

University of Wollongong

Research Online

Faculty of Law, Humanities and the Arts -
Papers (Archive)

Faculty of Arts, Social Sciences & Humanities

January 2017

Chinese trader perceptions on sourcing and consumption of endangered seafood

Michael Fabinyi
James Cook University

Kate Barclay
University of Technology Sydney

Hampus B. Eriksson
University of Wollongong, hampus@uow.edu.au

Follow this and additional works at: <https://ro.uow.edu.au/lhapapers>

Research Online is the open access institutional repository for the University of Wollongong. For further information contact the UOW Library: research-pubs@uow.edu.au

Chinese trader perceptions on sourcing and consumption of endangered seafood

Abstract

Growing trade networks through globalization have expanded governance of local environments to encompass multiple scales. The governing role of market actors, such as traders and consumers in importing countries, has been recognized and embraced for sustainable seafood sourcing and trade. The perceptions that affect the conduct of these actors are a potential influence on governance of distal environments. In this paper we investigate the perceptions of sea cucumber traders in China. Sea cucumbers are an important global fishery commodity predominantly traded to China, the world's largest seafood market, and seven traded species are endangered globally. We examine what traders and consumers in China perceive as important issues in seafood markets, and where they perceive the responsibility for sustainable fisheries to lie, to interpret what scope there is for sustainability to become an important issue in China's seafood markets. We find that clusters of perceptions about cultural status, quality, health and food safety, and country of origin influence decisions that consumers make. These norms are rooted in sociocultural practice and drive current trade strategies. While traders do want to mitigate risks and secure supplies, food safety, product quality and country of origin are viewed as more important concerns than stock sustainability. Responsibility for sustainable fishing is perceived to be that of national governments in production countries. Trading practices and consumer perceptions together pose a serious challenge to sustainable seafood markets, further confounded by clandestine cross-border gray trade into China.

Publication Details

M. Fabinyi, K. Barclay & H. Eriksson, 'Chinese trader perceptions on sourcing and consumption of endangered seafood' (2017) 4 *Frontiers in Marine Science* 181-1-181-12.



Chinese Trader Perceptions on Sourcing and Consumption of Endangered Seafood

Michael Fabinyi^{1,2,3*}, Kate Barclay¹ and Hampus Eriksson^{3,4}

¹ Faculty of Arts and Social Sciences, University of Technology Sydney, Sydney, NSW, Australia, ² Australian Research Council Centre of Excellence for Coral Reef Studies, James Cook University, Townsville, QLD, Australia, ³ WorldFish, Penang, Malaysia, ⁴ Australian National Centre for Ocean Resources and Security, University of Wollongong, Wollongong, NSW, Australia

OPEN ACCESS

Edited by:

Annette Breckwoldt,
Alfred-Wegener-Institut für Polar- und
Meeresforschung, Germany

Reviewed by:

Lydia Chi Ling Teh,
University of British Columbia, Canada
Sebastian Christoph Alexander Ferse,
Leibniz Centre for Tropical Marine
Research (LG), Germany

*Correspondence:

Michael Fabinyi
michael.fabinyi@uts.edu.au

Specialty section:

This article was submitted to
Marine Conservation and
Sustainability,
a section of the journal
Frontiers in Marine Science

Received: 07 December 2016

Accepted: 24 May 2017

Published: 15 June 2017

Citation:

Fabinyi M, Barclay K and Eriksson H
(2017) Chinese Trader Perceptions on
Sourcing and Consumption of
Endangered Seafood.
Front. Mar. Sci. 4:181.
doi: 10.3389/fmars.2017.00181

Growing trade networks through globalization have expanded governance of local environments to encompass multiple scales. The governing role of market actors, such as traders and consumers in importing countries, has been recognized and embraced for sustainable seafood sourcing and trade. The perceptions that affect the conduct of these actors are a potential influence on governance of distal environments. In this paper we investigate the perceptions of sea cucumber traders in China. Sea cucumbers are an important global fishery commodity predominantly traded to China, the world's largest seafood market, and seven traded species are endangered globally. We examine what traders and consumers in China perceive as important issues in seafood markets, and where they perceive the responsibility for sustainable fisheries to lie, to interpret what scope there is for sustainability to become an important issue in China's seafood markets. We find that clusters of perceptions about cultural status, quality, health and food safety, and country of origin influence decisions that consumers make. These norms are rooted in sociocultural practice and drive current trade strategies. While traders do want to mitigate risks and secure supplies, food safety, product quality and country of origin are viewed as more important concerns than stock sustainability. Responsibility for sustainable fishing is perceived to be that of national governments in production countries. Trading practices and consumer perceptions together pose a serious challenge to sustainable seafood markets, further confounded by clandestine cross-border gray trade into China.

Keywords: sea cucumber, China, seafood trade, sustainability, food safety, environmental governance, sustainable seafood movement

INTRODUCTION

Environmental governance is strongly affected by what actor groups perceive the important issues to be, and who they perceive as being responsible for addressing those issues (Robbins, 2004; Lakoff, 2010; Bennett, 2016; Beyerl et al., 2016; Cox and Pezzullo, 2016). How these perceptions influence governance has been explored in diverse fields. Work on “mental models,” behavioral economics and psychology has focused on understanding individual representations of the external environment (Jones et al., 2011; Beyerl et al., 2016), while much work in social anthropology and political ecology has examined how broader socio-political contexts and relationships contribute

toward the perceptions that shape environmental governance (Li, 2007; West, 2016). In this context, “governance” is viewed not as the sole domain of governments, but more broadly to encompass multiple scales and actors. We use Kooiman et al.’s (2005, p. 17) definition of governance as “the whole of public as well as private interactions taken to solve societal problems and create societal opportunities. It includes the formulation and application of principles guiding those interactions and care for institutions that enable them.” For example, small-scale fisheries governance is heavily influenced by diverse perceptions about the value of biodiversity and the environment (Foale and Macintyre, 2005), the state of the environment (Beyerl et al., 2016), the role of governance agencies (Jentoft, 2000), and social relations among stakeholders (Coulthard et al., 2011). With an increase in fisheries trade and the increasing role of private actors in certification and ecolabels, perceptions of consumers and traders can also have significant influence on environmental governance via international seafood markets. Consumer and retailer perceptions in international markets about the relative importance of sustainably caught fish can lead to the introduction of certification and ecolabels, which have influenced the development of fisheries management in source countries (Gutierrez et al., 2016). China is the world’s largest seafood market, and the perceptions that influence decisions among traders in this market are important to understand. In this paper, we draw on interview data on sea cucumber trade in Hong Kong and mainland China to examine if and how consumer and trader perceptions about sea cucumbers and the sustainability of sea cucumber fisheries affect environmental governance.

Conventionally, sustainable fishing has been perceived as the responsibility of governments and fisheries management institutions in producing countries. Contemporary globalization of social-ecological systems through markets, however, has caused vulnerabilities to people and environments that are difficult for national governments in producing countries to regulate (Berkes et al., 2006; Liu et al., 2013). For example, more than 50% of terrestrial and marine species threats in Malaysia and Papua New Guinea (PNG), two iconic global biodiversity hotspots, are linked to global trade (Lenzen et al., 2012). Seafood is the most highly-traded animal protein (Rabobank, 2015), so patterns of fisheries production and sustainability can thus be strongly influenced by the preferences and perceptions of actors (e.g., consumers and traders) in locations far from the original site of production. Modern market pressure is one of the central drivers of the status of biomass in marine environments and a central challenge to developing more sustainable production (Cinner et al., 2013; Kittinger et al., 2015). The sustainable seafood movement (SSM) has consequently developed as a way to effectively link market actors along the entire supply chain with the general discourse and specific aspects of sustainability, responding to the lack of effective measures related to the problem of declining fish stocks by governments (Gutiérrez and Morgan, 2015). It has expanded rapidly in recent years (Bush et al., 2013). The largest eco-label for seafood, the Marine Stewardship Council (MSC), now covers 306 certified fisheries in over 30 countries with a total of 9.5 million metric tons of seafood caught annually, representing approximately 10% of the global

harvest (MSC, 2016a). The perception in some countries that market actors are part of environmental governance—a central idea underlying the SSM—has therefore had a significant impact on global fisheries.

As the world’s leading consumer of food fish—up to 38% of global food fish by 2030 according to one source (Kobayashi et al., 2015)—the Chinese market is of particular importance for marine resource governance. The amount of seafood consumed per capita in China has been rising steadily over the past several decades, especially since the early 1980s when China’s economy began to boom: from less than 5 kg in 1980 to almost 35 kg today (FAOSTAT, 2016)¹. China is therefore a hugely influential market in global seafood consumption. Yet the perceptions, priorities and assumptions that drive the Chinese market are quite different to those of more well-documented markets in the USA and Europe, and remain comparatively under-examined.

In this paper we assess interviews with sea cucumber traders to examine how Chinese trader and consumer perceptions affect environmental governance in the frame of this international seafood trade. The sea cucumber trade is a particularly useful case to explore because the sourcing network connects Chinese consumers to global production in small-scale fisheries in poorer nations, as well as more developed industrial fisheries in developed countries, and high-technology aquaculture. Sea cucumbers have long been consumed in China as an item in banquets and as a health food. As the middle classes have expanded in China, sea cucumber consumption has also increased. Domestic production of sea cucumbers has escalated rapidly since the early 2000s (Fabinyi and Liu, 2014), while imports have also expanded. Between 1996 and 2011, the number of countries serving the Chinese sea cucumber market expanded from 35 to 83 and over 90% of the world’s tropical coastline now lies within countries that export sea cucumbers to Hong Kong (Eriksson et al., 2015). This surge in consumption has had significant effects for countries that supply the market (Eriksson and Clarke, 2015), and seven traded species are endangered (Purcell et al., 2014b). Globally, at least 38% of sea cucumber fisheries are considered overfished and 24 countries have closed or attempted to close their sea cucumber fisheries due to overfishing (Purcell et al., 2013). Although the majority of the sea cucumber market in China is in dried form—*bêche-de-mer* (BDM)—there is also a growing market for frozen and fresh (live) sea cucumbers (Purcell et al., 2014a). The traditional drying process is low-tech and enables stockpiling in production locations without refrigeration. This method has facilitated export from some of the least developed and most remote tropical islands of the world (Kinch et al., 2008).

We recognize that the trade in sea cucumbers has highly significant effects on other societally important concerns, such as local economic development and poverty alleviation (Barclay et al., 2016), but the focus of this study is on the question of environmental sustainability within the international seafood trade sector. We do not adopt a formal definition of perceptions in this study, but use the term in a general sense to refer to “the way in which something is regarded,

¹FAOSTAT Database. Available online at: <http://faostat3.fao.org/browse/FB/CL/E>.

understood or interpreted” (Oxford Dictionary, 2016). The paper examines perceptions about sea cucumber consumption, specifically relating to banqueting, food safety and health, and quality and country of origin. It then addresses perceptions about the governance of sea cucumber fisheries, including perceptions about environmental sustainability and trade regulation. We ask the following questions, which we return to in the Discussion section:

- (1) What do traders and consumers in China perceive as important issues in sea cucumber markets?
- (2) Where do traders and consumers perceive the responsibility for sustainable sea cucumber fisheries to lie?
- (3) What scope is there for sustainability to become an important issue in China’s sea cucumber markets?

METHODS

In September 2015 in China, interviews were conducted at major wholesale markets for dried seafood, where sea cucumbers are sold: Sheung Wan in Hong Kong, Yidelu in Guangzhou, Jingshen in Beijing, and Tongchuan in Shanghai.

Interviews were conducted together with a research assistant (one in Guangzhou and Hong Kong, one in Beijing, and one in Shanghai) in order to interpret from Cantonese when the interviewee did not speak Putonghua (sometimes called Mandarin), or to assist in the translation of some Putonghua when necessary. Interviews in Hong Kong and Guangzhou were conducted in a mixture of Cantonese and Putonghua, while interviews in Beijing and Shanghai were conducted in Putonghua. Some interviews extended up to an hour, while most lasted for approximately 30 min. Interviews were conducted until effective saturation of information took place, i.e., each new interview yielded little or no new data (Morse, 1995). In all, 30 traders or representatives of trade organizations were interviewed in detail (see **Table 1** and Supplementary Material). More interviews were undertaken with traders in Hong Kong and Guangzhou compared to Beijing and Shanghai because of the disproportionately large number of traders who specialized in sea cucumbers in these locations, reflecting their importance as key trading nodes. Interviews were semi-structured (Bernard, 2006), and focused on a range of topics related to the trade, including trade structure, buyer preferences, pricing and market trends, and marine resource governance in China and in source countries. Observations were also conducted, as well as many brief informal conversations with traders and price checks at retail outlets. Most traders of sea cucumber trade with

a broader portfolio of dried seafood products that includes abalone, fish maw, scallops, and shark fin. Traders specialize in one or more of these products to differing degrees; 10 of the traders we interviewed focused predominantly on sea cucumber. Our interviews focused on wholesale trading operations which specialized in sea cucumber, and which were of relatively larger scale, with an office in the market and several employees.

Interviews were also carried out with three key informant researchers from Australia and Hong Kong, identified by the authors as experts with detailed knowledge of the sea cucumber trade in Hong Kong and China. The topics for these interviews included similar questions used for the traders in order to triangulate their responses, and questions on particular areas of their expertise (e.g., environmental regulations, trading practices between Hong Kong and China). We did not directly interview international consumers themselves but asked traders, as key informants, for their views on consumer demand.

Because of the sensitive nature of some of the interview questions in relation to trade practices, they were not recorded, but detailed notes were taken. These notes were then qualitatively analyzed for patterns that emerged (Bernard, 2006).

The paper also draws on some unpublished data from 20 earlier interviews with Beijing seafood restaurant operators in 2012, and two interviews with traders of dried seafood products in Beijing in 2014 (see Fabinyi and Liu, 2014, 2016, for full elaboration of the methods used in the earlier studies). We also draw on existing published research on sea cucumber consumption and trade, and other secondary data, such as technical reports.

This study was carried out in accordance with the recommendations of the University of Technology Sydney Human Research Ethics Committee with informed consent from all subjects. All subjects gave verbal informed consent. The protocol was approved by the University of Technology Sydney Human Research Ethics Committee (reference number 2014000548). The Committee only required verbal consent, not written.

RESULTS

Table 2 provides a summary of perceptions about sea cucumber consumption and marine resource governance in China and their environmental and socio-economic implications.

Perceptions about Sea Cucumber Consumption in China

General Consumption Preferences

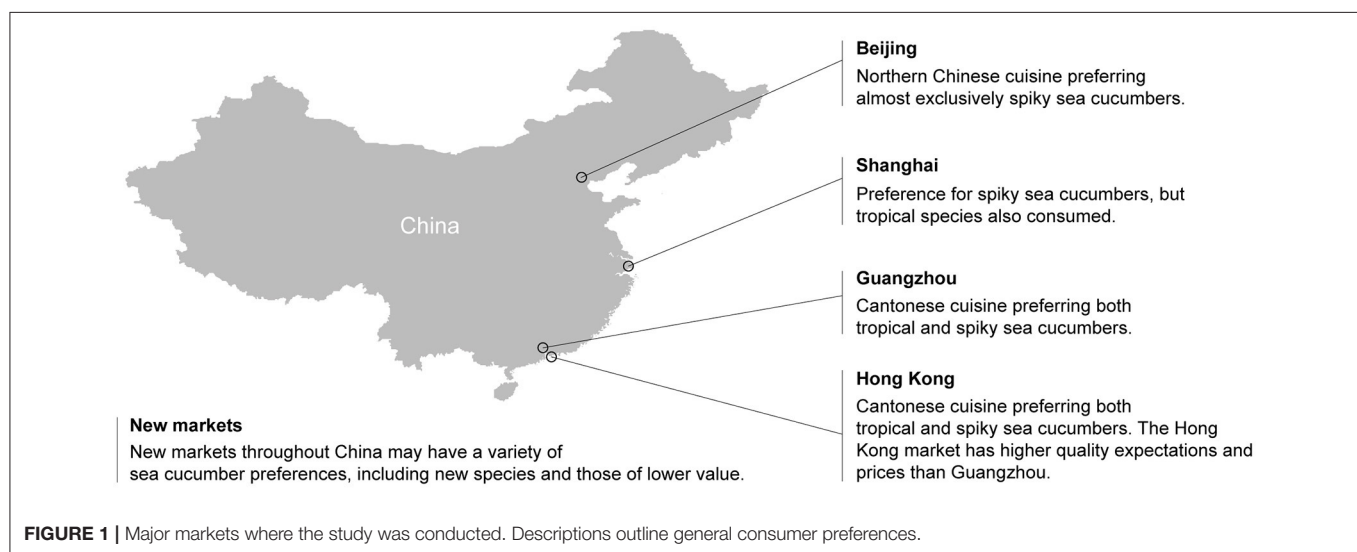
Two major types of sea cucumbers are distinguished by Chinese traders, and consumption preferences differ depending on geographical location (**Figure 1**). Japanese spiky sea cucumbers, *Apostichopus japonicus*, are found in temperate waters in parts of China (especially Liaoning and Shandong provinces) and neighboring countries such as Korea, Russia, and Japan. While they are often captured in the wild, they are also cultured in large quantities (Chen, 2003; Han et al., 2016a). Commonly referred to as *cishen*, (spiky sea cucumber), the most highly

TABLE 1 | Interviews in Hong Kong and mainland China.

Location	Number of interviews
Hong Kong	12
Guangzhou	9
Beijing	4
Shanghai	5

TABLE 2 | Summary of perceptions in China that influence BDM consumption and governance.

Perception	Environmental and socio-economic implications
CONSUMPTION	
Banqueting culture provides impetus for luxury consumption.	Social pressure to consume.
Increasing middle class wanting to buy luxury foods.	Increasing demand for sea cucumbers.
Consumer preference for food perceived as healthy, driving everyday consumption.	Rapidly increasing market for mid- and low-value product.
Sustainable fisheries not seen as an important quality of sea cucumbers as a product.	No pressure on traders by retailers to ensure sustainable sourcing.
Quality of processing and country of origin are important.	Currently not connected to environmental governance, but this could change if traceability improves.
GOVERNANCE	
Sustainability not seen as the responsibility of market actors.	No pressure by traders on suppliers for sustainably caught product.
Informal social norms and networks take precedence over formal trade laws.	The gray trade undermines traceability, transparency and rule of law, all necessary for any regulations on sustainability that could potentially be introduced for imports into China.

**FIGURE 1** | Major markets where the study was conducted. Descriptions outline general consumer preferences.

valued individuals of these sea cucumbers reach the highest prices on the markets and are regarded as the best of all sea cucumbers (prices of USD80–475/kg). This is for several reasons: their spiky appearance is viewed as appealing (the longer the spikes, the better); they are of a suitable size to be served individually, whole; and they are regarded as having better nutrition and health benefits than other types of sea cucumbers. In much of northern China, these temperate sea cucumbers dominate the market.

In contrast, tropical sea cucumbers include a far greater diversity of species and are sold in far greater quantities in southern Chinese markets. While *A. japonicus* is also the most highly-priced type of sea cucumber in southern markets, unlike in northern markets there are also significant numbers of tropical sea cucumbers. Their popularity in southern markets is likely due to their natural distribution in the south, as well as the historical linkages of southern Chinese communities with source locations of tropical sea cucumbers (e.g., in Southeast Asia) (Tagliacozzo and Chang, 2011). These larger tropical sea cucumbers are also sometimes served whole, but are more

often sliced up. They can be served individually or with other ingredients.

The prices of sea cucumbers vary significantly—from less than USD30/kg for dried, cheaper species of lower quality, to more than USD450/kg for high-value species of excellent quality (Table 3). *A. japonicus* was the most expensive type of sea cucumber in all locations, followed by sandfish (*Holothuria scabra*; *H. lessona*) (price of USD30–130/kg) and teatfish (*H. fuscogilva*, *H. nobilis*, *H. whitmaei*) (price of USD25–115/kg). Other types of tropical sea cucumbers commonly sold include prickly redfish (*Thelenota ananas*), South American sea cucumbers (*Isostichopus fuscus*, *I. badionotus*) and curryfish (*A. herrmanni*) (prices of USD20–110/kg). Purcell (2014) has conducted a more comprehensive survey of tropical sea cucumber prices in southern China.

Banqueting

Sea cucumbers were and are consumed for two major reasons: as a luxury status item, and as a health product. Records of sea cucumbers as part of royal cuisines have existed since the

TABLE 3 | Prices of selected sea cucumbers in USD/kg, September 2015.

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>	194–601	186–680		237–473 (from Japan)	79–316	Endangered
Sandfish, golden sandfish	<i>Holothuria scabra</i> , <i>H. lessoni</i> .	72–124	31–132	16–39	32–55	24–63	Endangered
White teatfish, black teatfish	<i>H. fuscogilva</i> , <i>H. nobilis</i> , <i>H. whitmaei</i>	70–117	61–108	24–39	32–39	24–38	Endangered/Vulnerable (<i>H. fuscogilva</i>)

The column on conservation status was taken from the IUCN Red List (IUCN, 2016). For these species, high quality products are consumed in banquets and mid- to lower- quality products are consumed at home and for family occasions.

Ming Dynasty (1368–1644), and they became more prominent during the Qing Dynasty (1644–1912) as one of the “eight great sea delicacies” (Yang and Bai, 2015, p. 9). In contemporary times, the most highly-priced sea cucumbers form part of luxury seafood banquets, served (often in a soup) together with other delicacies such as shark fin, bird’s nest soup, reef fish, lobster and abalone. In China, such banquets are central for professional and social advancement. The social relationships and “connections” (*guanxi*) necessary to “get ahead” can only be formalized through the shared experience of eating together (Mason, 2013; Harmon, 2014). The emphasis in such banquets is to give “face” (*mianzi*) to guests, and a key way to give face is to offer “face dishes” (*miancai*). Expensive dishes such as those containing sea cucumber therefore serve the function of showing the guests that the host values and honors them. These banquets provide the social context for the consumption of high-value sea cucumbers.

Recently, however, the luxury sea cucumber market has witnessed a downturn. First, the government’s anti-corruption campaign (Jeffreys, 2016) is viewed by traders to have had a significant effect on the sales of dried seafood generally. Hong Kong traders of dried seafood widely reported reduced profits over the past 2–3 years. One Hong Kong trader advised that the price of most kinds of BDM had dropped by 30–50% 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 how Japanese spiky sea cucumber had dropped from USD473 to USD315/kg in the course of 2015. Beijing traders reported significant declines in sales over the past years (see also Fabinyi and Liu, 2016). One Beijing trader spoke of an 80% drop in sales; another described a 70–80% drop in sales. Several dried seafood traders had closed since 2013. The anti-corruption campaign began shortly after Xi Jinping’s ascent to the leadership in late 2012, and has continued and even intensified since then. One of the specific targets of this campaign was government officials using public funds at banquets. While sea cucumbers are not exclusively eaten at such banquets, a considerable proportion of them are. Secondly, another factor relating to demand has been the slowdown in the Chinese economy. Due to government policies aiming to transition to a slower but more sustainable economic growth

pattern, since 2011 the growth rate of the Chinese economy has been slowing. However, the market for many of the mid- and low-value sea cucumbers will likely continue to expand, especially in new markets throughout China, largely due to their popularity as a health product.

Health and Food Safety

Sea cucumbers are also consumed for perceived health benefits, and they have been long documented in handbooks of Traditional Chinese Medicine (Yang et al., 2015). The name, *haishen*, literally means “sea ginseng,” and sea cucumbers are regarded as being especially good for kidney function and against impotence. Chefs and traders that we interviewed cited the numerous benefits of eating sea cucumbers: “Sea cucumbers have the function of self-repair and regeneration. So eating them will have a positive effect on our health. And it is a zero cholesterol, low fat food,” noted one. Another described how “if you eat it for a month, your immunity will be enhanced, and cancer cell growth will be restricted.” Others spoke of the positive effects of sea cucumber consumption on skin, their anti-aging properties, and their high levels of vitamins. Sea cucumbers are often sold in pharmacies, next to other traditional Chinese medicines. They are also sometimes incorporated into different products such as soap, “Holothurian wine,” and capsules (Figures 2A,B; see also Purcell et al., 2014a). Scientific research is ongoing to try to confirm the health benefits of sea cucumbers (Kiew and Don, 2012).

The importance of health as a driver of sea cucumber consumption is linked to strong concerns about food safety in China. 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 in China (Klein, 2013). An example of a prominent food safety concern in the marine sector is the use of antibiotics and other chemicals in aquaculture. This can be seen in product marketing: some farmed *A. japonicus* sea cucumbers, for example, are sold with the national Chinese organic certification in Beijing, which is administered by the China Organic Food Certification Center under the Ministry of Agriculture. Much of the frozen sea cucumbers and other types of seafood sold in Beijing supermarkets are sold with labels emphasizing “pollution-free,” “natural” characteristics



FIGURE 2 | Holothurian wine (A); capsules with contents of sea cucumbers (B); frozen sea cucumber from a supermarket (C); “Australian bald” sea cucumbers sold in Hong Kong (D).

(Figure 2C). Some sea cucumbers have labels asserting they are “non-additive” and “chemical free” “to assure consumers that no additives have been used to artificially increase the reconstitution ratio of the product” (Purcell et al., 2014a, p. 49). One Beijing-based trader described the potential for “green” labeling that focused not on environmental sustainability of the production, but on food safety: “in the past nobody asked about these things, but more and more people do now.”

Because of these strong associations with health, many people and families in China also consume sea cucumbers in less formal restaurant settings, among family gatherings, or regularly at home. Traders also noted that unlike shark fin, sea cucumber could be easily prepared at home by people with no formal training. There is therefore also a very large market for lower-valued sea cucumber that is consumed by diverse groups of people.

Quality and Place of Origin

A central factor affecting the price of sea cucumbers is the quality of the processing (Purcell, 2014). Most traders stressed the importance of good processing, and many traders simply stated that they would only try and buy good-quality sea cucumbers, and avoid those that were poorly processed. Dryness was the most important factor mentioned by many traders; related to this was the expansion rate (i.e., how much they convert from dry to wet

weight). Other characteristics looked for by traders included the way the sea cucumber was cut; the saltiness (the less salty the better); the size; the shape (straight and symmetrical, not curly); and the extent of damage. These characteristics determine the “grade” of the sea cucumber, and their eventual price.

Linked to these perceptions about the quality of sea cucumbers are perceptions about country or region of origin. Products from PNG and some Southeast Asian countries, for example, had a poor reputation for processing. Most traders suggested that the quality was very low, due to poor processing (e.g., poor handling of catch, poor drying, poor cutting, bad shape, high salt content). One trader noted that because of the poor quality of PNG products his company had stopped buying from there. Only one trader suggested that the quality of PNG products was high, citing the high quality of the “seawater” in PNG, meaning that it was low in industrial pollution compared to many production locations around Asia. In Beijing and Shanghai, most traders had not heard of PNG, and did not know where it was geographically located.

In contrast, place of origin branding is used for certain countries that are perceived to produce high quality seafood products. Different seafood products are associated with different countries. The best abalone and rock lobsters are perceived to come from Australia, for example, whereas the best salmon is perceived to be from Norway. For *A. japonicus*, Japanese sea

cucumbers are regarded as the best quality, and within Japan, sea cucumbers from the northern region of Hokkaido are viewed as particularly high quality. Within China, cultured *A. japonicus* from Liaoning and Shandong provinces are viewed as the best sea cucumbers. For tropical species, Australian sea cucumbers are regarded as the best.

Because of this reputation for quality based on place of origin, traders regularly advertise their tropical sea cucumbers as being Australian when there is no way of telling the actual origin of the product. Almost all of the sandfish (*H. scabra*) sold in Hong Kong, for example, is simply marketed as “Australian bald sea cucumber” (Figure 2D). These include undersized sea cucumbers that are unlikely to be from there because of the sizing requirements for Australian fisheries (e.g., 20 cm in Queensland; DEEDI, 2011). By contrast, despite the high numbers of these types of sea cucumber exported to Hong Kong from countries such as Philippines and Indonesia (Conand et al., 2014), no branding from these countries was observed. Such practices indicate that mislabeling is likely widespread, and that traders exploit consumer preferences for Australian products and the weak system for seafood traceability in China (Xiong et al., 2016).

Perceptions about Governance of Sea Cucumber Trade

Stock Sustainability

Consumer preferences for food that is considered safe and healthy significantly overshadow any concerns about stock sustainability that may be present. A recent survey of 300 middle-class seafood consumers in Beijing and Shanghai, for example, found strong support (mean score 3.7 out of 5) for the statement that “Compared to sustainability, I am more concerned about food safety when consuming seafood products” (Fabinyi et al., 2016, p. 7).

Many traders acknowledged problems of environmental sustainability, including with sea cucumbers—some noted, for example, that the supply of sea cucumbers from certain locations was becoming more difficult to source, and many Hong Kong and Guangzhou-based traders knew of management measures in other countries. One Hong Kong trader who had had long dealings with exporters in PNG, for example, 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 countries should sustainably manage their fisheries, and saw advantages to their business because of this. Four traders, for example, suggested that it could help to stabilize prices, while two others suggested it could help to stabilize supply. As one noted, “if they are sustainably managed, of course this will stabilize the supply, and eventually the price.” One Guangzhou-based trader suggested that sustainable management was a good idea “because sea cucumbers are slow to grow” and hence are vulnerable to overfishing. Overfishing was therefore recognized as a problem by some traders because of its impact on supply.

Other traders were less concerned about environmental sustainability: “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” one Guangzhou trader stated. Another one stated that “it would be better to catch them all at one time; it’s not my business if there are no sea cucumbers for harvesting anymore.” One Guangzhou trader advised that “there are still lots of sea cucumbers in the wild, and sustainability is not a concern compared to shark fin. So sustainability wouldn’t be helpful for me to improve the business.” This last comment refers to the widespread perception in China that sharks are threatened, in part due to an intensive environmentalist campaign featuring celebrities (Fabinyi et al., 2016). Because there is no such widespread perception in China about the threatened status of many types of sea cucumbers, there is no perceived gain to marketing them as “environmentally sustainable” in the manner promoted by the SSM.

Nearly none of the traders were willing to seriously engage with sustainability actions and initiatives, or said that certification schemes could improve their business. Only one Hong Kong-based trader suggested that eco-labeling may attract the interest of buyers. One other Guangzhou-based trader noted that eco-labeling “may attract traders whose target customers are from high end. I think it may be good for branding, but it would need a long time to set the image.” Most traders were instead very skeptical about the potential of eco-labels to improve their business, had not heard of the MSC, for example, and were not interested in MSC certification. As one trader stated, “I don’t think it can improve my business and I think buyers and customers from Hong Kong and China don’t care about this.” Others expressed a high level of cynicism toward such schemes: one trader, for example, asserted that “everyone knows that these certifications are just bought by companies anyway, and aren’t actually worth anything, so no-one will pay extra for them.” Cynicism toward abstract institutions such as certification and indeed the food system more broadly is widespread in China (Hanser, 2010; Klein, 2013). As we discuss in the Discussion and Conclusion, however, the status of the MSC and the discussion of sustainability issues in China does have the potential to change.

Others focused on the more general issue of responsibility for sustainability. One Guangzhou trader, for example, pointed out that private certification is unnecessary for seafood products, because “the Chinese government is already very strict with regulation.” Another Guangzhou-based trader suggested that “most countries already have sustainable management in place, so these types of certification aren’t necessary.” As another Guangzhou-based trader put it: “Of course this [sustainability] is a very big problem. But I just sell these products. It’s the responsibility of governments to regulate their fisheries properly.” The implication of such comments is that the responsibility for sustainable management of fisheries is perceived to be the role of governments (Fabinyi et al., 2016). From this perspective, sustainability is associated with state regulatory frameworks and is not perceived as something markets should or even could deliver.

Trading

Perceptions about trading practices have a strong influence over the extent to which this trade can be effectively governed for sustainability (Clarke, 2004). The structure of the sea cucumber

trade in Hong Kong and mainland China is complex, subject to change over time, and enmeshed in a broad range of other economic and social institutions.

Considerable uncertainty remains about trade routes, which tend to be fluid, opaque and diverse. One key route is from source countries into Hong Kong, re-export to Guangzhou, and then throughout mainland China. This is because Hong Kong is a free port with no tariffs but sea cucumber imports to the rest of the country attract tariffs of up to 30% (depending on the trade relationship of the country of origin with China). Officially, seafood transferred from Hong Kong to the mainland is subject to the tariff. Sea cucumber, along with other forms of seafood, thus appears to be transported into China through clandestine channels to avoid the tariff. The majority of Hong Kong-based traders reported selling most of their products to mainland China. When selling to mainland Chinese buyers, Hong Kong-based traders advised that buyers from the mainland take responsibility for transportation to mainland China. As one trader described: “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.” In this way, responsibility for trade legality is perceived to be that of the trader in China.

Guangzhou is the major trade hub for sea cucumbers brought into mainland China from Hong Kong. There are approximately 1,000 members of the Guangzhou Dried Seafood and Nut Industry Association (GDSNIA), the primary trade association in the Yidelu market area. When asked about potential opportunities for exporters to export directly to Guangzhou (bypassing Hong Kong), Guangzhou-based traders simply advised that this would be a more expensive way for exporters to do business, and that it would be much cheaper for exporters simply to sell in Hong Kong in order to avoid the taxes. Some Guangzhou-based traders pointed out that they did not need to invest overseas and buy directly 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?” The GDSNIA explained that it advised all of its members to do business completely legally, but acknowledged that it did not control the way its members did their business.

How the sea cucumbers are imported into Guangzhou, and the regulations that are supposed to govern the cross-border trade, was not something traders wanted to talk about in detail. This is understandable, given recent high-profile cases of prosecution against seafood traders in Guangdong province, and even more recent crackdowns by the central Chinese government against smuggling (Godfrey, 2014, 2015). Some traders advised that sea cucumbers were hidden within other cheaper types of seafood that would be subject to lower taxes. 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). Vietnam is another possible gray trade route into China (To and Shea, 2012; Eriksson and Clarke, 2015). Some

Guangzhou-based traders simply advised that these matters were all the responsibility of a “logistics company,” and that they did not know about any of the customs regulations. Smuggling practices have also been documented at point of export from producing countries to evade regulation and trade tariffs (e.g., The Hindu, 2016).

In such an environment, where formal governance institutions are weak and the trade is clandestine, perceptions about social relationships and informal institutions take on new significance (Nee and Oppen, 2012). Of particular importance is the perception of trust among business partners, which is more important than obeying the formal regulations regarding tariffs. This trust is in many instances cultivated over long-term family relationships that are built up over time (Cheung and Chang, 2011). Most of the seafood traders in both Beijing and Shanghai, for example, are also of either Guangdong or Fujianese origin, and many have family or long-term links with traders in Guangzhou. The importance of these types of social relations in professional contexts has been discussed in a great deal of literature in Chinese anthropology and sociology (e.g., Fei, 1992 [1947]; Wank, 1999). *Guanxi*, or the establishment of social relationships via trading of gifts, favors and banquets, for example, remains an indispensable part of professional success in contemporary China (Yang, 1994). These perceptions about the nature of social relationships are therefore central not only in creating demand for sea cucumbers in banquets discussed in 3.1.2, but also as part of the social relations needed to successfully engage in the sea cucumber trade—including the illegal gray trade. The gray trade, founded on these social relationships, is a significant barrier to sustainability and improved environmental governance of the sea cucumber trade (Wu and Sadovy de Mitcheson, 2016).

The importance of trust among business partners extends to source countries. In many cases, such exporters of seafood also tend to be of Chinese background (Tagliacozzo and Chang, 2011). Chinese traders who invested in overseas source countries for sea cucumbers emphasized the necessity of having a trusted local partner: “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 5 minutes.” Social norms and networks, and how they are perceived to operate, are therefore factors that strongly influence possibilities for governance of the trade.

DISCUSSION AND CONCLUSION

What Do Traders and Consumers in China Perceive as Important Issues in Sea Cucumber Markets?

We asked three questions at the onset of our analyses. When answering the first question we note that there is a range of perceptions in China that contribute to the nature of the sea cucumber trade and demand for sea cucumber products. The

diversity of consumers across Chinese provincial cuisine, social class and occasion, and a matching wide range of products on offer to cater for each of them, illustrates an immense complexity and challenge for understanding market drivers and the effects of sustainability initiatives. We also emphasize that these perceptions are not time-bound characteristics of a certain culture or society, and we do not intend to imply that the Chinese market cannot be concerned with environmental sustainability at all. Chinese consumer preferences for lower-trophic level freshwater fish such as carp, for example, is a perception that arguably has more positive effects for the sustainability of fisheries (Han et al., 2016b). We also note that while we did not directly interview consumers themselves in this study, our assertions about consumer preferences are based not only on responses from traders but also earlier research conducted with consumers and restaurant operators (Fabinyi and Liu, 2014; Fabinyi et al., 2016). Traders are in many cases also consumers of sea cucumbers.

Trader perceptions and consumer preferences constitute a part of social practices that have significant influences on environmental governance (Table 2). In the Pacific, for example, discussions are taking place about whether it is possible to market and brand Pacific BDM to appeal to consumer preferences (IUCN, 2015). The social context of banqueting and giving gifts—driven by dominant perceptions about how to achieve success in professional and societal contexts—has provided social pressure to consume high-value sea cucumbers. The increasing demand for healthy and safe food in China means that the market for mid- and low-valued types of sea cucumbers consumed in everyday meals outside of banquets—driven by a widespread perception in China that sea cucumbers are good for health—is rapidly expanding. The speed of modern expansion has caught new source countries unprepared, and many do not have the capacity to effectively manage their fisheries in the face of such pressure (Eriksson et al., 2015). Consumer preferences for sea cucumbers from certain countries seem to be driven by perceptions about the quality of seafood in these areas. However, mislabeling and a lack of traceability means that the stronger fisheries regulations in some desired source countries—such as Australia—do not necessarily lead to increased demand for actual Australian sea cucumbers that are more sustainably fished. When we summarize and interpret the consumer and trader perceptions from our study, we find that while markets are dynamic there is no clear indication that sustainability is going to become an important feature in the short- to medium- term.

Where Do Traders and Consumers Perceive the Responsibility for Sustainable Sea Cucumber Fisheries to Lie?

In China, the perception that consumers and retailers are active participants in and responsible for sustainable resource management is not widespread (Fabinyi et al., 2016). Instead, the responsibility for ensuring sustainability is seen to lie with the governments of fishing countries, and not the importing governments. Although China is a signatory to the Convention on International Trade in Endangered Species of Wild Fauna

and Flora (CITES), this is patchily enforced (Wu and Sadovy de Mitcheson, 2016) and there are no comparable regulations to those of the EU regarding Illegal, Unreported and Unregulated (IUU) fishing (Miller et al., 2014). Clandestine forms of trade to avoid tariffs are widely practiced, so that profits based on social networks and relationships are seen as preferable to following abstract state laws on tariffs that are poorly enforced. While these perceptions and practices about trade are not directly focused on environmental sustainability, they have the effect of seriously diminishing traceability and transparency, and hence the capacity to successfully govern trade. This means that even if the Chinese government were to start regulating more strongly for sustainability of imports (such as through improved enforcement of CITES regulations), the trade would first need to be brought into the legal sphere through enhanced regulation of the gray trade. Taken together with the perceptions on sea cucumber consumption discussed earlier, these perceptions about trading practices and governance have indirectly contributed to the decline and in some cases collapse of sea cucumber fisheries (Purcell et al., 2013).

What Scope Is There for Sustainability to Become an Issue in China's Sea Cucumber Markets?

Despite the fact that twenty-first century seafood consumers are increasingly materially connected to the distant environments from where products originate (Rabobank, 2015), complex multi-level supply systems tend to camouflage patterns of exploitation and sustainability that have the potential to influence consumer perceptions (Crona et al., 2016). Actors at the recipient end of supply chains are geographically removed from sourcing environments and activities, so their perceptions may not be influenced by direct experience and there is little consumer-facing traceability. Perceptions about environmental sustainability in China do not currently translate into market pressures toward sustainably caught seafood and its trade. While there is awareness of environmental problems, traders are not incentivized by consumer preferences to sell sustainably caught seafood as they are in some other countries and for other seafood. Consumers perceive environmental issues that affect them personally, such as pollution, as more important than issues of stock depletion in source countries. Improving the environmental sustainability of fisheries can improve the food safety and quality of products; however, our interviews with traders and previous research on consumer perceptions show that traders and consumers do not link these factors, but see food safety and quality as quite separate from environmentally sustainable fishing.

In 2004, Clarke (2004) found that stock sustainability was not a key factor of consideration for sea cucumber traders and emphasized that it seemed unlikely that sustainability initiatives would come from the trade domain. The narratives by traders interviewed 11 years later in our study still center on the same issues as those in Clarke's study. The trade hence seems continuously driven along its current trajectory with social structures and norms that are essentially the same as they were

in 2004. This raises a key question on how perceptions can be influenced and changed to better account for sustainability issues.

There is currently a great deal of work undertaken to increase awareness and potentially change perceptions of market actors within China. Consumer awareness campaigns, for example, have worked with celebrities to spread the idea that sustainability is a problem in shark fisheries. Jeffreys (2016) argues that these campaigns have had minimal impact on consumption practices because they do not address the social norms, pressures and expectations associated with buying shark fin. However, while consumer awareness may not be sufficient on its own to introduce sustainability into seafood markets, it is likely to at least be part of a transition to sustainable seafood markets. In this regard, there may be considerable scope for campaigners to provide awareness about the endangered wild status of many high-profile types of seafood consumed in China, such as sea cucumbers. Similarly, given that food safety is a far more dominant concern in the Chinese market, expanding the notion of “environmental sustainability” to make linkages to food safety where possible may be another potential avenue to influence consumers. There are also many other activities taking place in China that work with additional actors other than consumers in the seafood market, such as restaurants, hotels, supermarkets and other retailers (e.g., Zhou, 2016). It will be important to observe how such interventions unfold in the near future.

More broadly, this paper has contributed to the discussion concerning how to respond to the environmental sustainability challenges presented by globalization. Researchers from numerous fields have highlighted how what happens in one location can have environmental implications in another location (Berkes et al., 2006; Liu et al., 2013; Eriksson et al., 2015). The SSM was developed in part to respond to this challenge, linking actors across the length of the market chain through transparency institutions and infrastructure (Mol, 2015) embodied in certification. From this perspective, market actors around the world are viewed to be just as responsible for environmental governance through establishment of sustainable seafood markets as the government-based fisheries managers of countries where the seafood is produced (Oosterveer and Spaargaren, 2011). Producers of seafood invest in having their operations certified as sustainable, while wholesalers, retailers and consumers can exercise their market power to choose sustainably caught seafood. The rapid rise of this SSM has been affected by many geographically and historically specific factors (Gutiérrez and Morgan, 2015). Non-governmental environmental campaigns, media and scientific coverage has been focused in some areas and not others, and has changed over time. For example, awareness of the MSC label can vary widely globally, from 13% in Canada up to 71% in Switzerland (MSC, 2016b). More generally, the perception that market actors can be responsible for environmental governance through establishing and regulating sustainable seafood markets is also geographically and historically specific, and can change if broad cultural perceptions around sustainability and consumption shift, for example as a result of media campaigns.

The perceptions among Chinese traders and consumers that we have described above pose a significant challenge to the SSM. The ways in which consumer and trader perceptions

interact with influences on the trade highlight that on their own, market-based initiatives may currently struggle to provide the sorts of environmental governance impacts needed to ensure that sea cucumbers are harvested more sustainably (Jacquet et al., 2010). We suggest that this provides further evidence that the social context in which the SSM operates needs to be closely considered (Gutiérrez and Morgan, 2015; Adolf et al., 2016; Gutierrez et al., 2016). In particular, the ways in which market-based initiatives interact with the state, and the extent to which the perception that market actors can be responsible for market governance is shared across society, will be crucial for improved environmental governance through sustainable seafood markets. For China, we have argued that market-based initiatives have been hampered by limited government success in areas such as regulating the gray trade and improving traceability, and by a widespread perception that market actors are not primarily responsible for environmental governance. Ultimately, the success of the market-based SSM will be determined by the presence of regulating and enabling conditions in states and societies.

AUTHOR CONTRIBUTIONS

KB and MF conceived the research. MF conducted the fieldwork. MF, KB, and HE analyzed the data. MF, KB, and HE wrote the manuscript.

FUNDING

This research was funded by a grant from The David and Lucile Packard Foundation (KB, MF), by a Society in Science—Branco Weiss Fellowship (MF), and by an Australian Research Council grant (MF, DP140101055).

ACKNOWLEDGMENTS

Thank you to all of the traders in Hong Kong, Guangzhou, Beijing and Shanghai who spared their time to be interviewed. Thank you to Marielle Dumestre, Calton Law and Yvonne Sadovy from Hong Kong University, Hanlin Jia, Neng Liu, Yunzhun Lu, and Yining Zhang from Peking University, Lin Lin from the Jingshen Seafood Market, Wei Li from the Shanghai Administration Institute, Steve Purcell from Southern Cross University, Theo Simos from the University of Adelaide, and Allen To from WWF Hong Kong for assistance with fieldwork and/or helpful conversations that provided insight into the Chinese sea cucumber market. HE acknowledges the support by SwedBio at the Stockholm Resilience Centre. We thank the reviewers and the editor for their constructive comments that improved the paper. None of these individuals or organizations bear responsibility for the arguments presented in this paper.

SUPPLEMENTARY MATERIAL

The Supplementary Material for this article can be found online at: <http://journal.frontiersin.org/article/10.3389/fmars.2017.00181/full#supplementary-material>

REFERENCES

- Adolf, S., Bush, S. R., and Vellema, S. (2016). Reinserting state agency in global value chains: the case of MSC certified skipjack tuna. *Fish. Res.* 182, 79–87. doi: 10.1016/j.fishres.2015.11.020
- Barclay, K., Kinch, J., Fabinyi, M., Waddell, S., Smith, G., Sharma, S., et al. (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.
- Bennett, N. J. (2016). Using perceptions as evidence to improve conservation and environmental management. *Conserv. Biol.* 30, 582–592. doi: 10.1111/cobi.12681
- Berkes, F., Hughes, T. P., Steneck, R. S., Wilson, J. A., Bellwood, D. R., Crona, B., et al. (2006). Globalization, roving bandits, and marine resources. *Science* 311, 1557–1558. doi: 10.1126/science.1122804
- Bernard, H. R. (2006). *Research Methods in Anthropology: Qualitative and Quantitative Approaches*. Lanham, MD: Altamira Press.
- Beyerl, K., Putz, O., and Breckwoldt, A. (2016). The role of perceptions for community-based marine resource management. *Front. Mar. Sci.* 3:238. doi: 10.3389/fmars.2016.00238
- Bush, S. R., Toonen, H., Oosterveer, P., and Mol, A. P. J. (2013). The “devils triangle” of MSC certification: balancing credibility, accessibility and continuous improvement. *Mar. Policy* 37, 288–293. doi: 10.1016/j.marpol.2012.05.011
- Chan, G. (2015). Parallel traders back in Hong Kong after ‘useless’ four-day crackdown by mainland Chinese authorities. *South China Morning Post* 19/9/2015. Available online at: <http://www.scmp.com/news/hong-kong/economy/article/1859572/parallel-traders-back-hong-kong-towns-mainland-chinese>
- Chen, J. (2003). Overview of sea cucumber farming and sea ranching practices in China. *SPC Beche-de-mer Inform. Bull.* 18, 18–23.
- Cheung, G. C. K., and Chang, C. Y. (2011). Cultural identities of Chinese business: networks of the shark-fin business in Hong Kong. *Asia Pac. Business Rev.* 17, 343–359. doi: 10.1080/13602380903461623
- Cinner, J. E., Graham, N. A., Huchery, C., and MacNeil, A. M. (2013). Global effects of local human population density and distance to markets on the condition of coral reef fisheries. *Conserv. Biol.* 27, 453–458. doi: 10.1111/j.1523-1739.2012.01933.x
- Clarke, S. C. (2004). Understanding pressures on fishery resources through trade statistics: a pilot study of four products in the Chinese dried seafood market. *Fish. Fish.* 5, 53–74. doi: 10.1111/j.1467-2960.2004.00137.x
- Conand, C., Shea, S., and To, S. (2014). Beche-de-mer trade statistics for Hong Kong in 2012. *SPC Beche-de-mer Inform. Bull.* 34, 43–46.
- Coulthard, S., Johnson, D., and McGregor, A. (2011). Poverty, sustainability and human wellbeing: a social wellbeing approach to the global fisheries crisis. *Global Environ. Change* 21, 453–463. doi: 10.1016/j.gloenvcha.2011.01.003
- Cox, R., and Pezzullo, P. C. (2016). *Environmental Communication and the Public Sphere, 4th Edn*. Los Angeles, CA: SAGE.
- Crona, B., Daw, T. M., Swartz, W., Norström, A. V., Nyström, M., Thyresson, M., et al. (2016). Masked, diluted and drowned out: how global seafood trade weakens signals from marine ecosystems. *Fish. Fish.* 17, 1175–1182. doi: 10.1111/faf.12109
- DEEDI (2011). *Annual Status Report: East Coast Bêche-de-mer Fishery 2010*. Brisbane: Department of Employment, Economic Development and Innovation, Fisheries Queensland. Queensland Government, p. 11.
- Eriksson, H., and Clarke, S. (2015). Chinese market responses to overexploitation of sharks and sea-cucumbers. *Biol. Conserv.* 184, 163–173. doi: 10.1016/j.biocon.2015.01.018
- Eriksson, H., Österblom, H., Crona, B., Troell, M., Andrew, N., Wilen, J., et al. (2015). Contagious exploitation of marine resources. *Front. Ecol. Environ.* 13, 435–440. doi: 10.1890/140312
- Fabinyi, M., and Liu, N. (2014). Seafood consumption in Beijing restaurants: consumer perspectives and implications for sustainability. *Conserv. Soc.* 12, 218–228. doi: 10.4103/0972-4923.138423
- Fabinyi, M., and Liu, N. (2016). The social context of the Chinese food system: an ethnographic study of the Beijing seafood market. *Sustainability* 8:244. doi: 10.3390/su8030244
- Fabinyi, M., Liu, N., Qingyu, S., and Li, R. (2016). Aquatic product consumption patterns and perceptions among the Chinese middle class. *Reg. Stud. Mar. Sci.* 7, 1–9. doi: 10.1016/j.rsma.2016.01.013
- Fei, X. (1992 [1947]). *From the Soil: The Foundations of Chinese Society*. Translated by G.G. Hamilton and Z. Wang. Berkeley: University of California Press.
- Foale, S. J., and Macintyre, M. (2005). Green Fantasies: photographic representations of biodiversity and ecotourism in the Western Pacific. *J. Polit. Ecol.* 12, 1–22.
- Godfrey, M. (2014). China cracks down on seafood smuggling. *Seafood Source*. Available online at: <http://www.seafoodsource.com/news/supply-trade/27236-china-cracks-down-on-seafood-smuggling>
- Godfrey, M. (2015). China's ‘grey trade’ crackdown could change the game for seafood industry. *Seafood Source*. Available online at: <http://www.seafoodsource.com/seafood-expo-asia-2015/china-s-gray-channel-crackdown-could-change-the-game-for-seafood-industry>
- Gutiérrez, A. T., and Morgan, S. K. (2015). The influence of the Sustainable Seafood Movement in the US and UK capture fisheries supply chain and fisheries governance. *Front. Mar. Sci.* 2:72. doi: 10.3389/fmars.2015.00072
- Gutierrez, N. L., Defeo, O., Bush, S. R., Butterworth, D. S., Roheim, C. A., and Punt, A. E. (2016). The current situation and prospects of fisheries certification and ecolabelling. *Fish. Res.* 182, 1–6. doi: 10.1016/j.fishres.2016.05.004
- Han, D., Shan, X., Zhang, W., Chen, Y., Wang, Q., Li, Z., et al. (2016b). A revisit to fishmeal usage and associated consequences in Chinese aquaculture. *Rev. Aquacult.* doi: 10.1111/raq.12183. [Epub ahead of print].
- Han, Q., Keesing, J. K., and Liu, D. (2016a). A review of sea cucumber aquaculture, ranching, and stock enhancement in China. *Rev. Fish. Sci. Aquacult.* 24, 326–341. doi: 10.1080/23308249.2016.1193472
- Hanser, A. (2010). Uncertainty and the problem of value: consumers, culture and inequality in urban China. *J. Consum. Cult.* 10, 307–332. doi: 10.1177/1469540510376906
- Harmon, B. (2014). The crisscrossed agency of a toast: personhood, individuation and deindividuation in Luzhou, China. *Aust. J. Anthropol.* 25, 357–372. doi: 10.1111/taja.12073
- IUCN (International Union for Conservation of Nature) (2015). *Less Planning, More Action on – and Regional Approach to – Pacific Islands Bêche-De-Mer Fisheries*. Available online at: <http://www.iucn.org/about/union/secretariat/offices/oceania/?22054/Less-planning-more-action-on--and-regional-approach-to---Pacific-Islands-beche-de-mer-fisheries>
- IUCN (2016). *The IUCN Red List of Threatened Species*. Available online at: <http://www.iucnredlist.org/>
- Jacquet, J., Hocesvar, J., Lai, S., Majluf, P., Pelletier, N., Pitcher, T., et al. (2010). Conserving wild fish in a sea of market-based efforts. *Oryx* 44, 45–56. doi: 10.1017/S0030605309990470
- Jeffreys, E. (2016). Translocal celebrity activism: shark-protection campaigns in mainland China. *Environ. Commun.* 10, 763–776. doi: 10.1080/17524032.2016.1198822
- Jentoft, S. (2000). Legitimacy and disappointment in fisheries management. *Mar. Policy* 24, 141–148. doi: 10.1016/S0308-597X(99)00025-1
- Jones, N. A., Ross, H., Lynam, T., Perez, P., and Leitch, A. (2011). Mental models: an interdisciplinary synthesis of theory and methods. *Ecol. Soc.* 16, 46–46. doi: 10.5751/ES-03802-160146
- Kiew, P. L., and Don, M. M. (2012). Jewel of the seabed: sea cucumbers as nutritional and drug candidates. *Int. J. Food Sci. Nutr.* 63, 616–636. doi: 10.3109/09637486.2011.641944
- Kinch, J., Purcell, S., Uthicke, S., and Friedman, K. (2008). “Papua New Guinea: a hot spot of sea cucumber fisheries in the Western Pacific,” in *Sea Cucumbers: A Global Review of Fisheries and Trade*, eds V. Toral-Granda, A. Lovatelli, and M. Vasconcellos (Rome: United Nations Food and Agriculture Organisation (FAO)), 57–80.
- Kittinger, J. N., Teneva, L. T., Koike, H., Stamoulis, K. A., Kittinger, D. S., Oleson, K. L., et al. (2015). From reef to table: social and ecological factors affecting coral reef fisheries, artisanal seafood supply chains, and seafood security. *PLoS ONE* 10:e0123856. doi: 10.1371/journal.pone.0123856
- Klein, J. (2013). Everyday approaches to food safety in kunming. *China Q.* 214, 376–393. doi: 10.1017/S0305741013000325
- Kobayashi, M., Msangi, S., Batka, M., Vannuccini, S., Dey, M. M., and Anderson, J. L. (2015). Fish to 2030: the role and opportunity for aquaculture. *Aquacul. Econ. Manage.* 19, 282–300. doi: 10.1080/13657305.2015.994240

- Kooiman, J., Jentoft, S., Pullen, R., and Bavinck, M. (2005). *Fish for Life: Interactive Governance for Fisheries*. Amsterdam: Amsterdam University Press.
- Lakoff, G. (2010). Why it matters how we frame the environment. *Environ. Commun.* 4, 70–81. doi: 10.1080/17524030903529749
- Lenzen, M., Moran, D., Kanemoto, K., Foran, B., Lobefaro, L., and Geschke, A. (2012). International trade drives biodiversity threats in developing nations. *Nature* 486, 109–112. doi: 10.1038/nature11145
- Li, T. M. (2007). *The Will to Improve: Governmentality, Development, and the Practice of Politics*. Durham, NC: Duke University Press.
- Liu, J., Hull, V., Batistella, M., DeFries, R., Dietz, T., Fu, F., et al. (2013). Framing sustainability in a telecoupled world. *Ecol. Soc.* 18:26. doi: 10.5751/ES-05873-180226
- Mason, K. (2013). To your health! Toasting, intoxication and gendered critique among banqueting women. *China J.* 69, 108–133. doi: 10.1086/668804
- Miller, A. M. M., Bush, S. R., and Mol, A. P. J. (2014). Power Europe: EU and the illegal, unreported and unregulated tuna fisheries regulation in the West and Central Pacific Ocean. *Mar. Policy* 45, 138–145. doi: 10.1016/j.marpol.2013.12.009
- Mol, A. P. J. (2015). Transparency and value-chain sustainability. *J. Clean. Prod.* 107, 154–161. doi: 10.1016/j.jclepro.2013.11.012
- Morse, J. M. (1995). The significance of saturation. *Qualit. Health Res.* 5, 147–149. doi: 10.1177/104973239500500201
- MSC (2016a). *The MSC in Numbers*. Available online at: <https://www.msc.org/global-impacts/key-facts-about-msc>
- MSC (2016b). *Seafood Consumers Put Sustainability Before Price and Brand*. Available online at: <https://www.msc.org/newsroom/news/seafood-consumers-put-sustainability-before-price-and-brand>
- Nee, V., and Oppen, S. (2012). *Capitalism from Below: Markets and Institutional Change in China*. Cambridge, MA: Harvard University Press.
- Oosterveer, P., and Spaargaren, G. (2011). Organising consumer involvement in the greening of global food flows: the role of environmental NGOs in the case of marine fish. *Env. Polit.* 20, 97–114. doi: 10.1080/09644016.2011.538168
- Oxford Dictionary (2016). Available online at: <https://en.oxforddictionaries.com/>
- Purcell, S. (2014). Value, market preferences and trade of beche-de-mer from Pacific Island sea cucumbers. *PLoS ONE* 9:e95075. doi: 10.1371/journal.pone.0095075
- Purcell, S., Choo, P. Z., Akamine, J., and Fabinyi, M. (2014a). Consumer packaging and alternative product forms for tropical sea cucumbers. *South Pac. Comm. Beche-de-mer Inform. Bull.* 34, 57–62.
- Purcell, S., Polidoro, B. A., Hamel, J. F., Gamboa, R. U., and Mercier, A. (2014b). The cost of being valuable: predictors of extinction risk in marine invertebrates exploited as luxury seafood. *Proc. R. Soc. B* 281:20133296. doi: 10.1098/rspb.2013.3296
- Purcell, S. W., Mercier, A., Conand, C., Hamel, J. F., Toral-Granda, M. V., Lovatelli, A., et al. (2013). Sea cucumber fisheries: global analysis of stocks, management measures and drivers of overfishing. *Fish Fish.* 14, 34–59. doi: 10.1111/j.1467-2979.2011.00443.x
- Rabobank (2015). *Rabobank World Seafood Trade Map. Food and Agriculture Research and Advisory*. Amsterdam: Rabobank Industry Note, 1–9.
- Robbins, P. (2004). *Political Ecology: A Critical Introduction*. Cornwall: Blackwell Publishing.
- Tagliacozzo, E., and Chang, W. (2011). *Chinese Circulations: Capital, Commodities and Networks in Southeast Asia*. Durham, NC; and London: Duke University Press.
- The Hindu (2016). *Sea Cucumber Smuggling Goes on: Latest Seizure Is 20 kg*. Available online at: <http://www.thehindu.com/news/cities/Madurai/Sea-cucumber-smuggling-goes-on-Latest-seizure-is-20-kg/article14575970.ece>
- To, A. W. L., and Shea, S. K. H. (2012). Patterns and dynamics of the beche-de-mer trade in Hong Kong and mainland China: implications for monitoring and management. *Traffic Bull.* 24, 65–76.
- Wank, D. (1999). *Commodifying Communism: Business, Trust, and Politics in a Chinese City*. Cambridge: Cambridge University Press.
- West, P. (2016). *Dispossession and the Environment: Rhetoric and Inequality in Papua New Guinea*. New York, NY: Columbia University Press.
- Wu, J., and Sadovy de Mitcheson, Y. (2016). *Humphead (Napoleon) Wrasse Cheilinus undulatus trade into and through Hong Kong*. Hong Kong, SAR: TRAFFIC.
- Xiong, X., Guardone, L., Cornax, M. J., Tinacci, L., Guidi, A., Gianfaldoni, D., et al. (2016). DNA barcoding reveals substitution of Sablefish (*Anoplopoma fimbria*) with Patagonian and Antarctic Toothfish (*Dissostichus eleginoides* and *Dissostichus mawsoni*) in online market in China: how mislabeling opens door to IUU fishing. *Food Control* 70, 380–391. doi: 10.1016/j.foodcont.2016.06.010
- Yang, H., and Bai, Y. (2015). “Apostichopus japonicus in the life of Chinese people,” in *The Sea Cucumber Apostichopus japonicus: History, Biology and Aquaculture*, eds H. Yang, J. F. Hamel, and A. Mercier (Amsterdam: Elsevier), 1–24.
- Yang, H., Hamel, J. F., and Mercier, A. (2015). *The Sea Cucumber Apostichopus japonicus: History, Biology and Aquaculture*. Amsterdam: Elsevier.
- Yang, M. (1994). *Gifts, Favors and Banquets: The Art of Social Relationships in China*. Ithaca, NY; London: Cornell University Press.
- Zhou, S. (2016). Sustainable seafood week begins Saturday. *China Daily* 3 August. Available online at: http://www.chinadaily.com.cn/china/2016-08/03/content_26335903.htm

Conflict of Interest Statement: The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

Copyright © 2017 Fabinyi, Barclay and Eriksson. This is an open-access article distributed under the terms of the Creative Commons Attribution License (CC BY). The use, distribution or reproduction in other forums is permitted, provided the original author(s) or licensor are credited and that the original publication in this journal is cited, in accordance with accepted academic practice. No use, distribution or reproduction is permitted which does not comply with these terms.