribe, groups had made independent decisions about the fisheries within the areas they claimed under customary marine tenure. Interviewees in Timoenai talked of disputes, sometimes leading to physical violence, when members of one group encroached into fishing grounds owned by another group.

TNC Manus employee Manuwai Matawai, from Pere village, and Pongie Kichawen both strongly believed collective management of the marine areas of the eight groups would give the best outcomes for all of the groups. They were inspired by a case of a tribal governance network TNC works with in Choiseul in Solomon Islands to try something similar (Almany et al., 2015). Pongie and Manuwai travelled around the communities of southern Manus to discuss the idea of establishing a tribal network to make collective decisions about resource management and other issues that would benefit network members. Those communities in support of the idea, which consisted of eight Titan tribal areas, including the five areas that participated in the coral grouper study, sent 70 leaders to a gathering in June 2013 to officially establish the Mwanus Endras Asi Resource Development Network (MEnAR). Since then, with funding from the David and Lucile Packard Foundation, the group has met twice a year.

With support from TNC, in 2015 and 2016 MEnAR held stakeholder-driven participatory planning workshops for the entire 50,000-hectare sea estate. These workshops combined the best available local and scientific knowledge and allowed hundreds of stakeholders the opportunity to identify over 70 targets for management. Locally identified features were digitized into printable maps by TNC GIS (geographic information system) staff before being shared with local stakeholders in subsequent meetings. As a result of this participatory planning process and the strengthening of tribal governance structures, MEnAR is now implementing a detailed fisheries management plan based both on Indigenous knowledge and Western science for its 50,000-hectare managed area. Network-wide measures include a ban on night spear fishing; a ban on fishing all grouper spawning aggregations during the lunar phases that they are known to aggregate; and a commitment to not harvest trochus or sea cucumbers below NFA established size limits. Within the wider network, each Council of Chief area is also working to implement site-based managed areas on their customary fishing grounds, including the protection of cultural heritage sites. In 2016 four new LMMAs were established at the community level in Tawi, Hal Island, Locha, and Bundro to conserve spawning biomass of sea cucumbers and reef fish, to serve as insurance against overfishing.

MEnAR's six monthly meetings since 2013 have enabled rapid progress. Since its inception MEnAR has crafted and signed an official charter, developed and agreed on a strategic plan, and established a formal relationship with NFA to coordinate fisheries management activities, which resulted in a pledge from NFA to provide

a nearshore fish aggregating device (FAD) (Almany et al., 2015).<sup>19</sup> An office for MEnAR was located in the Margaret Mead Resource Centre in Pere village.

**FIGURE 20. Women's Meeting for April 2016 MEnAR Meeting outside the Margaret Mead Resource Centre, Pere Village**  
(photo credit: Kate Barclay)



The eight Council of Chief areas making up the tribal network are spread across five LLGs. One of these, Nali Sopot Penabu Rural LLG, of which Pere village is part, established an *Environment and Conservation Law 2007* under the Organic Law PGLLG, which has legal status as long as it does not contravene any provincial or national laws. Pere village then established underneath that a *Pere Environment and Conservation Area Management Plan* (see Appendix D Part B 4). The Plan includes the measures to be implemented throughout the MEnAR area:

- > LMMA (including no take zones)
- > season closures for trochus and BDM
- > protection of seasonal spawning aggregations
- > protection of sacred sites.

<sup>19</sup> It should be noted that a previous FAD experience at Mbuke Island supported by WWF resulted in social disruption. With customary tenure operating as it does in village contexts, FADs may be appropriated by powerful landowning groups, and others excluded from using them. See: KINCH, J. 2005. *The Socio-Economics of a European Union Rural Coastal Fisheries Development Program Fisher Group: Karkar Island, Madang Province, Port Moresby, Papua New Guinea: Motupore Island Research Centre, University of Papua New Guinea (UPNG).*

**FIGURE 21. Pere Village LMMA Sign** (photo credit: Kate Barclay)



Pere, where Manuwai Matawai is from, is the only Titan village to have a formal plan, as the other villages do not have the legal framework in place. Pere village has a population of around 1000 people, mainly Titan. There are five LLGs where Titan people live. In some of those Titan people are a minority, for example, Mbunai village has around 1000 people, but only 200–300 are Titan, the rest have moved to that part of the coast from inland. If formal conservation plans are to be created throughout the MEnAR area it would mean establishing four more LLG laws, including in LLGs where Titan people are in the minority, and having five separate plans for their intended single area. The new BDM Management Plan does not directly mention community conservation plans in relation to Fishery Management Plans. However, it does mention customary management measures that would include the Pere plan. Clause 11 states:

**Those seeking to assert customary management measures that are consistent with the BDM Management Plan will be encouraged to notify the NFA and Provincial Fisheries Administrations so that the measures can be incorporated into PMAC and LLGMAC management strategies.**

If the rest of the MEnAR spatial management plan, however, remains informal, how can they rely on government support for enforcing it? Indeed, even with the Pere plan, where the legal framework is in place, it is still unclear how government systems can help with enforcement. Villagers interviewed during fieldwork were confident that the tribal network will encourage Titan people to comply. Indeed, MEnAR leader Pongie Kichawen feels the MEnAR system is more positive in encouraging compliance than the 'negative, dispute-oriented' court system. Nevertheless, disputes among Titan people may arise, and questions remain about

how to protect their resources from 'poaching' by outsiders. Section 3.1.2 of this report and Appendix D (Part A 3.9 Issues 17-19; Part B 2.4.3-2.4.5) detail potential issues with using the Village Court, District Court system, and Local Land Court systems for breaches of community-based management plans. Furthermore, it is not yet clear how community-based efforts can dovetail with the government system for monitoring and reporting breaches at the village level for enforcement activities.

**FIGURE 22. Welcome Ceremony for April 2016 MEnAR Meeting, Pere Village**  
(photo credit: Kate Barclay)



The community development efforts of MEnAR are to be pursued through a Business Arm of the organization. At the time of fieldwork the Business Arm had not been registered. Pongie Kichawen, through his engagement with this project at the Inception Workshop and in facilitating fieldwork in Manus, expressed MEnAR's hopes that the project would provide information to help plan the Business Arm structure and activities. In gathering data and writing this report, therefore,

information and recommendations to inform the Business Arm have been collated in the form of a literature review of the use of co-operatives for commodity trading in PNG provided to MEnAR. In addition, some of the analysis in the report proper may be useful; see Section 2.2.6 on lessons learned for succeeding in BDM exporting, and below in this Section for lessons learned from a previous effort by Titan people to engage in BDM trading for community development purposes – a small company called Niniendras.

MEnAR's hopes for the Business Arm include trading not just in BDM from their waters but also in other marine commodities of commercial value from their waters. They see the co-operative model as suitable for a community development business using communally-owned resources. Interviewees from Pere village said the aim of the Business Arm would be to improve the incomes to fishers from their fisheries products, including BDM. They believed they could cut costs by aggregating product, thus making transport cheaper. This would require running a collector vessel. One of their islands has deep-water access so they hoped they might export product direct.<sup>20</sup> They also said it would be good if the labor of catching and drying product could be added to the price for the final product. One man said he would prefer just to catch sea cucumbers and hand them over to MEnAR to do the processing, while others said they wanted MEnAR only to do storage and exporting and they would prefer to keep doing the processing themselves.

One point worth mentioning about these aspirations in light of the findings of this project is to question the assumption that fishers were not doing well under the previous system of trading to companies based in Lorengau. As discussed earlier, there is a predisposition in PNG and other Pacific Islands countries, due to the history of colonialism and other factors, to assume that village-based commodity producers are being 'ripped off' by mostly foreign business people. However, looking at the prices given to the various nodes in the value chain in the later years of the industry from around 2004 when there was high competition among exporters, fishers were actually receiving on average 70 percent of the export price (Section 2.4). Prices fishers received were thus very good, and it may not be realistic to expect that through exporting themselves that the MEnAR fishers will do better than that. Exporting requires high levels of experience and skill in management and logistics, as well as relationships with buyers and large amounts of capital.

According to Pongie Kichawen, the next step for MEnAR is to register their Business Arm and seek funding from donors or development funding agencies to set the business up. He said it would be good to employ an accountant for a period such as three years, and/or a business manager, possibly a volunteer. Once the business starts to bring money in, it will need to cover other salaries too, such as Pongie's role as Secretary of MEnAR, for doing the substantial work of coordination among the eight Councils of Chiefs and establishing the organization formally.

MEnAR are concerned about measures in the new BDM Management Plan that may make it more difficult for them to establish a business trading BDM.

<sup>20</sup> It would be administratively difficult to establish an international port on an island, not least because of the Fisheries and Customs processes needed for clearing exports.

Specifically the PGK50,000 compliance bond is an obstacle they will find difficult to overcome. On the other hand, the new points-based license criteria give preference to community-owned businesses. It could be said, moreover, that if a business is not able to raise PGK50,000 for a compliance bond, then possibly that business will have difficulties raising the large amounts of capital required for BDM trading. All exporters said that PGK300,000 was the minimum cash requirement to start buying enough product to make a container shipment. The new license criteria also gives points for a business plan, and it seems that a business plan should be the first priority in establishing the Business Arm for MEnAR.

### *Niniendras*

There is a precedent for the kind of business envisaged for the Business Arm of MEnAR. In the years preceding the moratorium in 2009, communities on Mbuke Island, part of the Titan group, had a business with a transport ship and a subsidiary company trading BDM via Port Moresby called Niniendras. Both businesses closed down due to not making enough money. Anthropologist Anders Rasmussen was conducting fieldwork on Mbuke for some years in the mid- to late-2000s and has summarized the main reasons for the failure of Niniendras, based on his extensive interviews with Mbuke people (Rasmussen, 2015) (pp. 146-154):

- > Niniendras had many more employees than businesses of a similar size in Lorengau. Leaders from each of the eight clans were employed as ‘executives’ with remuneration set according to public service salary scales. Titan people living in Port Moresby who facilitated the sale of Niniendras BDM direct for export or to exporters based in Port Moresby were also paid executive salaries.
- > The manager responsible for buying, transporting and selling BDM did not appear to have a business background. As a village man he was open to clan-based obligations, meaning he succumbed to pressure from his clan leaders to let them use company money for non-company purposes.
- > The Niniendras BDM buyers were under social obligations to grade BDM from fishers related to them higher than for other fishers.
- > Niniendras buyers graded higher than exporters or importers were then grading the same product, leading to losses.
- > Some young men fishers preferred to sell to exporters based in Lorengau because their prices were higher than the prices offered by Niniendras, leading to reduced product volumes for Niniendras, and intra-group disputes.

Manus-based Exporter B said the Niniendras managers failed to get to know the business well and properly build relationships with importers. For example, they did not ensure the product was good enough quality. They sent product that was not sufficiently dried, so it was wet and smelly by the time it reached Hong Kong, so it needed to be boiled and dried again, so they got a lower price than anticipated.

Exporters interviewed were pessimistic of the potential of the co-operative model for BDM. According to G, people involved in co-ops have been “more interested in the perks of being directors than actually developing fisheries”. By contrast, Government Official A was very positive about the co-operative model, as a way

for people to organize business to benefit themselves. In his assessment, co-ops in PNG have succeeded well on the whole, although most eventually failed due to “management problems”. Reviews of co-ops in PNG and internationally conclude that the strong point of co-ops is their legitimacy for communally held resources and ability to consolidate product and coordinate market activities on behalf of smallholders. The difficulty lies in achieving a balance between financial viability and successfully meeting co-op members’ social goals (Maghsoudi et al., 2012). There are PNG examples, such as the Alekano Savings and Loan Society, where this balance seems to have been achieved, at least for a period (Brown and Wong, 2012).

Based on this analysis, a key question for working out the MEnAR business plan is what the objectives of the company should be, and how ‘community development’ will be understood in terms of those objectives. Should the company aim to fund projects of community benefit such as schools and health clinics? Will community development have been achieved if fishers are given better prices? Will it have been achieved if clan leaders are given salaries from the company? Possibly some mixture of all of these is appropriate, but then the question is whether enough profit can be raised to cover them all adequately. Similar issues arose with the commodity co-operatives established in PNG from the 1960s to the 1980s (Mugambwa, 2005).

Another important question to ask is whether MEnAR will be able to control the fishing activities of young men as hoped. Older men, who are the backbone of the MEnAR initiative, were not able to make younger men fall in with the Niniendras plans in the past.

The question raised earlier about whether CBRM can be self-sustaining or needs ongoing input from external NGOs is relevant for MEnAR. Certainly, if the Business Arm can succeed then it may fund some parts of the CBRM in future, but that is not a short-term proposition. Furthermore, it unlikely it could ever fund stock assessments or MCS, which can only be efficiently managed at the national scale. The twice-yearly meetings that bring all eight Councils of Chiefs together seem key to the progress achieved thus far, but these are externally funded and expensive. Could MEnAR sustain these meetings without external support? Could they sustain the momentum and coherent sense of purpose without meetings? One possibility may be to use teleconferencing by mobile phone or internet-enabled mobile tablets for discussions between meetings, and have the physical meetings less often, although lack of phone reception and internet would remain a problem for some communities for the foreseeable future. There are resource questions about who would supply and maintain the tablets, whether all the relevant communities have good enough mobile internet coverage, paying the data bills, and so on. Teleconference meetings are also not as engaging as face-to-face meetings, even for people who frequently use them, so that will be another challenge.

One final question about the sustainability of MEnAR, relevant for all organizations, is about leadership. To date MEnAR has benefited from the charismatic leadership of Manuwai Matawai and Pongie Kichawen. Pongie is planning to pursue other interests in 2017, and is currently working with Executive Officer Piwen Langarap. It may be prudent to consider developing a wider leadership base, including

possibly through mentorship and/or internships with Manuwai, Pongie, Piwen and other community leaders.

### 3.4.2 Case Study Brooker Island

The case study for Brooker is much less detailed than the MEnAR case study for the related reasons that this project did not include fieldwork there and the MEnAR group are already proactively developing CBRM and engaging with NFA, donor organizations and researchers to prepare for the reopening of the fishery. Nevertheless, the Brooker case study is instructive as a comparison to help highlight the particular nature of the MEnAR case. According to Jeff Kinch, who has been researching coastal fisheries in Melanesia for close on 20 years, the findings here for Brooker hold for most of the BDM fishing communities in Milne Bay because their lives and their approach to using their marine resources are largely similar. Coastal fishing communities around PNG thus vary greatly in their preparedness to undertake the village-level resource management activities envisaged in the new BDM Fishery Management Plan.

Before demand and prices for BDM took off in the late 1980s, customary marine tenure was not actively asserted on Brooker or the surrounding islands. Most fisheries were more or less open access to the people who lived there. The islands' remoteness meant there were few incursions by outsiders who would have been seen as illegitimate. Once the BDM 'gold rush' started, however, groups started asserting customary tenure over fishing grounds. There was a BDM 'war' between fishers from Brooker and a neighboring island in the late 1990s through to when land mediators in 2002 decided on boundaries and ownership.

**FIGURE 23. Work Boats from Brooker and Other Islands in Alotau**

(photo credit: Kate Barclay)



This manifestation of customary marine tenure for BDM on Brooker, as with many other areas around the country, had no contributions towards conservation. It operated as a way to facilitate access, and to attempt to prevent access if it was seen as contravening ownership rights and access protocols. If such unsanctioned fishing continued it then gave rise to disputes, including physical violence. Customary marine tenure was not used to prevent access for conservation purposes, nor was that seen as one of the reasons a landowner group might assert their tenure rights. Moreover, there was no tambu fishing ground closure system in use for conservation purposes around Brooker.

One striking point about the group interview with fishers conducted at Sanderson Bay in Alotau was that they were not able to respond immediately to Kate Barclay's question about what kinds of things they thought would improve the sustainability of the fishery. Co-Researcher Jeff Kinch who facilitated and interpreted for the interview said that Brooker people are not used to thinking about fishing in terms of sustainability – they were not often exposed to that kind of conceptual framework. This was in stark contrast to the Titan fishers in Manus, who immediately understood what Barclay was asking and gave her detailed answers that reflected familiarity with the conceptual approach behind the question. This is probably due to the forementioned extensive engagement Titan peoples have had with external researchers and NGOs and thus the conceptual framework of sustainability. During his research at Brooker Island Jeff Kinch ran workshops on marine resources and their management, and NGO Conservation International (CI) has engaged with communities around Milne Bay on conservation awareness. However, the day-to-day necessity of making a living tends to overtake notions of long-term resource management.

It would be potentially useful to investigate the possibility of a more LLG-based management system for places such as Brooker, where there are no existing community-based initiatives to manage marine resources, and no existing institutions that look likely to promote CBRM. An action research project could investigate the potential for LLGs to devise and implement local-level monitoring and enforcement activities in conjunction with the PFO and NFA as envisaged in the new Management Plan.

In sum, the key point to take from the comparison of Brooker with the Titan case is that one size will not fit all, and in a country as culturally diverse as PNG it should be no surprise that the Titan and Brooker case studies represent such contrasting examples. Policies to further develop the new Management Plan scaffold for village-level governance of sea cucumber fisheries must allow for variation across communities and not adopt a one-size-fits all approach. NFA and PFO staff are no doubt well aware of this fact, so the challenge lies in working out how to tailor the broad policy to individual community situations.

### 3.5 Regional Intergovernmental Approaches

Regional approaches to improve the management of sea cucumber fisheries across the Pacific have been suggested, but as yet none have been implemented. So far the main ongoing regional activity for BDM is the Secretariat of the Pacific Community (SPC) *Bêche-de-Mer Information Bulletin* available on the SPC website (<http://www.spc.int/>). Several interviewees mentioned the idea, promoted by IUCN, that since the regional organization the Parties to the Nauru Agreement (PNA) has been so successful in regional initiatives for the management and development of tuna resources, that something like the PNA could be developed for BDM. The researchers, however, were unable to find any documented plans for pursuing a PNA model for BDM. NFA has instead been concentrating on a Melo3 group under the Melanesian Spearhead Group (MSG) umbrella. There are two points to note regarding the idea of a PNA for BDM: a) tuna is different to BDM in that access fees for tuna constitute a significant stream of revenue to coastal countries, whereas

BDM management involves a net cost; b) the PNA have been collaborating on tuna issues for over 30 years now, and success in the last decade builds on that long-term relationship.

In 2012 the MSG Leaders' Summit noted the achievements of the MSG in offshore tuna fisheries management, and recognized with concern that little had been done for the sustainability of nearshore and inshore fisheries.<sup>21</sup> Leaders agreed to generate a Roadmap for the protection of inshore fisheries, which they then developed over the next couple of years. At the time of writing this report, NFA was finalizing its national Roadmap for Coastal Fisheries and Inland Aquaculture. Strategies under the draft Roadmap include measures already committed to in the new BDM Management Plan, such as stock assessments, as well as measures extending the new Management Plan in the areas of socio-economic surveys and biological sampling activities on exports. There is also the MSG Memorandum of Understanding (MoU) for Coastal Fisheries (MSG, 2014), which has as its aim

**[T]o develop harmonized systems for the sea cucumber fisheries in the area of policy, development and management measures that address marketing issues and fishery development strategies which are suited for the MSG governments and communities.**

Another broader regional effort to increase the protection of coastal fisheries including for sea cucumbers is the 'New Song' regional approach 'Pathways to Change' outcome from the a workshop preceding the 2015 9th Heads of Fisheries meeting in New Caledonia (SPC, 2015). In endorsing this document all 26 member countries and territories committed to increasing the profile of coastal fisheries from a marginal issue to recognizing their central role in food security, nutrition and community development for coastal and island peoples around the region.

Concrete measures are yet to emerge for BDM from this regional initiative; however, one possible measure raised at the 2015 SPC workshop that developed the New Song document was to pursue an idea raised in a recent report on effective management of sea cucumber fisheries in Melanesia and Tonga (Carleton et al., 2013b). In this report recommendations were made for several initiatives to be regionally coordinated:

- > Investigations into the BDM trade and markets internationally should be undertaken and shared, to help inform trade policy as well as fisheries policy.
- > Information that is not commercially sensitive about companies trading in BDM in the region should be shared, including information on the individuals and companies involved in:
  - ownership of companies as nominated on license documentation
  - management and quality control
  - financing and investment.

<sup>21</sup> MSG countries include PNG, Solomon Islands, Vanuatu, Fiji and the Kanak Socialist National Liberation Front (FLNKS, a group of pro-independence parties from the French territory of New Caledonia).

### 3.6 Hong Kong and Chinese Government Measures

The point of importation of internationally traded seafood is a potential area for fisheries management measures. In 2005 and 2009/10 the Japanese government used trade sanctions to prevent the importation of tuna that was not clearly legally caught as per arrangements under the International Commission for the Conservation of Atlantic Tunas (ICCAT). In 2010 the European Union implemented tough measures with which imports of seafood must comply under a regulation to prevent, deter and eliminate illegal, unreported and unregulated (IUU) fishing. Shipments not complying with the regulation may not be imported. In 2014, the US government launched a Presidential Task Force on Combating Illegal, Unreported, and Unregulated Fishing and Seafood Fraud to investigate also using importing procedures to prevent IUU seafood from entering US markets.

Since overfishing is such a problem for BDM, as is illegal trading (Eriksson et al., 2015), and BDM is, like tuna, a highly internationally traded product, measures applied at the point of importation are worth considering. There is not enough market power for BDM in Japan, the EU or US, but could such measures be used for the vast majority of BDM that is imported to Hong Kong? Hitherto no such measures have been suggested, and it seems unlikely in the short to medium term that the Chinese government would apply such measures. Key informant Professor Yvonne Sadovy noted that since Hong Kong is an entrepôt that makes its wealth from trade, the Hong Kong administration is predisposed to want trade to be as free as possible and is likely to resist any pressure to regulate trade more than it is already. Kate Barclay found similar sentiments in previous research with Japanese Fisheries Agency officials, along the lines that since the Japanese economy relies heavily on international trade, the Japanese government is averse to using trade sanctions for fisheries purposes. It took 10 years for ICCAT to convince the Japanese government to go this route and for the Japanese government to put in place the required legislation and carefully plan the use of trade sanctions in 2005, so as to avoid causing 'tit-for-tat' retaliation against Japanese trade.

#### 3.6.1 Customs and Quarantine

The two main forms of regulation that are currently applied to seafood imports to Hong Kong and China are Customs and Quarantine (see Appendix D Part D 1.1, and Section 2.3 of this report on the importing node of the fish chain).

Customs procedures collect statistics on imports and also charge relevant duties and tariffs. The majority of BDM is imported to China via the 'grey trade' (Section 2.3.2) administered by importers based in Hong Kong in order to avoid the tariff applied to BDM imports to China, because as a free port Hong Kong does not have tariffs. Interviewees said the tariff for PNG BDM in China had been 30 percent. Legal research conducted for this report found that a 13 percent value added tax (VAT) applies to BDM in China, but that beyond that tariffs vary depending on the bi- and multilateral trading arrangements with the individual countries of origin (Appendix D Part D 1.2.5). Customs rules are not uniform across all ports in China; there are national Customs regulations and under those regional regulations and local ones. The importation process may even vary between individual Customs officers. This is an additional reason seafood imports often go through Hong Kong,

to avoid the risk of lengthy delays with Customs in mainland Chinese ports (Fabinyi, 2016)(Appendix C).

Importers interviewed for this project were unwilling to talk about Customs procedures, because the grey trade is illegal. Those who answered the question said Customs was handled by external logistics companies, and therefore was not the responsibility of the importers (Appendix C). To gain deeper understanding of the role Chinese markets play in marine conservation it may be necessary to investigate the importation routes further, noting that because this trade is illegal it will be difficult and potentially unsafe to obtain accurate detailed information. The legal research for this project noted that exporters often use Customs brokers due to the lack of consistency with Customs regulations across Chinese ports (Appendix D Part D 1.2.2). Possibly these brokers are, or are connected to, the logistics companies the importers mentioned.

As noted in Section 2.3 on importing, the grey trade in BDM, although very widespread, is occasionally subject to government crackdowns. These seem to be increasing since the post-2013 anti-corruption campaign (Appendix C) (China Inspection and Quarantine Times, 2010, Godfrey, 2015a, Godfrey, 2014).

The statistics collected by Customs in Hong Kong on BDM imports is already quite useful in understanding global BDM fisheries and trade patterns (Eriksson and Clarke, 2015). There are 10 types of information required by Chinese Customs regulations, including the relevant product Customs code, country of origin, importer location and mode of transport used (Appendix D Part D 1.2.3). The Customs information, however, could be made more useful, for example, if it included species names.

Quarantine processes are applied to some food imports, for the purposes of checking food safety and also if there is a risk of importing pests that would cause environmental problems in the importing country. Interviews conducted for this project indicated that PNG BDM imports were not subject to Quarantine inspections in Hong Kong or China. It is however, conceivable they might be in future if concerns arose that there was a food safety risk. Government regulations regarding food safety for seafood have tightened in recent years in response to food safety scandals in China and increasing consciousness in China of the need to regulate for food safety (Fabinyi, 2016). One Hong Kong trader interviewed who traded in large amounts of BDM from Japan had regular inspections from the government after the Fukushima disasters in 2011, to test for radioactivity (Appendix C).

### 3.7 International Trade and Fisheries Rules

The United Nations Food and Agriculture Organization (FAO) is the main intergovernmental body that promulgates international-level ideas for improving the sustainability of fisheries. The FAO has: a) a Code of Conduct on Responsible Fisheries (1995) in which Article 11 is about postharvest practices and trade; b) an International Plan of Action to Deter IUU (2001), under which a model plan for Pacific Islands countries was released in 2005; c) the Ecosystem Approach to Fisheries that has been incorporated into domestic legislation internationally,

and; d) Voluntary Guidelines for Securing Sustainable Small Scale Fisheries (2015) (Appendix D Part E). These various guidelines, plans of action and codes of conduct carry normative weight, in that regional and national measures are often only seen to be legitimate if they comply with the FAO pronouncements. They are not enforced, however, and sometimes their use in domestic legislation is not deeply or explicitly embedded, as is visible in the PNG new BDM Management Plan and Fisheries Act.

The two forms of international regulation that have a more direct impact on data about the BDM trade and regulations for the BDM trade are Customs codes and the Convention on the International Trade in Endangered Species (CITES), respectively.

#### 3.7.1 International Trade Data

Existing trade data based on Customs codes illuminates the BDM trade somewhat, but also acts to obscure the picture (Conand et al., 2014). Furthermore it is difficult to work out where BDM is going through trade data due to anomalies in re-exports from entrêpôts. In addition to distortions in information about product going to China caused by the grey trade, tariff regulations between Hong Kong and mainland China encourage classification of imports as 'for processing' which distort aggregated import tallies and create discrepancies between Hong Kong declared re-exports and declared imports in the mainland trade. Import duties in Taiwan also encourage under-reporting of imported quantities. Singapore also records domestic exports and re-exports separately, and discrepancies between these have been noted (Kinch, 2004a). One article cites wildly varying BDM import statistics from different international and Chinese official sources, cautiously noting that 'irregular' flows of BDM as a problem will worsen as demand outstrips supply (Zhang, 2013).

A harmonized coding system was introduced by the World Customs Organisation and has been adopted by PNG and BDM-importing countries, including China, but even so, complications arise. Since 2012 the code for dried or 'traditional' BDM used for Hong Kong imports has been 03081990, before that it was 03079930 (Conand et al., 2014). According to one Customs interviewee, PNG exports to 2009 used 03079930, but according to another Customs interviewee they used the code 16059010 (corresponding to the post-2012 code 16056100). The 16 codes are used for 'smoked' seafood, whereas the 13 codes are used for dried seafood, so apparently sometimes PNG Customs officials defined BDM as dried (which may or may not have involved the use of hot coals and a form of smoking), and at other times they defined it as smoked. Greater coordination between agencies to detect and fix inconsistencies such as this are needed for trade data to become a more reliable source of information about volumes of sea cucumbers being fished internationally.

Trade data using Customs codes is an important source of data about global sea cucumber fisheries, so it is important that there be international cooperation to improve the clarity and accuracy of trade data (Eriksson and Clarke, 2015).

### 3.7.2 Convention on International Trade in Endangered Species (CITES)

Notwithstanding the non-requirement to list species under existing Hong Kong or Chinese Customs law or international Customs codes, the trade in species listed under CITES must be recorded. Currently only one species of sea cucumber is listed under CITES – the brown sea cucumber (*Isostichopus fuscus*) from countries such as Ecuador (the Galapagos Islands has very depleted stocks) and Mexico.

In 2015 the US Government proposed that several sea cucumber species be considered for listing under Appendix II of CITES at the October 2016 Conference of the Parties to CITES (CoP17), including species that were fished in PNG, such as: surf redfish (*A. mauritiana*); blackfish (*A. miliaris*); brown sandfish (*B. vitiensis*); lollyfish (*H. atra*); snakefish (*H. coluber*); white teatfish (*H. fuscogilva*); elephant trunkfish (*H. fuscopunctata*); golden sandfish (*H. lessoni*); black teatfish (*H. whitmaei*); curryfish (*S. herrmanni*); and amberfish (*T. anax*) (USA Government, 2015). These, however, did not make the final list of species to be considered at the CoP17 meeting (CITES, 2016)

If key BDM species were to be listed under CITES, the legal implications are that they could be traded internationally with authorization by the granting of an export permit or re-export certificate. No import permit would be necessary for these species under CITES. The granting of export permits would require demonstration that the animals have been fished sustainably, in accordance with relevant laws and regulations, so the effect may mean stronger regulation within PNG. Under CITES, governments may only issue permits for export if it can be demonstrated that the trade will not be detrimental to the survival of the species. This process is called non-detrimental findings (NDF), and is a central concept in the operation of CITES. Since trade in CITES-listed species must be recorded, it would also potentially improve international trade data for understanding global fisheries.

As part of the CITES listing process, countries involved in the BDM trade have the opportunity to put their case as to whether listing would be desirable, including through organizations such as the FAO. In relation to an earlier attempt to list sea cucumbers under CITES it was noted that a lack of information about sea cucumber species and their overfishing, and difficulty identifying species in their traded form were problems that need addressing before a CITES listing could be effectively administered (Bruckner et al., 2003). Moreover, investigations into the live reef food fish trade, which includes CITES-listed species, however, have found that CITES provisions may not be fully enforced due to the murky legal status of the seafood trade through Hong Kong, a related lack of inspections of seafood shipments and of domestic markets, and insufficient information exchange with source countries (Wu and Sadovy de Mitcheson, 2016).

In addition to these governance implications, if species of BDM fished in PNG were listed, there would be governance implications merely from raising the possibility through proposing it. Authors of this report have noted that one reason BDM traders tend to keep their information and networks close is that past marine conservation campaigns including potential CITES listing have made them wary (Kinch, 2004a) (Appendix C). Attempts to have sea cucumber species listed

on CITES, therefore, could have the effect of making traders less willing to be transparent and cooperative with researchers and government officials in working towards a more sustainable fishery.

On the other hand, when northern bluefin tuna (*Thunnus thynnus*) was raised for listing under CITES in 2010, the Japanese government sprang into action with trade sanctions under domestic legislation and ICCAT to demonstrate that the existing systems were strong enough (Walker Guevara and Foster, 2010). Enough countries were convinced that CITES listing was unnecessary that northern bluefin was not listed at that meeting. The outcome was nevertheless positive for conservation in that IUU fish from the Mediterranean that had been entering Japanese markets in significant quantities for some years faced much stiffer obstacles in reaching that market after 2009.

It is far from clear that key stakeholders would respond the same way to the potential CITES listing of sea cucumbers, but it remains a potential leverage point to consider for improving governance. Under what circumstances might the Chinese or PNG governments see the CITES listing as threatening enough to their constituents (seafood traders in China, fishers in PNG) that they would be galvanized to stronger action in terms of regulation? Could private sector actors be goaded into demonstrably improving sustainability in their supply chains by the threat of CITES listing?

### 3.8 International NGOs and Foundations

International NGOs, including charitable foundations such as the David and Lucile Packard Foundation, are a group of actors affecting the governance of sea cucumber fisheries. One way they do this is through supporting LMMAs and CBRM in the absence of government support for such initiatives. As noted earlier, international NGOs supporting LMMAs in PNG include TNC, WWF, CI, and WCS. Foundations have provided much of the funding for this work.

The Packard Foundation's support of this governance analysis and other research such as that being conducted by TNC in PNG may also influence governance of sea cucumber fisheries. Findings from TNC work has already influenced Titan people in Manus to work towards CBRM, including taking the innovative step of merging their sea territory to make a much larger managed area than is usual for LMMAs. It is possible the current governance analysis may also cause stakeholders to change their practices to take advantage of ideas raised.

Finally, conservation organizations and funding Foundations have been influential in campaigns to change the markets for unsustainably fished seafood. For example, the Packard Foundation among others have been influential in the spread of Marine Stewardship Council certification of fisheries, which has fundamentally changed some seafood markets, particularly in Europe. Greenpeace has been influential in achieving change in some key canned tuna markets. Campaigns against shark fin consumption, alongside other factors such as the anti-corruption campaign of the Chinese government and a downturn in the Chinese economy, have seen consumption of that product decline and seen the emergence of stigma for the retail sale of shark fin. Hong Kong traders interviewed were concerned about the

environmentalist motives for this study. Hong Kong has witnessed intensive anti-shark fin campaigning in recent years, with the result that many dried seafood traders are highly suspicious of visitors. Many have prominent 'no photography' signs displayed on their walls and entrances, and some have plastic sheeting put up over walls and windows to hide their products from outside view.

No such significant campaign has yet emerged for BDM and it may not be a suitable commodity for certain types of campaign, being neither charismatic nor megafauna. Various kinds of strategy for market interventions are discussed below, however, so there may nevertheless be a potential role for NGOs and Foundations in this sphere for BDM.

### 3.9 Private Sector Market Measures

Governance arises from factors affecting the decision-making of actors along the fish chain. In that sense the private sector is already a major part of the Governing System through: creating demand for BDM in the first place; offering high prices; fishers responding by supplying BDM; opening up new markets for new species thereby enabling the fishery to broaden and compensate for overfishing of the most valuable species, and so on. This is not intentional governing for the five governance aims (food security; community wellbeing; economic livelihood viability; social justice; and environmental sustainability) but nonetheless shapes the industry and thus is a big part of its governance. Private sector actors may also, through market measures, intentionally govern the fish chain towards one or more of the five governance aims. The best known of such measures are ecolabels and brands such as Fair Trade. In this section we consider the potential for measures that differentiate product within markets to contribute to improving the governance of sea cucumber fisheries in PNG.

#### 3.9.1 Ecolabeling

Ecolabels may work through consumer demand for products certified as being more sustainably produced than other products, or through price incentives along the supply chain driving demand for ecolabeled product (in which case the demand may not be from consumers but from retailers or other actors in the chain) (Asche et al., 2015). There is not currently a significant market for ecolabeled food in China. Consumer interest in ecological sustainability issues in seafood production is low, although one study has found that consumers would be willing to pay more for ecolabeled product (Xu et al., 2012). The seafood industry is skeptical that anyone will pay more for ecolabeled product (Fabinyi and Liu, 2016, Fabinyi and Liu, 2014a, Fabinyi and Liu, 2014b, Fabinyi et al., 2016).

Traders interviewed in Hong Kong and China acknowledged the problems of environmental sustainability in sea cucumber fisheries, and that this was leading to BDM being more difficult to source from some locations. Many of the traders in Hong Kong and Guangzhou knew there was a moratorium on the PNG fishery and why it was in place. One Hong Kong trader who had had long dealings with PNG exporters was very supportive in principle of the need to manage PNG's sea cucumbers, saying that this was 'good for the country' and 'good for the livelihoods of villagers'. Other traders agreed with the broad notion that fisheries should be sustainably managed, suggesting that it could help to stabilize prices.

However, most traders were unwilling to seriously engage with sustainability actions and initiatives, and did not feel that doing so could improve their business. As one Guangzhou-based trader put it:

*Of course this is a very big problem. But I just sell these products. It's the responsibility of governments to regulate their fisheries properly.*

This perspective resonates with the findings of a broader survey of Chinese consumers, which found that consumers view questions of environmental governance and sustainability very much as the responsibility of government, not of consumers or the market (Fabinyi et al., 2016). Other traders had no interest in environmental sustainability, with one Guangzhou trader saying:

*I don't care about these things; if there are no sea cucumbers left there [in PNG] I can just go and buy them from somewhere else.*

Traders were sceptical about the potential of certification to improve their business. Most had not heard of the Marine Stewardship Council. One said:

*Everyone in China knows that these certifications are just bought by companies anyway, and aren't actually worth anything, so no-one will pay extra for them.*

Interviews with exporters in PNG supported these findings, with all exporters interviewed saying none of their importers had ever raised environmental sustainability or ecolabeling as something they were concerned about.

This is not to say that ecolabeling will never take off in China, but it indicates it is not a short-term proposition. It is worth noting that in places such as Europe and North America, where ecolabeling has become a significant feature of seafood markets, conservation NGOs put in a great deal of effort over many years to first build public awareness that overfishing is a problem. That kind of groundwork may be necessary before ecolabeling or some other kind of sustainability-oriented market measure can be effective. Japan is another country where ecolabeling has not had much take-up in seafood markets. One research project found that Japanese consumers had noticeably different attitudes towards ecolabels if they were given information about overfishing before being asked about their willingness to pay more for an ecolabeled product (Uchida et al., 2014).

#### 3.9.2 Place-based Branding

Place branding is another way product may be differentiated such that its value increases, and may be connected to market measures aimed at improving one or more of the five governance aims. As noted earlier, NFA staff indicated that one strategy they are thinking of is to improve the quality of PNG product and its reputation in end markets, which could lead to increased value for the PNG

fishery.<sup>22</sup> The BDM industry in China has expressed an interest in establishing stronger ‘country of origin’ awareness on the part of importers.<sup>23</sup>

Place branding exists in Chinese BDM markets, in that countries whose products are seen to be high quality, such as Australia and Japan, are used for labeling, but not necessarily accurately. Almost all of the sandfish sold in Hong Kong is simply marketed as ‘Australian bald sea cucumber’, including extremely small sea cucumbers that are unlikely to actually be from Australia. By contrast, a great deal of the BDM in Hong Kong comes from countries such as Philippines and Indonesia (Conand et al., 2014), but no branding from these countries was observed. Many traders interviewed in Shanghai and Beijing were not aware of PNG as a BDM producer, but almost all of the traders in Guangzhou and Hong Kong were aware of PNG product. Among these traders, PNG product was universally described as having a reputation for low quality due to poor processing.

Traders suggested quality of processing was one of the most influential things in their decision to buy from certain sources. Many traders simply stated that they would only try and buy good-quality sea cucumbers, and avoid those that were poorly processed. One trader noted that their company had stopped buying from PNG because of poor quality. Traders consistently said that they pay more for and prefer to buy product that is of high quality.

In addition to pursuing governance goals through improving quality and linked to that the reputation of PNG BDM as a whole, there may be potential in branding product from different regions within PNG. Exporter E said his importers who are knowledgeable about quality have told him Daru sandfish is the best in the world, with its ‘thick’ meat. Exporter E does not think this place branding goes beyond the importer, rather, sandfish from Daru went into the top grade. Exporter B, whose company sold from Manus as well as Morobe Province said the Manus product was kept in separate bags from the Morobe product and the importer paid a higher price for the Manus BDM. Exporter C, who was also based in Manus and shipped via Lae in Morobe, was asked by his importer for similar arrangements.

### 3.9.3 Food Safety and Quality

Despite the lack of ecolabels in the Chinese market, there is a significant and growing market for organic foods. Consumers are very keen to eat food that is considered safe, because of the high prevalence of food safety crimes and scandals in recent years. Food safety is the most prominent issue in the public imagination around food production in China, including for BDM (CAPPMA, 2009, Fabinyi et al., 2016, Purcell et al., 2014a).

<sup>22</sup> The work by Steve Purcell and others on improving quality in BDM processing in Pacific Island countries has been put into a manual and videos designed for fishers as educational tools ACIAR. 2014. Processing Sea Cucumbers: A Training DVD for Pacific Island Fishers. Available: <https://www.youtube.com/watch?v=KH6u0oZockk&nohtml5=False> [Accessed 15 June 2016], PURCELL, S. 2014a. Processing Sea Cucumbers into *Bêche-de-Mer*: A Manual for Pacific Island Fishers. Noumea: Southern Cross University (SCU) and Secretariat of the Pacific Community (SPC).

<sup>23</sup> Notes from the Second Plenum of China’s Sea Cumber Development Leading Group Conference, held on 22 September 2013.

There are concerns about chemicals used in food production, and about fake products. The main concerns for BDM in Chinese markets are about domestically farmed sea cucumbers. A 2014 Chinese documentary revealed the practice of adding a cocktail of pesticides and antibiotics to sea cucumber hatchlings in a township near Dalian in Liaoning Province (CCTV, 2014). Another broadcast about a sea cucumber aquaculture facility near Dalian talked of the heavy use of antibiotics, sodium hypochlorite (bleaching powder) and medical hydrogen peroxide, which was causing pollution and fish kills in the surrounding environment (CRIEnglish, 2014). Liaoning with neighboring Shandong Province in the northeast of China is the heartland of sea cucumber aquaculture in China. Some farmed *Apostichopus japonicus* sea cucumbers are sold in Beijing with the national Chinese organic certification, and much of the frozen BDM and other types of seafood sold in Beijing supermarkets is sold with labels emphasizing ‘pollution-free’, ‘natural’ characteristics. High pesticide and heavy metal residue levels have combined with excess supply to lower the price of locally raised BDM, representing an opportunity for imported Pacific BDM to attract a premium in the Chinese market (Zhang, 2013).

FIGURE 24. Packaging of BDM in Frozen Section of a Beijing Supermarket (photo credit: Michael Fabinyi)



Companies from the US, Australia and New Zealand are already using this advantage. One product from the US, “Prime Sea Cucumbers” is marketed as being from the “deep oceans of the Western Pacific”, with labeling assuring that their sea cucumbers are at least five years old and nothing has been added to the sea cucumber during processing. This product is certified as satisfying Hazard Analysis and Critical Control Points (HACCP) requirements and meeting US Food and Drug Administration standards, and has export quarantine approval from the US Department of Commerce’s National Oceanic and Atmospheric Administration (He, 2015).

One of the traders interviewed for this study who focuses on high-end sea cucumbers for the Hong Kong restaurant market imported most of their sea cucumbers and other seafood such as abalone from Australia for food quality and safety reasons. Although there is no legal quarantine requirement for importation to Hong Kong, the trader said it was important for marketing reasons to have food safety and quarantine certificates from the Australian Department of Agriculture and Water Resources. This company did not normally buy from countries such as Indonesia and PNG because of the reputation for poor quality. If PNG quality can

be improved there may be potential to increase the value through such methods. One trader suggested that the clean seawater of PNG meant PNG could produce very high quality BDM. Marketing PNG BDM as safe as well as high quality could involve the Competent Authority for food safety testing (currently used for tuna exports to the EU) based in NFA, and may require cross-departmental cooperation with the quarantine agency. It would require some ingenuity to work out a system for ensuring food safety that would be effective but also feasibly efficient in implementing HACCP systems and inspections for all fishing and processing locations around the country.

FIGURE 25. Certified Organic Individually Wrapped BDM, Beijing Supermarket (photo credit: Michael Fabinyi)



It should be noted, however, that at this stage the willingness to pay premiums for BDM certified as safe to eat seems to be limited to high-end markets. Key informant Steve Purcell said that during his fieldwork in Hong Kong and China, he often saw BDM being sorted on the floor, and that many importers are not considering food safety as part of their business plan. Exporters B and E, who both still export marine products to China, said they have never heard an importer request anything to do with food safety. According to Exporter E, for some of the newer low value markets in mainland China the awareness of quality as an issue is still very low:

*[Importer X] is based in Guangzhou, and they have their own business in Hong Kong. I had to teach the Chinese buyers about quality. The Chinese buyers would take all the rubbish. The chefs – if the name is sea cucumber, they'll just buy, they only know about price. Importers don't ask for any food safety or other certification.*

FIGURE 26. Grading BDM on the Ground (photo credit: Michael Fabinyi)



### 3.9.4 Bundled Branding

So while differentiating BDM on environmental sustainability grounds is not a viable marketing strategy at this stage, there are quality, safety and place of origin branding issues already at play in end markets that could be harnessed to improve the governance of PNG's sea cucumber fishery. Moreover, some of these could possibly be bundled in with ecological concerns. Even in the Western markets where the environmental issues around food production are well established in

the public imagination, willingness to pay more for a product often requires at least one another criteria to be bundled in with the environmental one, such as higher quality (Devinney et al., 2010).

A BDM product that could be credibly marketed as 'green' in the sense of a wholesome production process as well as environmentally friendliness and is perceived to be high quality might be able to attract a price premium (Fabinyi and Liu, 2014b, Fabinyi and Liu, 2014a, Purcell et al., 2014a). This would require a lot of work both on the marketing side and on the side of developing systems to supplying product reliably meeting these criteria. It is only likely to work at the luxury end of the market. This would mean competing with Australia, New Zealand and other countries that already market their seafood to China along these lines. Australia and New Zealand both have FTAs with China, which means lower tariffs than PNG exports, and unlike PNG they have the resources to staff trade offices and support exporters in the Chinese market (Godfrey, 2015c). Considering the importance also of the low value market to PNG's exports in the past (see Section 2.2) focusing on quality in processing first and working up from there may be more feasible than any kind of ecological certification in the short to medium term.

### 3.9.5 Traceability

Any of the above forms of labeling and certification work best if there is a reliable system of traceability in place, so that it is possible trace a product back through the supply chain to its place of origin. This principle emerged first for handling food safety problems, so that all pieces of food affected could be identified and be subject to a product recall. It is a legal requirement for food importers in many countries to keep records that enable traceability back through the 'chain of custody' if necessary.

There is no government requirement in China for importers to record their suppliers for traceability. Many traders, however, said they do keep certificates of origin as a business strategy in case a food safety problem arises. In Beijing and Shanghai, wholesale traders are required to keep records of how much of what products they sell, and to whom, primarily for tax purposes. Several traders noted that food safety issues are less common with dried seafood products such as BDM compared to highly perishable live or frozen seafood. It was reportedly a common practice for traders in Guangzhou to simply group large quantities of different seafood products together and use a single certificate of origin. Because of this practice, the prevalence of grey trading, widespread mislabeling of country of origin of BDM and the fact that BDM comes from many different countries, traceability is therefore extremely low. By the time most BDM from tropical sea cucumbers arrives in Beijing or Shanghai, the traders will only know that it came from Guangzhou, and perhaps Hong Kong before, and not know the country of origin.

## 4. ANALYSIS

Thus far this report has covered a lot of ground describing the BDM Fish Chain and the Governing Systems affecting the ways sea cucumber fisheries have operated in PNG. Some analysis has been provided in comparing the new Management Plan with the old one, highlighting improvements on the old Plan and which areas are still likely to have problems in achieving sustainability in the sea cucumber fishery. This final section of the report takes the analysis deeper and wider, to look at 'governing interactions' in different elements of the fish chain, before moving on to outline the opportunities to improve the governance of BDM in PNG that have arisen from the analysis.

### 4.1 Governing Interactions

#### 4.1.1 Village Relations

The government approach centering on the new Management Plan and some of the dynamics in the fishery do not fit well with stakeholders' principles and images about how the fishery should be conducted. For example, the main underlying principle behind how stakeholders believe the fishery should operate is that fishers and customary resource owners should be the main beneficiaries, and the fishery should contribute to development for village-based Papua New Guineans. This is addressed in one way by simply having the fishery, assuming that if cash flows to fishers then development occurs.

Empirically it is clear that cash flowing into villages does contribute to wellbeing in some ways. On Ware Island in the Engineer Group of Islands in Milne Bay the BDM trade resulted in some tangible benefits in the form of an overall improvement to housing standards and the construction of four new teachers houses for the school (Foale et al., in press). There were few other lasting benefits from the BDM trade, however, with a significant negative impact being a reduction in food security through people neglecting their gardens in favour of fishing and buying food. In Ontong Java in Solomon Islands, fishers bought solar panels with their BDM money, improving the power situation in their communities, and it was possible there was a resilience benefit in having this additional income source, but few other benefits were evident, and negative outcomes noted included reduced food production and social disharmony from some of the ways young men used their income (Christensen, 2011, Christensen and Mertz, 2010). A socio-economic survey conducted of coastal communities in New Ireland Province suggests that family income from fishing generally did not make much difference to development indicators (Kaly, 2005). To achieve the desired community development outcomes from BDM different instruments and strategies are needed.

The discussion in Section 3.1.2 on village-level issues for the new Management Plan and for CBRM highlighted that there is a lack of resources for LLG implementation of the new Management Plan and for enforcement for non-government CBRM effort. Although there is a lack of resources, however, the new Management Plan and interviews with government staff both indicate that much thought has been put into these kinds of governing interactions. These efforts address the

environmental sustainability and livelihood viability aspects of governance that are generally accepted as being within the purview of fisheries management in PNG.

Interviews and documents examined, however, exhibit less consideration of the community wellbeing and social justice aspects of village-level governing interactions, in terms of how the cash earned from BDM is used, and whether it contributes to community development. These aspects are often not seen as part of fisheries management, and indeed are often beyond the skills sets of fisheries managers. Nevertheless they are crucial to the ecosystems approach to fisheries and so ways must be found of addressing them in fisheries management, for instance through collaboration with other organizations with relevant expertise.

Ways in which social justice and community wellbeing concerns are currently addressed in the new Management Plan are through having women and youth representatives on LLGMACs and PMACs, and in the MEnAR governance structure. To build on representation in these bodies, village-level governing interactions could also be addressed within communities through consideration of new ways of handling the cash coming from BDM. Community development facilitation workshops could consider ways young men may keep some money for their recreation as well as contributing to family incomes. This would improve on the previous pattern whereby young men were resented for using BDM money for recreation and then coming to their women relatives expecting to be fed and housed (Rasmussen, 2015). Gender-aware agricultural and fisheries development work in Solomon Islands highlights the kinds of processes that can lead to a self-driven reorganization of interactions at the village level for overall governance benefits (Cohen et al., 2014, Hilly et al., 2012, World Bank, 2015, WorldFish, 2013). If such processes could be successfully adopted in PNG coastal villages, the income from BDM may become more developmental.

Approaching village-level governing interactions as a community development challenge would align with the principles behind the MSG 'Roadmaps' and the SPC 'New Song' for coastal fisheries, as well as the FAO Guidelines for *Securing Sustainable Small-Scale Fisheries* (FAO, 2015, MSG, 2014, SPC, 2015). In all of these articulations of ideal principles for coastal fisheries management in the Pacific, fisheries are seen as central to community development in island and coastal regions. The New Song in particular specifies that fisheries should have a higher profile within governments and whole-of-government approaches are needed to adequately deal with the challenges of managing nearshore marine resources sustainably.

#### 4.1.2 Relations between Levels of Government

One of the principles of an interactive governance assessment is to consider the appropriateness of the mode of governance, with the main types being co-governance, self-governance and hierarchical governance. The old Management Plan could be characterized as hierarchical governance, but it only really operated at the export node of the chain, and in fact the fishery itself was largely self-governed. It was therefore a hybrid system, and was not effective at protecting the environmental sustainability that all of the other governance goals rely upon. Hierarchical governance may be an effective form of fisheries management,

and may in some social contexts be accepted as the legitimate model. As noted earlier, however, interviews and the legal framework in PNG indicate that hierarchical governance is not broadly socially accepted as appropriate. For example, Government Official B said that devolution was necessary because BDM is a nearshore resource and so comes under provincial, not national, jurisdiction. Furthermore, he felt that resource owners needed to be given some formal responsibility for BDM management. The new Management Plan with its 'joint-management' moves more towards co-management, especially in terms of devolution, but in many ways it remains hierarchical with provincial and local-level involvement explicitly and legally subordinated to the national-level arrangements. NFA is still the only level of government with the resources to manage the fishery.

The dynamics of devolution and co-management have varied implications for governability. On the one hand they add complexity to governing systems, increasing the numbers of people to consult and interests to balance. On the other, interviewees expressed the opinion that this is how governance should be done in the PNG context, and these principles are embedded in key documents such as the Organic Law PGLLG and the BDM Management Plan. Failure to pursue them therefore leads to political and social acceptability problems, including exacerbating compliance problems. By the same token, if devolution can be successfully achieved, more distributed management of the fishery would improve social and political support for the management system. The implication here is that pursuing devolution and co-management can be most beneficial to governance by focusing on the dual aim of: a) keeping the consultative processes and bodies manageable, and; b) ensuring they are effective.

Intersections between different scales and the goodness of fit of management tools to the system-to-be-governed are relevant to understanding the potential of devolution to improve governance. For political acceptability in the PNG context, devolution is required. Yet devolution makes the management of the fishery much more complex, including the involvement of many more government organizations. Arguably there are neither the resources nor the drive to effectively manage fisheries at the local or provincial levels, except in a few cases. In light of this the compromise, a pragmatic solution is visible in the new Management Plan of allowing for devolution but not relying on it.

Further research into the communication and articulation between government and industry and between the NFA, the NFA Board, the NMAC, PMACs, LLGMACs and other community-based efforts to manage BDM could be useful in identifying how best to achieve this dual aim. Consulting widely is time consuming and thus expensive, especially for a fishery as extensive as this one. For example, interviewees in Manus noted that NFA held a consultative workshop in Lorengau before the new Management Plan was drafted, so fishers able to get to Lorengau had some input. However, the draft Plan was not then taken back to them for review and comment before it was finalized, so fishers felt the consultation was unfinished. Effective but manageable consultative bodies and processes are not easy to achieve. It is thus tempting to fall back on hierarchical models of telling fishers what the rules are. With a lack of enforcement at the village level this is unlikely to be effective. Another option is building compliance because fishers believe the rules will help

sustain the fishery, but this requires extensive and effective consultation. There are lessons to be learned from fisheries internationally about how to achieve effective consultation across multiple scales and diverse actor groups (Daw et al., 2015, Fulton et al., 2011). The further research on communication and articulation between industry and government and between levels of government could include 'active research', with stakeholders workshopping the problems, solutions and tradeoffs, to potentially come up with new rules that achieve governance goals while also fitting better with the realities of village fishing.

#### 4.1.3 Relations between the PNG Government and Industry

In addition to devolution, the joint-management of the new Management Plan includes articulation with industry and other stakeholders. Since regulation of exports is the key to the new Management Plan, relations between fisheries managers and traders require attention to ensure the new Management Plan is as effective as it can be. One way to maximize the effectiveness of fisheries management is to have a compliance strategy as well as an enforcement strategy. With good compliance most players – apart from a few rogues – stick to the rules, because they see it as being in their interests to do so. They self-regulate as well as support government regulation. In PNG this principle has been recognized and implemented for and by the tuna industry, which complies with various regional and international rules (Kinch and Carnie, 2011). NFA created a position for industry liaison and facilitation; however, instead of facilitating industry liaison or working with provincial fisheries the position became focused on training of NFA staff (Kinch and Carnie, 2011). Our interviews with traders indicated that relations between traders and NFA and the NFA Board are an area with significant room for improvement.

Exporter D captured neatly the importance of compliance as well as enforcement, and how relations between industry and government are crucial to enabling a compliance approach. In this exporter's opinion, NFA see BDM as a government issue and that government can control the fishery. Exporter D pointed out that (notwithstanding government's ability to close the fishery) industry controls the fishery, and for government to have an influence on how the industry operates they would need to work together.

*If they cooperate with us we will welcome it [the new Management Plan], but if they force it down our throats we will find ways to get around it.*

Comments from other exporters about relations with NFA and the PFOs similarly show the need for improvement. Exporter E said he was invited to one meeting where NFA staff spent the whole meeting dealing with administrative matters for which industry consultation was not necessary. This poor planning left him feeling he had wasted his time, and he was less inclined to want to contribute to further consultative processes. Exporter E also said that he felt some NFA staff adopted a 'bossy' attitude towards traders at consultative meetings, which did not help with engagement. Exporter A also said he felt NFA staff adopted a top-down approach in dealing with traders, rather than a collaborative approach. Exporter G, who enjoyed relatively good relations with NFA explained:

*They didn't come and teach you, there were lots of... misunderstandings. It was like they were waiting for you to commit a crime, [they thought] exporters were the worst; [exporters] were always in the wrong. Then they come and fine you.*

In our interviews some BDM traders said NFA's engagement with industry in designing the new Management Plan was good, while others were less satisfied. Exporters who were on the NMAC or had been invited to join PMACs said they felt quite well informed about the new Management Plan. Exporter G said he felt that in the past NFA 'just told us what to do' and penalized them if they did the wrong thing, whereas now he sees NFA discussing issues with traders and asking for input. Exporters not part of these committees said they felt 'in the dark', excluded, and did not perceive that there had been a positive move towards co-management. NFA conducted extensive consultations with PFOs, BDM traders and fishing community representatives at the provincial level over a period of years in preparation for drafting the new Management Plan. Why then, did some of our interviewees feel 'in the dark' about the new Management Plan?

There is a problem in hoping that having industry representation on committees will be sufficient to enable successful industry engagement. It can help the committee understand particular industry perspectives on topics of deliberation, but it by no means ensures that matters of importance will be communicated via the industry representative out to the rest of the industry. That may happen if the industry representative on a committee is an appointed industry organization representative, as is the case with the Fishing Industry Association (FIA), which is a mandated member of the NFA Board. The FIA representative has always been from the tuna industry, not from BDM trading or small-scale coastal fisheries. There is no industry organization for BDM, so committee members really only represent their own business. Why would they tell their competitor companies what is going on in the committee? A further factor in the PNG context is that business competition often becomes entwined with local and national politics, so people are predisposed to expect that companies on government committees are being unfairly favored.

Moreover, securing adequate consultation with fishers as a section of industry is even more difficult due to their location in remote villages and their life experiences not including the tasks and skills involved in committee work. It is possible to include one or more fishers on committees, fly them in for meetings, and provide them with papers, but unless those fishers have also had life experiences to prepare them for this work it is not realistic to expect them to grasp the issues, join the discussion, put their case and make sure their points are followed through in decisions on an equal footing with the town-based public servants and business people on the committee.

Options to consider for improving the consultative aspect of governance include having the NMAC and PMAC industry positions on rotation, possibly annually, among licensees. Or the exporters could employ a professional industry representative to act on their collective behalf. Similarly, a community development specialist or similarly skilled person could work with fisher committee members to help facilitate their participation in committees. These options are not an

easy or complete solution to the problem, but it is certainly worth investigating options to improve communication between industry and government, in terms of improving the results from industry representation on committees, and in terms of thinking beyond this to other routes of communication. The Communication and Education Strategy currently being developed by NFA would be a good forum for such investigations.

Apart from engaging with industry and including them in management processes, the incentives in management tools and communication with the industry at large are other ways to encourage compliance. The new Management Plan export license criteria encourage compliance, as does the compliance bond for exporters. Encouraging compliance among fishers is a different challenge, due to minimal government interaction at the village level. Here the NFA communication and education plan to go with the new Management Plan will be crucial. The challenge is to convince fishers who have very limited cash-earning opportunities and who have not had the regulations applied to them in the past that following the rules is the best thing for them to do. The communication plan was discussed by the NMAC in November 2015 and a communication centre is being established at the National Fisheries College (NFC) in Kavieng, but the plan is yet to be finalized or implemented.

Since the communication plan is so important both for improving awareness and compliance at the village level, and could facilitate devolution as well as more effective liaison with traders, it is worth considering whether further research could be useful for maximizing the effectiveness of the communication plan.

#### 4.1.4 Relations along the Supply Chain

In addition to relations between levels of government and between government and industry, relations between private sector players along the supply chain also contain governing interactions. There are two main influences on governance visible in this set of relations. One is a development dimension, this time in terms of how Papua New Guineans approach fishing as a business, or acquire the skills, capital and knowledge to move into the exporting business. The other is about social capital and trust between fishers, buyers, exporters and importers.

There is a set of disjunctures between the way Papua New Guinean village-based fishers think about the BDM business and the way exporters approach it. First, there is somewhat of a mismatch to do with the ways villagers want to fish and the ways traders want them to supply. Exporter G said PNG fishers are not reliable suppliers due to their varying motivations to make money and their diverse livelihood strategies, meaning they stop fishing to do other things when the need arises. Moreover, if an important person dies a whole village may stop fishing for a time. This is a problem from the perspectives of the exporters and importers they sell to; they want reliable supply. Exporter B related similar concerns and noted that he felt most fishers were naïve in the way they approached cash-earning enterprises such as BDM. Similar issues of mismatch between the way Pacific Islanders approach cash-earning activities and the way their buyers believe they should approach them have been noted and analyzed around the Pacific (Barclay and Kinch, 2013, Patterson and Macintyre, 2011).

Other issues include the tendency (developed during the colonial period and through aid projects) of villagers to believe outsiders should give them things, whereas traders expect relations to be commercial. Ill feeling may arise from this mismatch in expectations, and may be exacerbated by villagers' predispositions to expect that traders are 'ripping them off', another tendency developed through colonial relations and post-Independence capitalist trade patterns. In fact, from around 2004 it seems that PNG fishers were receiving a very good price, but the perception of being 'ripped off' remained. If a fisher believes the trader should have donated equipment but instead extended it on credit, and believes that the trader is paying an unfairly low price, then the fisher may be ready to behave badly towards the trader. Certainly it will be more difficult to have collaborative relations in this situation.

These disjunctures of expectations between fishers and traders seem likely to have contributed to some of the high levels of malfeasance that have characterized the PNG BDM industry. Malfeasance on the part of fishers, ethnic Papua New Guinean traders, non-national exporters, importers and financiers all contributed to low levels of trust and higher transaction costs. Exporter E put this down to the high level of competition among the exporters, and said it meant there was a strong element of short-termism among some players. By this he meant that some of the 'fly-by-night' overseas buyers were unconcerned if PNG's resources were ruined because they would move to another supply country. He also saw that some of the fishers and local traders were likewise willing to trash the resources now for a quick sale rather than seeking a sustainable industry.

*Those bad operator traders made the industry like a cowboy town. If they come back again I won't get involved in the BDM trade again. They cheated their business partners and created a bad business environment.*

The license criteria for the new Management Plan are intended to address short-termism among exporters, in prioritizing exporters who are investing in the industry and excluding those who have breached license rules.

Discouraging short-termism among fishers is a more difficult proposition because of the current lack of direct interventions at the village level. On the part of fishers, short-termism in regard to the resource may arise because of the lack of other opportunities to earn cash, and because sea cucumbers are not consumed as a food locally. Short-termism in business relations – willingness to spoil business relations through malfeasance – may have several sources, including the predisposition to expect traders are exploiting them raised earlier. Another kind of short-termism at play in fisher approaches to the BDM business is a cultural-economic feature noted by anthropologists in the Pacific region – Pacific Island people simply do not approach business as 'possessive individuals' who save cash to cover low income periods or future investment needs. Rather they spend any cash they receive quickly (McCormack and Barclay, 2013). Anthropological research indicates that this approach of Pacific Islanders to incomes is deep seated through various cultural formations and so is not easily changed via development projects. Indeed, the research also indicates that in many rural and island locations, where cash work is extremely limited and there is no government welfare, the economic

strategies employed by Pacific Islanders, including reluctance to commit fully to any one business and instead keep a range of food-producing and cash-earning options open and invest heavily in internal social relations, is an important part of their economic resilience. Compared to low-income people in much of the rest of the world, Pacific Islanders living on customary land have a level of independence in relation to business. They are less committed to business, because they can still feed themselves even if the business disappears. In terms of their food security this is a good thing, but it is also a challenge to maintaining functional business relations. For example, improving prices through improving quality can occur when traders conduct extension activities with fishers or provide access to equipment. The high risk of fishers selling their product to competitor traders, however, discourages this kind of collaboration within the supply chain.

Improving relations between players along the supply chain thus warrants serious attention. In order to facilitate more collaboration and trust, the prevalent assumptions that damage relations need to be addressed, including the perception among fishers that 'Asian' or 'European' traders are by definition exploitative, and the perception among traders that villagers are economically naïve. NFA's communication and education plan could develop strategies to improve mutual understanding between Papua New Guineans and their non-Indigenous counterparts in terms of approaches to business. CBRM is a good institutional base from which to address resource short-termism among fishers. The exporter license criteria are also a tool by which to address both resource short-termism and relations with fishers on the part of exporters.

Relations between exporters and their importers are also colored by the prevalence of malfeasance, which appears to have occurred on both sides, with unscrupulous importers taking advantage of new importers and the closed nature of the market by paying them very low prices, and some exporters having cheated importers by taking money and then not supplying product, or by being unreliable about the quality of product supplied. This in turn further closes the market, with relationships of trust, once established, being jealously guarded.

#### 4.1.5 Relations between Traders and the Chinese Government

The illegal nature of the BDM trade from Hong Kong into its major markets in China, poses a clear obstacle to governability. There are various ways in which the Chinese government and China-based traders could improve regulation of the importation of BDM to improve the environmental sustainability of the fishery. More accurate trade figures would enable triangulation with production figures to monitor catches. Traceability and trade documentation would make it possible for importing requirements to include that the produce was legally caught, strengthening measures put in place in production countries. Accurate place of origin labeling would enable countries that have effective fisheries management and food safety regimes to safeguard market premiums for their efforts. In order to improve trade data or put in place importing requirements against IUU fishing the trade will first have to be brought into the legal sphere.

## 5. OPPORTUNITIES FOR IMPROVING BDM GOVERNANCE

This reports highlights three main areas as opportunities to improve the governance of BDM when the PNG sea cucumber fishery reopens. The first, about the development aspects of the fishery and trade, relates to the governance goals of community wellbeing, livelihood viability, food security and social justice. All of these rely on environmental sustainability as a foundation, but require new approaches to support their realization. The second considers the 'goodness of fit' of the management instruments in the new Management Plan (export controls with TACs and closed seasons, devolution, and size limits) in light of the System Properties (complexity, diversity, dynamics and scale). Finally, this report reveals how crucial relationships are to the governance of BDM, both between government and industry and also along the fish chain among fishers and traders, and that there is room for improvement in these relationships. We recommend approaching the relationships among stakeholders together with the technical issues needing to be addressed in fisheries management, in order to improve both sets of issues.

### 5.1 BDM as a Development Opportunity

At first glance the challenge for PNG's new Management Plan is to avoid following in the footsteps of Tonga, which had a moratorium in place for many years to allow sea cucumber stocks to recover, but whose stocks were depleted again very quickly after the fishery was reopened (Pakoa et al., 2013). This is no doubt important, but the analysis in this report shifts the focus somewhat, and says it would also be good to avoid following in the footsteps of the Philippines, where sales of luxury seafood to Chinese markets, while lucrative for fishers, do not maximize the development benefits that could result because of a lack of social and economic institutions supporting the industry (Fabinyi, 2016). Part of this is about conservation measures and making the fishery environmentally sustainable. Equally, however, it is about fishers' access to capital, their ability to use finance beneficially, and about alternative livelihoods reducing fishers' reliance on a narrow group of easily overfished resources.

One of the key results of applying the interactive governance framework in this research is that BDM must be addressed in a 'holistic', non-sectoral manner. Only addressing the fisheries management aspects of BDM will not give the desired outcomes of improved economic lives for coastal and island villagers and growing opportunities for Papua New Guinean business people. The need to address BDM within its broader social context resonates with international policy instruments developed under the Ecosystem Approach to Fisheries (FAO, 2003). It also resonates with the existing literature on livelihoods approaches, and vulnerability in fishing communities (Mills et al., 2011).

When the results of this research were presented to NFA staff, they responded that in the past they have tried to take a cross-departmental approach, working with sections of the government responsible for community development and business development, to improve outcomes in coastal fisheries. They found, however, that it was very difficult to manage cross-departmental projects, and the outcomes

were disappointing. Nevertheless, the fact remains that there is no point having a sea cucumber fishery if it does not contribute to development, and simply having the fishery open has not lead to demonstrable development impacts in the past. Facilitating development per se is beyond the remit of NFA, so collaboration with other organizations is required. Accepting that whole-of-government approaches are no doubt difficult to manage, it is worth investigating whether more innovative ways of approaching collaboration could build on lessons learned and devise effective feasible ways of working cross-departmentally.

**RECOMMENDATION 1:** Conduct further research on how to work effectively and feasibly with other departments and non-fisheries organizations to facilitate development via BDM.

**RESPONSIBILITY:** NFA, other departments, donor bodies and NGOs, SPC (implementing the New Song)

### 5.1.1 Community Development

The development aspirations for coastal fisheries are written into the PNG Fisheries Act and are objectives in the new BDM Management Plan, but the assumption seems to be that development flows from village-based fishers selling their product. Interviews and the literature examined for this research show, however, that while cash incomes are needed and welcome, there is room for improving the development outcomes of those flows of cash. For example, gender-aware community development facilitation could encourage villagers to work out new ways to organize cash incomes from communally owned resources. It is beyond the purview of NFA to do this alone, so it is instructive to look to the SPC 'New Song' for regional nearshore fisheries management, which recommends that coastal fisheries be given a higher profile within government because of their inextricable links to health, nutrition, livelihoods and other non-fisheries sectors (SPC, 2015). The *FAO Voluntary Guidelines on Securing Sustainable Small-Scale Fisheries* also call for this kind of cross-sectoral approach to seriously addressing the development aspects of fisheries (FAO, 2015). NFA could take this approach, and work interdepartmentally to further the community development aspects of the BDM trade.

**RECOMMENDATION 2:** Building on Recommendation 1, and on lessons learned regionally, including in other sectors, launch community development programs to support villagers to manage their income from marine resources to further the governance goals of food security, community wellbeing, livelihood viability and social justice.

**RESPONSIBILITY:** Villages and community groups including Churches, various PNG Government departments, NGOs, donors, NFA (in a facilitating and coordinating role).

### 5.1.2 Business Development

A second development-related issue in BDM is that of having more Papua New Guineans involved in owning and managing exporting businesses. The principle that Papua New Guineans should be the primary beneficiaries from the BDM trade is widely accepted. Thus far the only instrument to pursue this principle is the bans on non-nationals being involved in fishing or exporting in the new BDM Management Plan. The ban has not resulted in large numbers of ethnic Papua New Guineans entering the BDM export business independently or in relationships of equality with overseas investors or overseas-background PNG citizens who are specialist international traders. It is worth bearing in mind that having more Papua New Guineans owning and running businesses may also not result in broader community development, unless those businesspeople reinvest their wealth locally. Nevertheless, the interviews and documents examined for this research show that the principle of having more Papua New Guineans involved in exporting BDM is a major part of what stakeholders want as part of generating development from the resource.

One aspect of improving business opportunities from BDM is improving prices via improving quality, and improving supply through measures such as aquaculture, which NFA has been working on through its participation in Australian Centre for International Agricultural Research (ACIAR) projects (Hair et al., 2016, Purcell, 2014a, Purcell, 2012).

Another important aspect of improving business opportunities from BDM that has hitherto not been tackled is the unrealistic expectation that it is possible to trade BDM successfully without prior international trading experience. NFA interviewees for this project were aware of this problem, but other Papua New Guinean government and community interviewees expressed hopes that with a little facilitation Papua New Guineans without a business track record would become successful BDM exporters, to the benefit of their communities. The BDM trade is very competitive, so anyone hoping to succeed in this field should be skilled and knowledgeable. Interviews with exporters for this study revealed that it took each of them years to develop the knowledge, contacts and capital to be able to do well. In their early attempts most were duped by unscrupulous buyers and lost large amounts of cash through bad deals. Rather than hoping Papua New Guineans will enter the BDM exporting business simply by banning non-nationals from licenses, or for hopeful groups to request easier entry to the business via subsidized credit or exemption from the compliance bond, it may be more productive to run business development programs to skill up Papua New Guineans hoping to make a career in international seafood trading. Some activities to consider along these lines include:

- > research on models of partnership with established businesses that will result in knowledge transfer to Papua New Guineans starting out in seafood trading
- > policies to encourage Papua New Guineans to gain the knowledge, contacts and capital necessary for success in international seafood trading through
- > business degrees

- > internships
- > language study
- > sponsored trips to seafood expos (not as a junket, use criteria to select participants who have demonstrated desire to learn and develop contacts from the experience, and require a short report from participants on what they learned).
- > business skills development opportunities (provide opportunities to fail and learn from mistakes in low risk businesses before trying high-capital BDM).

**RECOMMENDATION 3:** Instigate business development projects, such as sponsoring education in relevant business areas, internships, and facilitating partnerships between Papua New Guineans hoping to enter the business and seasoned seafood traders.

**RESPONSIBILITY:** NFA, other PNG government departments, Chinese embassy sections dealing with government scholarships and business exchange, business associations.

## 5.2 Management Instruments ‘Goodness of Fit’

The System Properties (see Table 1) are useful here to think through how well the management instruments fit the System-to-be-Governed. Greater diversity and complexity pose challenges to governability, while dynamics and scale indicate the drivers behind operations and the levels at which interventions may be applied. Our research indicates that the overall plan is sound, especially in terms of exerting control over the export node of the chain and in the balance of devolution embodied in the plan. Further thought could be given to the science used for setting limits to the fishery, and to supporting international measures to monitor the BDM trade.

### 5.2.1 Export Controls with TACs and Closed Seasons

When we look at the complexity and scale of the BDM fish chain (see Table 1 System Properties) the PNG government’s choice to regulate exports is a good fit. The fishery is extensive, informal and conducted in areas where government services have little purchase. At the point of exporting, however, the BDM supply is consolidated from hundreds of thousands of fishers down to a handful of exporters in each maritime provincial capital and Port Moresby. Moreover, exporting is a formal business requiring government licensing. The point of export is far more governable than the fishery under prevalent conditions in PNG, so it makes sense to concentrate management efforts on the exporting node of the chain.

The success of the new Management Plan, however, rests on ensuring fishery closures are enforced effectively and at the right times. In the past the monitoring of catches via export reports was not timely enough, which allowed the fishery to overshoot the intended limits and render the whole plan ineffective.

**RECOMMENDATION 4:** Retain the focus on the point of export as the main point of control in the new Management Plan. Ensure effective implementation by monitoring catches closely and closing each fishery decisively at the appropriate time.

**RESPONSIBILITY:** NFA, including the departments responsible for licensing, monitoring and enforcement.

Participants in the research also voiced concerns about whether TACs are the most appropriate tool for PNG, because to be effective they require thorough stock assessments, which are very expensive. There was little scientific basis for TACs used in the past. NFA has invested in stock assessments for TACs in recent years, but some of the key informants interviewed were not convinced this scientific basis would be adequate for the TACs to work as well as they should in enabling NFA to effectively protect the resource from overfishing. For example, with multiple geographic features spread around PNG’s very large coastline, and more than 20 species of sea cucumber commercially targeted, stock assessments for TACs are a very expensive proposition.

Key informants and the literature suggested that alternative scientific bases for setting limits on the fishery include: surveys for assessing the status of fisheries (rather than TACs per se); protection of spawning biomass (reliant on developing data on spawning seasons by species and geography, and reliant on ability to enforce protection at the local level); and strengthening communication about and enforcement of the size limits regulations (Feary et al., 2014, Purcell et al., 2010, Purcell et al., 2014b).

**RECOMMENDATION 5:** Investigate ways to improve the science base of the new Management Plan. Consider participatory research including village-based fishers.

**RESPONSIBILITY:** NFA, PFOs, fishing communities and/or their LLGs, NGOs working in CBRM.

### 5.2.2 Devolution

The unfolding of domestic politics in PNG since Independence means devolution is a necessary part of contemporary government. At the same time, however, at the provincial level, and even more so at the local level, there is a lack of preparedness to undertake the role of effectively managing fisheries. Moreover, at the local scale the diversity and complexity of the fishery poses problems for governability. A management plan that took power away from NFA and gave it to provincial governments, LLGs and communities would therefore be a good fit at the level of principle and vision, but not in terms of the practicalities of governance. The compromise achieved in the new Management Plan is thus a good fit between the need to allow for devolution where particular provincial governments and local organizations demonstrate preparedness for it, but not to rely on devolution where capable institutions are not yet in place.

Even without deepening devolution, encouraging greater capacity among PFOs is important for ensuring the implementation of the new Management Plan at the provincial level is effective for reporting on catches, regulating exports, and enforcement activities for exporters operating in provincial towns. NFA has worked closely with PFOs, including through donor-funded projects, providing training and resources for coastal fisheries management activities. Despite these efforts, however, the effectiveness of provincial-level management of BDM was a weak point in the previous management Plan and will potentially continue to be a weak point for the new Management Plan. Work commissioned by the MSG on nearshore fisheries policies provides a foundation for exploring improvements in this area (Govan et al., 2013).

**RECOMMENDATION 6:** Retain the new Management Plan principle of allowing for devolution without requiring it. Actively encourage devolved arrangements where provincial governments, LLGs and/or communities demonstrate capacity.

**RESPONSIBILITY:** NFA, NMAC, PFOs, community organizations, Local Level Governments.

**RECOMMENDATION 7:** Investigate options beyond training and MOU funding for improving capacity at provincial government level, such as bureaucratic reform.

**RESPONSIBILITY:** NFA and National Government departments responsible for Provincial Government, PFOs, Provincial Governments themselves.

### 5.2.3 Size Limits

Size limits are a particular tool where there is scope for improving goodness of fit. Size limits were enforced at the point of export, the intention being that this would transmit back up the supply chain to remove the incentive for fishers to catch undersized sea cucumbers, but this did not work well under the previous Management Plan. As noted several times already, the point of export is a good point at which to implement measures, but the implementation of those measures was not effective enough. Whether or not exporters refused to buy undersized product, fishers often killed and processed undersized sea cucumbers anyway, in the hope they could sell them. This created a flawed governance outcome whereby the undersized animals neither remained in the ecosystem nor resulted in income.

One possibility is to drop size limits altogether and take a 'balanced harvesting' approach to fisheries management. Size data for each species from each location could then be used as part of the science for assessing the state of the fishery. This approach could improve relationships between fisheries managers and exporters by removing one of the ways in which traders are criminalized.

Fisheries manager and key informant interviewees, however, argued against dropping size limits as a management measure and instead that its implementation should be strengthened. There were two main reasons for this. First, fisheries managers felt that although some fishers had flouted size limits in the past, others had abided by the size rules, and that it constituted a break on fishing effort. They felt that if size limits were lifted, then more fishers would treat the fishery as 'open slather', exacerbating the tendency towards overfishing. Second, size limits are an

easily grasped rule for villagers because the logic of leaving the animals until they have bred makes intuitive sense. Making size limits work in the new Management Plan will require not only more effective enforcement of exporters so they in turn enforce the rule on fishers, but also more effective communication to encourage greater compliance at both nodes of the chain.

**RECOMMENDATION 8:** Strengthen size limit communication with villagers, including wet lengths for different species, and strengthen enforcement of ban on exporters, so that fishers cease to have a likely market for undersized product so that fishers cease to have a likely market for undersized product.

**RESPONSIBILITY:** NFA, PFOs.

### 5.2.4 CITES Listing, Improved Trade Data Collection & Traceability

Various international trade reporting mechanisms canvassed in the Governing Systems section of this report are potentially a good fit, although none of them has hitherto been effective. Trade reporting mechanisms can: 1) bolster domestic fisheries management reporting mechanisms; 2) improve understanding of global harvesting patterns and markets; and 3) improve the potential for marketing based on place of origin.

CITES listing could add a layer of control on the trade beyond what is required by the new Management Plan, through the need for appropriate permits, as well as require more careful attention to the status of stocks through the process of demonstrating non-detrimental findings. Furthermore, it would require Chinese importing authorities to regulate imports more thoroughly, even though CITES listing for other seafood species has not resulted in full legalization of the Hong Kong trade into the rest of China (Wu and Sadovy de Mitcheson, 2016). Bringing the trade between Hong Kong and the rest of China into the legal sphere is a pre-requisite for improved data on the trade all the way along the supply chain, and the kinds of governance benefits that could arise from having traceability. Making PNG Customs report consistently would not only help to ensure the trade data present an accurate picture of PNG's BDM trade, but also assist in regional and global efforts to understand the international trade in BDM.

**RECOMMENDATION 9:** Investigate options for improving international reporting on the trade in BDM, including through: 1) Customs processes (export and import); 2) traceability for food safety and quality; 3) a regional trader database; and 4) CITES listing.

**RESPONSIBILITY:** CITES member states, NFA, SPC, PNG Customs, Chinese authorities for customs, excise and quarantine, Chinese food safety authorities, PNG Government and other seafood producer states exporting to China, conservation NGOs.

### 5.3 Addressing Governing Interactions along with Technical Issues

Some of the governing interaction relationships discussed in the previous section could be addressed at the same time as some of the technical functional challenges identified in the Governing Systems section of the report. This would involve NFA and PFOs doing some of their work differently and may require organizational cultural change, which should be taken into account in attempting to implement any of these ideas.

Participatory research into sea cucumbers could address human resource and cost limitations while also providing the relationship base for improving communication and consultation between fisheries management agencies and village-based fishers. The resource issues identified in having PFOs and NFA staff undertake stock assessments could be addressed by having interested fishers in villages participate in surveys. In wealthy countries this is called citizen science, where people with paid jobs use their leisure time to assist professional scientists gather data. In Melanesia, however, subsistence fishers need to be paid for their time. Coastal fishers are very knowledgeable about their local environment, and participatory research along these lines was used by MEnAR DevNet working with TNC to produce high quality resource maps of the seascape they are moving towards managing collectively under CBRM. In the short term, organizing teams of village-based fishers to work with NFA and PFO staff is much more time consuming and thus more expensive than simply sending staff out to do the work, but in the long term the potential benefits of a participatory research approach could be immense. There is currently a lack of contact between village-based fishers and PFO and NFA staff. Participatory research could provide the conduit for addressing problems of communication and lack of compliance identified in this report, and for building the knowledge and motivation needed for communities to initiate CBRM. Using village-based fishers in this way to address a technical issue could also improve the lack of interaction between NFA and PFOs and villagers. Interaction occurring through villagers participating in science about sea cucumbers could be used to improve awareness of the rules and the science behind them, and open more channels for villagers in reporting wrongdoing. It could address the problems outlined earlier in terms of having communication between management institutions and fishers occur mainly through representation on the three levels of Advisory Committees for the fishery. Participatory research is allowed for in the new Management Plan. NFA staff have pointed out that attempts to conduct participatory science in the LMMA network in PNG were not sustainable, so lessons should be learned from these experiences before attempting it for BDM.

This report has identified relationship problems between NFA and BDM exporters, with the latter resenting the top-down approach often taken by NFA and PFO officers, and feeling that the system of BDM management in the past inculcated criminalization rather than collaboration between government and industry. The new Management Plan, with its licensing criteria, is a good step in the direction of a tool that fosters collaboration in that it will limit involvement in the industry to those with a long-term interest in it. If more instruments for managing the fishery

can be shifted to the basis of the shared goal of a sustainable industry, shifting the focus from enforcement to compliance, and the manner of interaction between government and industry also transform to a more cooperative manner, then the new Management Plan will operate more smoothly than if relations remain top-down.

Devolution likewise may be tackled as being both a technical issue (keeping it manageable) and a relationship issue (making it effective). It is certainly not easy to achieve manageable but effective collaboration across levels of government, so it would be advisable to investigate the possibilities and lessons learned.

Creating a shift towards more collaborative relationships in BDM management will be difficult because, as this report highlights, many of the key relationships currently suffer from a lack of trust. Furthermore, resource managers are usually aware that relationships are important to their work, but find it difficult to identify how to address improving relationships. NFA's Communication and Education Strategy will be pivotal to being able to undertake any of these ideas for dealing with technical and relationship issues together. Input from a range of fields of expertise will be needed to help make the Strategy as effective as possible in the crucial role of improving relationships and compliance, including public communication, organizational communication and science education.

The Communication and Education Strategy should consider all aspects of relations relevant to governing the fishery, including how to get the most effective communication about management via the three levels of Advisory Committees. Questions it might ask are:

- > How can industry membership on committees become a channel of communication with industry, rather than a benefit only for the individual on the committee? Should such a committee membership be promoted through an industry association that has the responsibility of acting on behalf of and communicating with its whole membership?
- > How can village-level fishers be effectively represented on provincial- and national-level committees, and an accessible flow of information between those committees and fishing communities be maintained? Could this be achieved with a professional representative?
- > How can effective but manageable devolution through the three levels of government be best facilitated? Is it mainly via the three levels of Advisory Committee?

**RECOMMENDATION 10:** Conduct further research into improving the relationship aspects of fisheries management tools as part of the Communication and Education Strategy. This should include: 1) devolution relations between levels of government; 2) relations between government officers and village-based fishers; 3) relations between government and exporters; and 4) private sector relations along supply chains.

**RESPONSIBILITY:** NFA, donors, NGOs, industry representatives.

**RECOMMENDATION 11:** Develop the Communication and Education Strategy for BDM as a central pillar for the effective implementation of the new Management Plan.

**RESPONSIBILITY:** NFA.

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## 7. APPENDICES

All of the Appendices are available as separate documents on this web page:

<http://www.uts.edu.au/about/faculty-arts-and-social-sciences/research/projects/png-beche-de-mer-fish-chain>

**Appendix A** – pre-2009 National Béche-de-Mer Fishery Management Plan

**Appendix B** – 2016 National Béche-de-Mer Fishery Management Plan  
Note: at the time this report was published the final version of the new Plan was not yet available, we will upload it when it is.

**Appendix C** – Fieldwork report from Hong Kong SAR and mainland China (by Michael Fabinyi)

**Appendix D** – Legal report on the draft Béche-de-Mer Fishery Management Plan (by EDO NSW and Sarah Waddell)

