Introduction

Blue procurement models come in several different structures. First, is the structure of obtaining marine aquarium products which are sustainable and beneficial to local communities. Second, is the structure of obtaining reef-dependent seafood that has been independently verified against a sustainability certification such as the Marine Stewardship Council (MSC). Third, is working with small-scale fisheries which may be subsistence-based and/or have a commercial aspect. Relatedly, a fourth potential form of blue procurement is the establishment of concessions, such as conservation or community-managed concessions, which produce sustainably sourced products.

Historical Overview

The sustainable procurement of locally produced commodities—particularly by Indigenous Peoples—has existed for thousands of years. However, the origin of commercial green procurement likely started with the creation of the Forest Stewardship Council (FSC) in 1994, and the launch of the Sustainable Forestry Initiative (SFI) in 1995. The Marine Stewardship Council (MSC) was launched shortly thereafter in 1997 after a statement of intent was signed between WWF and Unilever in 1996. The MSC Fisheries Standard was then “born” in 1998.

Other important historical dates include:
1999: “By 1999, with its standard in place and with growing interest from fisheries, fish buyers, and retailers, the MSC became independent of WWF and Unilever, and a year later {2000} certified its first fishery – for rock lobsters off the coast of Western Australia.”

2000: Carbon Disclosure Project (now known as CDP) is founded.

2004: WWF initiated the Aquaculture Dialogues which “were a multi-stakeholder roundtable {that} formally started in 2004,” and later “the Netherlands based Sustainable Trade Initiative IDH joined forces with WWF Netherlands to create the Aquaculture Stewardship Council {ASC} in 2010.”

2006: “The watershed came in February 2006, when Walmart, the world’s largest retailer, declared that it was aiming to sell only MSC-certified seafood within five years. {…} Retail, however, is only half the story: in the United States, over 50 percent of all seafood is eaten in restaurants, so the catering sector is vital too. But then, just weeks after the Walmart breakthrough, the Compass Group – the largest catering company in the Americas, which supplies thousands of restaurants, schools, and hospitals – made a similar announcement. Sustainable seafood had entered the mainstream.”

2008: In 2008 “US Congress followed suit and passed an amendment to the Lacey Act of 1900, which prohibits trafficking in illegally harvested plants and wildlife.”

2009: CDP launched the global Water Disclosure Project.

2015: Forest Trends’ new project and platform Supply-Change.org is launched.

2017: Indonesia “became the first nation to make its fishing fleet visible to the world via GFW {Global Fishing Watch}. Since then, Peru, Chile, Panama, Mexico, Namibia, and Costa Rica have either published their vessel data to the GFW map or have publicly committed to do so.”

2019 (October): Seafood Stewardship Index is launched by the World Benchmarking Alliance (WBA), “ranking 30 of the most influential seafood companies in the world on their commitments, transparency and performance to meet the UN SDGs.”

2019 (October): Global fishing data from the Global Fishing Watch becomes available on the Bloomberg Terminal.
Mechanisms of Instrument

Commodity supply chains—whether for pelagic tuna, farm-raised oysters, or MSC-certified rock lobsters—often involve local producers, aggregators, processors, traders, manufacturers, and buyers, along with extensive transportation, marketing and financing networks, and auditors. Consumer pressure (e.g., product boycotts) and investor pressure (e.g., filing proxy statements) are helping to influence these supply chains to adopt more sustainable procurement practices and to address climate change. For instance:

BlackRock, the world’s largest asset manager, put corporate boards on notice that it expects them “to have demonstrable fluency in how climate risk affects the business” and how management is managing that risk. Specifically, the world’s largest asset manager is encouraging companies, “in due course,” to follow the recommendations of the Financial Stability Board’s Task Force on Climate-Related Financial Disclosures, launched in December by Michael Bloomberg and Mark Carney, governor of the Bank of England. 14

As stated by WWF,

By implementing mechanisms such as tradable fishing quotas, levies, and product certification, fisheries managers can provide economic incentives for sustainable fishing practices, thereby improving both the environmental and economic conditions of the industry. Governments can raise revenues to manage fisheries by charging fishing access payments, license fees, excise taxes and fines.15

In addition to an independent certification such as MSC, there is also the use of individual fishing quotas (IFQs) and individual transferable quotas (ITQs):

Under a system of IFQs, a government fisheries agency or an industry-wide association of fishers allocates specific shares of the total allowable catch of a given fish species within a defined area to specific individuals, groups, or companies. This is often done on the basis of their current or historical shares of a particular fishery, although lotteries and auctions have also been used as the basis for allocating quotas. Because fishers have the property right to secure future benefit from the resource, they are prepared to wait, and practice conservation, in order to optimize their long-term return.

Under a system of ITQs, these shares or quotas are made freely transferable and divisible, and can be bought and sold to other fishers or fishing companies. ITQs can also be leased or mortgaged, like other types of property rights. Without any expenditure of public funds (other than for administrative
costs), the private sector thereby ends up achieving the same result as expe-
sive government programs designed to buy out excess fishing capacity, either
by scrapping excess fishing vessels or by paying individual fishers not to fish.16

An important mechanism of sustainable commodity supply chains is a certi-
fication standard, and numerous procurement models involve independent
verification against a third-party certification. There are also internal certifi-
cations, which are viewed as potentially less transparent and less stringent.
Some of the leading independent certification systems include Aquaculture
Stewardship Council (ASC)-certified and MSC-certified seafood.

Obtaining certification may yield a premium price on the commodity
when compared to its traditional counterpart, or certification may open up
markets for certified products which would not otherwise exist. In addition
to certification standards, there are reporting mechanisms such as reporting
to the CDP, particularly its Water Program.17 Companies reporting to the
CDP Water Program include both publicly traded companies and privately
held companies.

Several other innovative, technological advancements have enabled better
supply chain management and traceability including the Global Fishing
Watch and the Sea Around Us. The Global Fishing Watch is “promoting
ocean sustainability through greater transparency. We use cutting-edge tech-
nology to visualise, track and share data about global fishing activity in near
real-time and for free.”18 Similarly, the Sea Around Us “makes a wide range
of data analyses and indicators available.”19

Size of Instrument

There are several ways to assess the size of the blue procurement sector and
its potential.

Aquaculture Stewardship Council (ASC)

The ASC is an independent certification standard used to assess social
and environmental practices of farm-raised (i.e., aquaculture) seafood. The
ASC, as of January 2020, certified a total of 1134 farms and another 273
farms were in assessment. Collectively, the certified production volume was
approximately 1.9 million tons of farm-raised seafood.20

As noted by TNC, “the growth of aquaculture presents an opportunity
that is both environmental and financial in nature. Current forecasts suggest
producers will need $150 to $300 billion in capital expenditures in the next ten years to build out the infrastructure required to accommodate consumer demand.”

**Marine Aquarium Trade**

There is a global market for the marine aquarium trade:

In terms of target species, Elizabeth Wood notes that for fish, 1,000 species are caught and an estimated 25-35 million specimens are traded annually. The most commonly traded are low individual value species such as butterflyfish, anemonefish, damselfish, gobies, angelfish and wrasse, with this being supplemented by low-volume trade in high-value fish such as clown triggerfish. In terms of identifying the major exporters, Colette Wabnitz and others indicated that between 1997-2002 there were the Philippines (43 per cent), Indonesia (26 per cent), and the Solomon Islands (12 per cent), the remaining trade being sourced from Australia, the Maldives, Fiji, Palau and Sri Lanka. Over the same time period, specimens from these states were mainly destined for the USA, the UK, France, Germany and the Netherlands.

According to the FAO, “between 2000 and 2011, global exports of ornamental fish increased from US$181 million to US$372 million. Total trade in live marine ornamentals is estimated at around US$44 million annually.”

**Marine Stewardship Council (MSC)**

According to the MSC’s 2018–2019 Annual Report, there were in 2019:

- 361 certified fisheries (including 13 fisheries currently suspended) and another 109 fisheries in assessment;
- 11.8 million tonnes of MSC certified catch, representing 15% of the overall global catch;
- The 109 fisheries in assessment represent another 1% of the global catch; and
- A total of 41 countries had MSC certified fisheries.

In addition, there were approximately 37,000 products sold with the blue MSC label, which included one million tons of seafood sold to consumers with the MSC label, and an estimated USD$9.1 billion was spent by consumers on seafood with the MSC label.
The following case studies will examine LINI’s Sustainable Ornamental Fish Aquaculture, Western Australia’s MSC-Certified Rock Lobster Fishery, Rare’s Fish Forever Work in the Philippines and Indonesia, and Blue Ventures’ work in Madagascar. LINI is based in Bali, Indonesia and uses the sustainable capture of reef fishes as a driver of stewardship, including the Banggai cardinalfish. The Western Australia Rock Lobster Fishery was the first MSC-certified fishery in the world. The Western Rock Lobster is Western Australia’s most valuable fishery and historically was Australia’s most valuable single species wild capture fishery. Rare, a global nonprofit organization, has developed the Fish Forever Program, which is being used throughout the Philippines and Indonesia. Fish Forever is under the umbrella of coastal fisheries reform using fully protected areas to protect essential fish habitat and to both replenish and sustain fish production. OurFish is an application applied to the program and a signature program of Rare, which is also applied to the Fish Forever Program, as is the use of Pride Campaigns to shift key behaviors. Blue Ventures, in collaboration with local communities, has helped develop the concept or approach known as locally managed marine areas (LMMAs). Blue Ventures’ LMMAs program focuses on three zones along Madagascar’s west coast, which together include over 75 communities, a combined coastal population of more than 40,000 people, and a total marine area of almost 6000 km².

**Case Study #1: LINI’s Sustainable Ornamental Fish Aquaculture**

**Introduction**

LINI is based in Bali, Indonesia and uses the sustainable capture of reef fishes as a driver of stewardship. LINI, which means “to line up,” is an early initiative, small project but one that is a complex undertaking with many components. For instance, LINI is working on sustainable supply chains with a part of it including endemic species, there are financial aspects related to working with local communities whose livelihoods are dependent on the reefs, LINI undertakes coral reef restoration, and LINI has been working over the years to influence policy and to educate the government on how to see the coral reefs differently (i.e., the government sees the reefs primarily for tourism, but reefs also provide for sustainable fisheries)²⁶ (Fig. 14.1).
More specifically, the waters off Banggai Island are home to the Banggai cardinalfish (*Pterapogon kauderni*), which is an endemic species only found in this tiny area in Central Sulawesi, Indonesia. In addition, LINI also works with the octopus trade on Banggai Island and LINI works in North Bali and Banda Island, Indonesia with mainly the artisanal, handline tuna fisheries. 27

**Identify the Problem**

One of the main problems is that while there are many organizations working within MPAs, there are fewer organizations—such as LINI—that are working outside of the MPAs. Likewise, there are very few organizations looking at the issues outside of the MPAs, in the areas where there are little-to-no regulations or enforcement. 28

With respect to the supply chain for sustainable ornamental marine fish, there were a host of problems. Essentially, actors throughout the supply chain did not know how to do the business and there was overexploitation of the natural resource and fair trade was not happening. For instance, there were destructive fishing practices, practitioners did not know how to export fish nor how to hold the fish, and the exporters wanted to pay the fisherfolk as little as possible.
Regarding destructive fishing practices, cyanide has been shown to be harmful to reefs, fish, and people. Net-catching is more sustainable when fishers are properly trained in the method; however, where fishers do not know how to efficiently use nets, it can be quite harmful to the reef. 29

Because there was little money, fisherfolk tried to collect as many fish as possible (i.e., such as blue tangs). Furthermore, the fisherfolk were not informed about how to safely dive, because they did not have the knowledge nor the proper equipment. This latter point was so serious, that fisherfolk even died, and it was like “a blood diamond but with fish.” 30

Another problem was that around the year 2000, only people who had money were able to keep marine tang because you needed the necessary gadgets and equipment, in addition to the expensive fish. However, the less expensive nano tang began to be produced in China. 31

The Banggai cardinalfish, which is endemic to Banggai Island, is also classified on the IUCN Red List as endangered. 32 Likewise:

Since 1995 it {the Banggai cardinalfish} has increasingly been exploited for the international aquarium trade. In its proposal to have the species inscribed on Appendix II in 2007, the USA quoted figures of 600,000–700,000 specimens traded in 2001. The FAO assessment relating to this proposal was unsympathetic as it was felt the population levels had not reduced enough to merit inscription. Given the species’ high productivity, the FAO interpreted the marine species annotation to the Fort Lauderdale Criteria as requiring an 80-90 per cent reduction in population size to justify Appendix II listing. At COP14, the proposal was withdrawn after a number of contracting parties concurred with the FAO opinion, whilst Indonesia reassured the USA that it had worked with the EU to implement sustainable management plans for the species. 33

**Why the Problem Is Important**

Indonesia is an archipelago nation with a large number of people living by the coast and approximately 80% of the reefs are being exploited by small-scale fisheries. Yet, from the coast to the borders of the EEZs, the Indonesian Government does not see the activities outside of the MPAs as much of a concern and does not provide enough attention. Yet, these areas provide food security for Indonesians and provide income for the country through exports. In addition, it is often marginalized communities, that not enough organizations work with, who are dependent on these areas. Yet through sustainable fisheries, these local communities can be guardians of the reefs and you can link the fisherfolk with the hobbyists. 34
Another reason why the problem is important and why the Marine Aquarium Council (MAC) wanted to start with Indonesia is because after the Philippines, Indonesia is one of the main exporters of aquarium fish.\textsuperscript{35}

Furthermore, Central Sulawesi is amongst the fifty most important bioclimatic units.

**How Problem Was Identified**

The problems facing areas outside of the MPAs were identified mainly by NGOs. For instance, the founder of LINI, Ms. Gayatri Reksodihardjo-Lilley, previously worked with WWF Indonesia for nine years before LINI. It was during her time with WWF Indonesia, that Ms. Reksodihardjo-Lilley first worked on the issues which included identifying the problem of corals being mined for construction purposes and that corals were being unsustainably collected for ornaments and for the export trade. Ms. Reksodihardjo-Lilley then started talking to local fisherfolk and the coral collectors and advised them to collect dead corals rather than taking a big chunk of live corals. Ms. Reksodihardjo-Lilley and her team, back in 1998, then started lobbying the government to stop these practices. However, Ms. Reksodihardjo-Lilley and her team saw the problem, but did not see the problem from the business side, and just wanted it to all stop and “there were a lot of nos and a lot of do not do this or do that.”\textsuperscript{36}

Ms. Reksodihardjo-Lilley then joined the Marine Aquarium Council (MAC) and learned a lot about the problems facing the supply chain and realized that you can really make the aquarium trade sustainable and there are businesses who want to do the right thing.\textsuperscript{37}

Ms. Reksodihardjo-Lilley then founded LINI to put it all together—from the local fisherfolk to the exporter, importer, and wholesaler—to achieve a situation where the private sector is benefitting conservation.\textsuperscript{38}

**Effectiveness of Process for Identifying Problem**

Ms. Reksodihardjo-Lilley started seeing through the supply chain that the buyers from the retail shops wanted to help, but they did not know how to help. The MAC, as a standard-setting organization, started working through the issues with the belief that an independent certification could help demonstrate that fish coming from the producing country are able to maintain optimal health until the retailers. During this time, the MAC spread throughout Indonesia to provide training on better fish collection methods.
This included helping fisherfolk understand there were other options to catch fish and to do so without harming the environment. The thinking was that if the buyer could appreciate the changing ways, then they could reward the fisherfolk. Similarly, the fisherfolk could then see there was an incentive for them to change.\textsuperscript{39}

**Steps Taken to Address the Problem**

There were several steps taken, as previously mentioned:

- Ms. Reksodihardjo-Lilley joined the MAC and learned about the problems facing the supply chain and realized that you can really make the aquarium trade sustainable and there are businesses who want to do the right thing.\textsuperscript{40}
- Ms. Reksodihardjo-Lilley then founded LINI to put it all together—from the local fisherfolk to the exporter, importer, and wholesaler—to achieve a situation where the private sector is benefitting conservation.\textsuperscript{41}

As explained by PhD candidate Ms. Shannon Switzer Swanson, what is great about LINI is that the main part of their work, that is productive, is that they are so attuned to the local context. LINI is very open to adapting their process to the communities’ needs, the interest there, and their local resources. In Banggai, for example, there were a handful of people who are buying and selling blue tangs and Banggai cardinalfish. LINI worked with these people and used their skills to give them opportunities to raise and sell fish, and not just catch them.\textsuperscript{42}

**Results**

In terms of policy, one of the most important results is that Ms. Gayatri Reksodihardjo-Lilley and her team were able to get the government to start collecting data on reef fish for the aquarium trade. It took ten years to achieve this, but it is now part of the agenda.\textsuperscript{43}

In terms of the traditional fisherfolk and the local communities, Ms. Reksodihardjo-Lilley does not think they have achieved what they wanted to achieve. For instance, in the Banggai Islands, there are still fisherfolk collecting fish (i.e., particularly blue tangs) with cyanide. However, LINI just does not have enough people, time, and funding.\textsuperscript{44}

Another achievement is that there are industries, particularly the retail shops in the buying countries, who are starting to recognize and support
LINI. For example, LINI has started to collaborate with Maidenhead Aquatics, which has over 160 stores across the United Kingdom.\textsuperscript{45} Representatives from Maidenhead Aquatics come each year to meet with LINI to learn about the industry, to meet the fishers, to appreciate what the fishers do, and to help LINI do reef restoration in North Bali and in Banggai Island.\textsuperscript{46}

Furthermore, Fair Trade certification just started in Indonesia for tuna and Safeway has started to offer this Fair Trade tuna from Indonesia.\textsuperscript{47}

### Challenges and How They Were Met

One challenge is that you cannot do premium pricing with sustainable, wild-caught marine aquarium fish. The premium pricing and payments are not very difficult to work on throughout the supply chain within the country. However, when you start talking with the exporters and especially with the importers, particularly in the United States, they do not want to increase their prices. It is like “greenwashing whereas people in the developed countries say yeah it has this certification, but as long as it is cheap.” A related problem is that many fisherfolk have stopped collecting Banggai cardinalfish because the value is too small and the fisherfolk have other occupations such as tending to clove gardens or collecting octopus. This said, Indonesia is one of the top ten countries to export reef octopus for the food trade.\textsuperscript{48}

Another challenge is that the MAC did not work well and in fact, it no longer exists. While people in Indonesia were eager to use the MAC, from the business and financial aspect, the exporters and importers did not want the cost to be added. Similarly, it is challenging to implement a labelling system—whether Fair Trade or MAC—with aquarium fish because you are dealing with a live specimen. Likewise, you can label coffee or chocolate, but you are dealing with a live animal and how do you put a label on a fish? It is also hard to trace and you need to put a big investment into the infrastructure.

A further challenge was that the United States, under CITES, sought to ban the trade in Banggai cardinalfish around 2008. The U.S. withdrew its proposal, but then approximately ten years later, the same scientists proposed a similar ban through the EU. However, there needs to be local stakeholders who properly manage the fishery, as opposed to a complete ban or moratorium. This is because the Banggai cardinalfish are easy to breed and easy to identify in the wild, so you just need to do enforcement.\textsuperscript{49}

While 99% of marine aquarium fish cannot spawn in captivity, the reverse is true with freshwater fish. This said, if you can buy captive bred, buy captive bred, but a lot of marine fish are wild caught.\textsuperscript{50} Thus, another challenge is
that some areas, such as Hawaii and Fiji, are closing the marine aquarium trade. In Hawaii, there was a suspension of collecting marine aquarium fish. Green chromis, yellow tangs, and clownfish are popular tropical fish, with yellow tangs, in particular, coming from Hawaii. However, organizations, including the SCUBA industry, saw that tangs were disappearing and believed it was a result of collection. In Fiji, “everything being traded is stopped,” including live rock (i.e., reef rock with life in it, which is not coral but helps in filtration) which was a big trade in Fiji. Unfortunately, some would mine live rock for roads and buildings. Around May 2018, the Indonesian Ministry of Marine Affairs and Fisheries stopped issuing the health certification for corals for the aquarium trade as they did not believe the aquarium industry was complying with the regulations. There are no corals being exported (i.e., both wild and cultured corals), but more and more species are coming from marine cultures. There is a lot of potential for marine cultures for coral farmers and there is a conservation aspect as farmers are basically creating coral habitat. However, instead of stopping just the bad actors, the Government stopped the entire trade, including those who were doing good for the environment. While the trade of wild-caught corals should be stopped, you need to do marine culture on a case-by-case basis as you are adding more corals when you do marine culture.51

Beyond Results

Researchers with Roger Williams University, including Dr. Andrew Rhyne, are developing a gadget to test the cyanide levels in fish and LINI is going to collaborate with the researchers.52 This should help with the sustainability of the trade.

Lessons Learned

Ms. Gayatri Reksodihardjo-Lilley, with 20+ years of experience, has several lessons learned to share. First, there is a need for more organizations that are interested in this work and who are working on marine aquarium industry issues to get involved. Likewise, Ms. Reksodihardjo-Lilley has worked for the Big International NGOs (BINGOs) and they work a lot with dive tourism and food fish. However, the BINGOs—whether it is not cool or whether there is a mindset that fish should be used for food or swimming in the ocean and not in aquariums—are not working on sustainable aquarium fish.53
There is still a lot of work that needs to be done, but the marine aquarium trade can be sustainable for many of the species and the communities can be the guardian of the reefs. The fish being collected need healthy reefs and those communities that understand this need will self-protect the reef because they are dependent on the reefs for fish.54

It is not easy to get funding. Funding is needed so local communities can be trained about managing their resources. Likewise, the communities need help from other organizations on how to manage the resources, such as doing a resource assessment and monitoring of the resources by a government entity and/or an NGO. In addition, the industry can help itself throughout the supply chain such as the way that Maidenhead Aquatics makes a regular contribution or donation of £1 to LINI for every box of marine aquarium fish that is purchased through its supply chain.55

Other Resources for LINI’s Sustainable Ornamental Fish Aquaculture

“Expanding our understanding of the trade in marine aquarium animals” paper by Andrew L. Rhyne et al.

- https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5274522/

LINI

- http://lini.or.id/; and
- https://www.facebook.com/LINIfoundation

Maidenhead Aquatics

- https://www.fishkeeper.co.uk/

Marine Aquarium Biodiversity and Trade Flow

- https://www.aquariumtradedata.org

Ornamental Fish International

- https://www.ofish.org/
Case Study #2: Western Australia’s MSC-Certified Rock Lobster Fishery

Introduction

The Western Australia Rock Lobster Fishery was the first Marine Stewardship Council (MSC) certified fishery in the world. The Fishery, which consists of zones A, B, and C, is located off the coast of Western Australia from the city of Augusta on the Southern boundary to the city of Onslow on the Northern boundary (Fig. 14.2).

The Fishery had an “initial limited-entry system {which} evolved into a sophisticated TAE {Total Allowable Effort} control system with ITE {Individual Transferable Effort} units issued to each vessel, which allowed the fishery to operate close to maximum sustainable yield (MSY) levels and to generate significant licence values for fishers. More recently (2010), this fishery was converted to TAC {Total Allowable Catch} management with a strategy of targeting maximum economic yield. In other words, the Fishery swapped from an input control regime to an output control regime.

Another interesting feature of the Fishery is that “in a more general context, these prices paid for pot units traded through the licence register set up under the Fisheries Act are an equivalent to ‘stock market’ prices where the fishery as a whole is equivalent to a listed ‘company’ and the ITE or ITQ units are effectively ‘shares’ in that company.”

Identify the Problem

Historically, there were problems associated with limiting the number of fishing vessels, particularly vessels from out of state, and problems associated with the potential drastic increase in the number of lobster traps...
(known as pots). This said, “although the vessel and pot numbers were controlled, nominal fishing effort measured as ‘pot lifts’ continued to increase through the 1970s and 1980s and the effectiveness of fishing gear was also increasing.”\textsuperscript{60} Thus, there were concerns about “recruitment overfishing” and “effort creep.”

Climate change is another problem facing the Fishery. For instance:

The south west of Western Australia is predicted to be heavily influenced by the impacts of climate change (e.g. increasing sea temperatures, declines in rainfall). Some climate change information has been taken into account in the
rock lobster stock assessment process and the effect of the marine heat wave in 2010/11 on fisheries has been assessed but further information is required to examine potential impacts on this bioregion.61

This said:

At a longer time scale, WRL {Western Rock Lobsters} have been rated a high risk to the effects of climate change as many aspects of its life history are highly sensitive to environmental conditions (Caputi et al., 2010). The economic performance of the WCRLMF {West Coast Rock Lobster Managed Fishery} is strongly affected by the value of the Australian dollar (affecting the price of lobsters), fuel and labour costs and status of the Chinese economy as China imports nearly all of the WRL.62

Bycatch is another potential problem. In addition to past issues with the bycatch of marine mammals and sea turtles, the “main bycatch species landed in the WCRLMF are octopus, champagne crabs, and baldchin grouper.”63

Why the Problem Is Important

These problems are important because the Fishery provides jobs and revenue to the commercial fishery. The Fishery is also a large recreational fishery.

Western Australia has approximately eight species of rock lobster, but the “most abundant by far is the western rock lobster {Panulirus cygnus}.”64 The Western Rock Lobster “{…} forms an important sector of the State’s economy. It is Western Australia’s most valuable fishery, with an estimated value of $359 million in 2014, and has historically been Australia’s most valuable single species wild capture fishery.”65

Similarly, the Fishery “{…} is important for regional employment with 234 commercial vessels operating in 2017 with most of the catch handled by four main processing establishments. The rock lobster fishery is also a major recreational activity and provides a significant social benefit to the Western Australian community with over 60,000 recreational fishers holding rock lobster licences in 2017.”66

It is also important to conserve seagrasses and shallow reefs, where approximately 95% of recruits live before the lobsters, upon nearing puberty, migrate West.

Further, Western Australia’s Shark Bay and Ningaloo Coast are both listed as World Heritage Marine Programmes.
How Problem Was Identified

The Fishery has “been the subject of comprehensive biological research and management since 1963,” and thus, the problems have been assessed on an ongoing basis. Since 1949,

the commercial fishery has been documented through industry landing records and detailed research logbooks since 1963. Additional information from puerulus settlement (1968 onwards), observer programmes (starting 1971), and fishery independent spawning stock surveys (1991 onward) have provided particularly detailed databases for the fishery.

Further,

An extensive science program supports the management of lobster fishing. We collect data on commercial and recreational catches and fishing activity, and carry out independent monitoring to look at the abundance of the breeding stock, puerulus settlement and environmental factors that may affect breeding success and survival.

These programs enable our researchers to estimate catches up to four years ahead, and assess the impacts of changes in fishing technology and practice.

For the past 20 years, recreational catch and fishing effort has been estimated from the results of an annual mail-based survey of fishers. Since 2000/01, telephone diary surveys have provided extra data. The trends generated by the data collected, with data on puerulus settlement, are used to predict recreational catch and effort in following seasons.

Effectiveness of Process for Identifying Problem

It has been noted that:

Consultation occurs between the Department and the commercial sector either through the Western Rock Lobster Council or the Annual Management Meetings convened by the Department through the Western Australian Fishing Industry Council. Consultation with Recfishwest and other interested stakeholders is conducted through specific meetings and the Department’s website. Consultation with non-fisher stakeholders is undertaken in accordance with the Department’s Stakeholder Engagement Guidelines.

Thus, the process for identifying the problems appears to be effective.
Steps Taken to Address the Problem

The Fishery includes both recreational and commercial fishing. Steps taken to address threats of overfishing by recreational fishers include the fact that “recreational lobster fishers need a licence and there are also gear restrictions and size, bag and boat limits, as well as a closed season.” For commercial fishing, there are:

- Areas closed to fishing;
- Lobster size limits;
- Protection for any females in breeding condition;
- Controls on the type of gear used; and
- A limit on the catch for the whole fishery, known as Total Allowable Commercial Catch (TACC).

The annual TACC has fluctuated from a low of 5500 tons, to approximately 6300 to 6600 tons, and could possibly go as high at 7000 tons.

With respect to bycatch, for instance, “the move of the rock lobster fishery from an effort-controlled fishery to a catch quota fishery, coupled with significant effort reductions, will ensure the octopus catch in the WCRLMF remains a low proportion of the overall catch.”

Results

Some results from the Fishery are:

- The Fishery was “one of the first limited entry fisheries in the world”;
- In 2000, the Fishery became the first fishery in the world to be certified to the MSC. In 2017, the Fishery was recertified to the MSC for a fourth time; and
- In 2016–17, “there were 878 direct jobs and 1558 indirect jobs including in direct fishing, processing, boat building and tourism.”

Another major result of the Fishery is that researchers can predict within 2% the stock of lobsters in four years’ time. Every year a stock assessment is conducted to determine what future takes will do for profitability and for the stocks. Relatedly, the Fishery was one of the first in Australia to undertake independent sampling. Data for fisheries often comes from the fishers, which can be bias, such as when reporting whale entanglements and bycatch. In contrast, the Fishery’s sampling has been standardized, as much possible
to include the same bait, traps, locations, and the same lunar cycles. In addition to this sampling, there is a smart camera system deployed in commercial lobster pots and gives a snapshot of the local environment (e.g., the fish swimming around, pictures of seafloor, etc.), takes baseline data such as water temperature, and all of this is geo-referenced.\textsuperscript{78}

There is also a long-term coral reef monitoring program. Likewise, “the main activities at the Abrolhos are commercial rock lobster potting and line fishing and recreational fishing and diving. The Department has a long-term coral reef monitoring program at the Abrolhos to detect potential impacts from human use and natural influences.”\textsuperscript{79}

Another major result of the Fishery is that the “major long-standing and most successful processor in the Western Australian fishery has historically been a large fishers’ cooperative, which distributes its profits back to fishers and has had no incentive to accumulate fishing rights on its own behalf and compete with its shareholders.\textsuperscript{80}

With a reduced TACC, the Fishery processors—with half the supply—have focused on marketing and processing changes. This includes a focus on the export market for live lobsters mainly to China and less so to Japan and Taiwan. The price at the dock has gone from about AUS$18 per kilogram to approximately AUS$70 per kilogram. This has been a benefit to fishers who no longer need to go to sea during storms or holidays.\textsuperscript{81}

There is also a positive result of a rebounding whale population, including Southern right whales \textit{Eubalaena australis} and one of the world’s fastest recovery rates for humpback whales \textit{Megaptera novaeangliae}.\textsuperscript{82}

**Challenges and How They Were Met**

One challenge for the Fishery has been bycatch and entanglement:

Whale entanglements increased with the move to quota management, peaking in 2013 with 17 reported entanglements in western rock lobster fishing gear. The significant social and ethical concerns around these entanglements prompted two collaborative Fisheries Research and Development Corporation (FRDC) research projects between industry and government. These led to the introduction of gear modifications in 2014, which has seen a reduction in entanglements.

In what was considered to be a world first, mitigation measures required fishers to remove slack from pot ropes, reduce the number of floats, avoid having pots in clusters, and minimise fishing in known migration pathways.
Gear modifications are estimated to have reduced entanglements of whales in western rock lobster gear by about 66%, with two and four entanglements recorded in the 2015 and 2016 seasons respectively. However, with an increasing whale population migrating through the fishery each year, a continued collaborative approach between industry and government to mitigate these entanglements is critical.

Our Western Rock Lobster fishery continues to monitor, respond and innovate to reduce whale entanglements to as low as they can possibly be in the waters off Western Australia.83

There are more entanglements, in part, because there are more whales. To address these concerns, there is industry and government collaboration and researchers are looking at designing an inexpensive, satellite tracking buoy. Traditionally, fishing boats are not legally allowed to approach endangered species, such as whales. There are whale disentanglement teams, but such teams typically need sunlight and good weather conditions to help the whales. With a move toward a social license to fish concept, industry is stepping up, and in the future, all commercial fishing boats may be equipped with the tracking buoy that would enable a faster response by the government’s whale disentanglement teams.84

Another challenge concerns the movement of such lobsters. Likewise, “there are a few invertebrate species capable of long-distance movement, for example spiny lobsters. Lobsters are also nocturnal, making visual surveys unproductive.”85 In fact, it is not uncommon for a western rock lobster to migrate up to 800 km (nearly 500 miles).86

The challenge of relatively low tax revenue and a high volume of the Fishery being exported has often been cited. For instance:

The western rock lobster resource is currently worth over $5 billion, however the net return to the Western Australian Government through licence fees for this community resource is only $10 million per annum. Currently more than 95 per cent of commercially caught WA rock lobster is exported to China, meaning little flows into our local market for the enjoyment of Western Australians and tourists.87

There have also been challenges with stakeholders and consultations:

Some of these controls also required frequent stock assessments, real-time monitoring of catch, and adjustments midseason to ensure the fishery achieved the nominal target catch. For these reasons, the TAE changes created significant industry debate, uncertainty, and costs which ultimately contributed to the Government’s unilateral decision to simplify management by directly setting
a TAC and adopting ITQs. This occurred despite a lack of overall industry support at the time, although there had been industry consultation and debate in the preceding years.\(^{88}\)

A potential challenge, which has not materialized, is concerns about a monopoly being formed:

However, despite the lack of specific controls on who could own lobster fishing licences, ownership outside of the Western Australian fishing community has not become a feature of the fishery to date. While licence ownership controls were not imposed, there was until recently a legislated requirement that lobster processing companies (also historically subject to limited licences) were majority (80%) Australian owned to control offshore ownership and the associated possibility for transfer pricing to minimize Australian taxes.\(^{89}\)

**Beyond Results**

The Fishery appears to be sustainable. In addition to regular recertifications against the MSC, the Western Australia Government notes:

Commercial and recreational catch rates have been maintained near their record-high levels. Fishery-independent egg production indices at all sites are well above both threshold and long-term levels indicating that the biomass and egg production in all locations of the WCRLMF is at record-high levels since surveys began in the mid 1970s. The breeding stock is therefore considered sustainable-adequate.\(^{90}\)

Yet, “in recent years, research has shown a drop in ‘puerulus settlement’ – the numbers of late larval-stage lobsters settling on inshore reefs – which can be used to predict catches up to four years ahead. We are continuing to focus on securing long-term sustainability.”\(^{91}\)

Regarding bycatch and entanglements, several measures have been taken:

Sea lion exclusion devices (SLEDs) have now been implemented for rock lobster pots near Australian sea lion breeding colonies. Demersal gillnet fishing effort in the West Coast Bioregion, which has historically been responsible for a very small number of sea lion captures, is now less than 10% of its peak level of the late 1980s. Regulated modifications to rock lobster fishing gear configuration during humpback and southern right whales’ northerly winter migration have successfully reduced entanglement rates by more than 65% in recent years.\(^{92}\)
However, regarding the overall sustainability of the Fishery, it is important to recognize:

While the case study experience with ITE and particularly ITQ-based management suggests that both are capable of generating significant economic benefits, the longer term impacts of these control systems on ownership of the fishing rights, the flow of benefits from fishing, and the resulting manageability of lobster stocks are questions yet to be answered.  

**Lessons Learned**

A few important lessons learned are:

The review suggests that early adoption of tradable ‘access rights’ similar to franchisee contracts in the case study fishery was a critical first step in gaining fisher support for management and the licence values created provide a useful indicator of fishery viability. The historical process where basic biological controls are enhanced with limited entry before developing sophisticated ITE or ITQ-based systems appears an effective and efficient pathway for fishery development with wider relevance.

According to Dr. Simon de Lestang, research scientist with the Fisheries division of Western Australia’s Department of Primary Industries and Regional Development, one important lesson learned is that there is no equilibrium in fisheries. Maximum sustainable yield and finding the sweet spot was an old way of thinking. This said, the environment is changing so much and in ways we do not fully understand. Increasing water temperatures is often reported, as well as the impacts of increased ocean acidification on shells; in addition, are changing food sources, currents, and availability of zooplankton.

A more conservative approach to fisheries management is a must. The resulting reduction in catches can be compensated. For instance, more effort can be put into marketing and best handling practices to reduce injury to the lobsters and to ensure lobsters are in peak health to survive the journey. Fisherfolk can make more money and have more confidence in their business due to the greater resiliency of the fishery.

Another important lesson learned for Dr. de Lestang is the importance of demystifying fisherfolk to the general consumer. In contrast to popular opinion, the lobster fishery is a big business with lots of smart, hardworking people in the industry. The lobsters are live caught, not aquaculture, and the MSC certification helps promote a constant evolution of the fishery. This
said, if more people bought only MSC certified seafood, the oceans would be in a better place.  

**Other Resources for Western Australia’s MSC-Certified Rock Lobster Fishery**

Government of Western Australia’s Department of Primary Industries and Regional Development

- http://www.fish.wa.gov.au/Species/Rock-Lobster/Lobster-Management/Pages/default.aspx;
- 2019 Annual Report: https://dpird.wa.gov.au/sites/default/files/2019-10/DPIRD%20Annual%20Report%202019%20-%20PDF.pdf; and
- Resource Assessment Report Western Rock Lobster Resource of Western Australia: http://www.fish.wa.gov.au/Documents/wamsc_reports/wamsc_report_no_9.pdf

MSC

- https://www.msc.org/en-us/home/meet-the-wild-ones/western-australia-rock-lobster; and
- http://rock-lobster-stories.msc.org/

The Lobster Newsletter

- http://www.fish.wa.gov.au/Species/Rock-Lobster/Pages/The-Lobster-Newsletter.aspx

Recfishwest

- https://recfishwest.org.au/

Western Australian Fishing Industry Council

- https://www.wafic.org.au/

Western Rock Lobster Council

- https://www.westernrocklobster.org/
Case Study #3: Rare’s Fish Forever Work in the Philippines and Indonesia

Introduction

While many focus on addressing the impacts from large-scale, commercial fisheries, it is important to understand that:

Although the production (in tonnes of fish) of small-scale fisheries is similar to large-scale fisheries, the former employ most of the fishers and fish workers, have lower production costs and less bycatch. Furthermore, small-scale fisheries provide food (animal protein) and cash to purchase goods and services to poor people worldwide, and aquatic environments can be thus considered as ‘banks in the water’ that support local economies.96

Rare, a global nonprofit organization, has developed the Fish Forever Program, which is being used throughout the Philippines and Indonesia (Fig. 14.3).

Fish Forever is under the umbrella of coastal fisheries reform using fully protected areas to protect essential fish habitat and to both replenish and sustain fish production:

The idea of Fish Forever was born through three major realizations: that coastal fisheries were largely unmanaged and in decline; that coastal communities were facing an existential crisis impacting the foundation of their economy, food security, culture and wellbeing; and that the most widely-used management tool in coastal waters — Marine Protected Areas (MPAs) — were struggling to be effective, given a lack of community support and fisher compliance, among other factors.97

OurFish is an application applied to the program and a signature program of Rare, which is also applied to the Fish Forever Program, is the use of Pride Campaigns to shift key behaviors. The OurFish app is a specific tool used by fish buyers to record their transactions between local fishers—as a business management tool—to manage their business and to collate their taken data. This data (i.e., how many people are fishing, how many fish are taken, etc.) are then reported to local governments and management councils.

The umbrella campaign is to elevate the discussion of how to reform fisheries and connecting this back to communities through being a responsible fisher, a responsible fishing community, participating in the management of its fishery, and abiding by rules (i.e., not fishing in protected areas). There are
also tactical campaigns, such as how to drive fisher registration and not just due to legal requirements, but to take pride in their role as a fisher and to supply data. Essentially, Rare is helping to build the social movement. 98

One of the reasons behind establishing Fish Forever is that limited financing goes toward marine conservation, particularly toward small-scale fisheries. As estimated by Rare approximately “0.5% of all foundation grant-making goes to marine conservation, and an independent study Rare commissioned estimates that between 5-12% of that is directed to small-scale fisheries relevant projects; further, small-scale fisheries related projects makes up less than 0.5% on average of development finance institutions’
portfolios.” With respect to funding, “since 2012, public funders, including Germany’s International Climate Initiative (BMUB- IKI) and Blue Action Fund, Sweden’s International Development Cooperation Agency, the GEF, the World Bank/Nordic Development Fund and Nordic Climate Facility, and USAID have committed $27.5 million to Fish Forever.”

Rare works throughout Mesoamerica and the Pacific Islands, but its programs in the Philippines and Indonesia are more mature. In the Philippines, it is a slightly different context as the government has already devolved governance to municipal authorities to manage at the local level (i.e., manage fisheries, protection efforts, etc.). Likewise, Rare has been working with local governments and community groups. There is a marvelous networking system set up and the government support is great. For instance, within the national government, managing coastal zones is written into their national development plan through 2022. Further, Rare has approximately 40 staff in the Philippines, a couple of offices, and is building a training hub. In Indonesia, there are two parallel models with the provincial level and under the provincial level is the sub-districts level, which Rare is helping to build up and align.

Identify the Problem

In the Philippines, which is similar to Indonesia:

A combination of rapid population growth, growing fishing effort, the introduction of destructive fishing practices, and weak fisheries governance, along with coastal habitat loss and degradation through development and pollution, has extracted a heavy toll on the health of coral reefs, seagrass beds and mangrove forests impacting the productivity of the country’s fisheries.

This said, “coral reefs grow slowly and die quickly. Global coral cover has declined precipitously, with Indonesia and the Pacific losing 50% of live coral cover over the last 40 years.”

One such problem is bleaching as “a three-year global coral bleaching event that began in 2014 was the longest and most damaging event of its kind on record. It followed another severe bleaching event in 2010, leaving little time for recovery.”

There are also problems after building reserves and with the structures associated with having a system in place to collect data in perpetuity. Such data can inform how many fish are there, how to protect critical habitat, and how to manage the marine reserve. Rare recognized early that data was
very important to measure impact and upon joining Rare, Dr. Steve Box brought the OurFish app. The app’s largest footprint was in Honduras and Myanmar and is being rolled out in the Philippines, Indonesia, Mozambique, and Brazil. The problem that OurFish is attempting to resolve is the need for fisheries data, especially data “from the beach.” This data is the record of landing data, essentially the transaction between the fisher and the buyer. Community based buyers are the first point of sale and quite often, the fisher is connected to one buyer. From a behavior point of view, the problem is people are not accustomed to writing things down in a logbook. At the end of the day, they want to sell the fish and go home. Thus, you need to train them to undertake a new behavior that they do not want to do. Dr. Box found that buyers are accustomed to writing everything down. For instance, they write down receipts. The buyer might have lent the fishermen money to fish and then the buyer would pay the fishermen the balance when they come back to the shores. 105

Similarly:

Small-scale fishers catch for subsistence, sale in local markets, recreation and other non-commercial purposes. It’s been estimated that half of global catch for human consumption comes from small-scale fisheries, and the communities where such fishing takes place are some of the most dependent on fishing as a trade and food source. Historically, those communities, largely concentrated on the coasts of developing countries, have lacked low-cost, user-friendly means of tracking daily catch. 106

Another problem is that many MPAs are top-down:

The reasons for small-scale fisher opposition to top-down MPAs are commonly threefold. First, exclusionary MPA policies can lead to unintended social and economic consequences […]. Second, top-down MPAs have often resulted in the further marginalization of vulnerable groups and populations from marine governance processes […]. Third, the conservation goals, and thus legitimacy, of top-down MPAs is often not well communicated and therefore questioned or not understood by local fishers. 107

Thus, community engagement is essential.

**Why the Problem Is Important**

The Philippines’ Tubbataha Reef National Park is a World Heritage Marine Programme, numerous sites throughout the Philippines are listed among the
top fifty bioclimatic units (i.e., Palawan, Mindanao and Negros) and the Philippines is one of seven key countries for the Coral Reef Rescue Initiative.

Similarly, Indonesia’s Komodo and Ujung Kulon National Parks are World Heritage Marine Programmes, Indonesia’s Raja Ampat and Kalimantan are among the world’s coral reef “bright spots,” numerous sites throughout Indonesia are listed among the top fifty bioclimatic units (i.e., North Sumatra & Aceh, and Riau Islands), and Indonesia is also one of seven key countries for the Coral Reef Rescue Initiative.

How Problem Was Identified

The Fish Forever Program has taken steps to identify and monitor the problems, including:

- In Indonesia and the Philippines, “Fish Forever conducted more than 1,200 fish and 1,200 coral transects and counted more than 689,000 individual fish to measure the ecological responses to Fish Forever”;  
- “Fish landings monitoring across the three countries {of Brazil, Indonesia, and the Philippines} documented nearly 56,000 individual fishing trips, recording over 674,000 kilos of fish. Catch data were collected for all target species in Indonesia and the Philippines but were limited to five primary target species in Brazil”; and
- Rare “completed more than 15,000 Knowledge Attitude and Practice (KAP) and household surveys at the beginning and end of the Fish Forever campaigns to measure the social responses to Fish Forever.”

Effectiveness of Process for Identifying Problem

Dr. Steve Box often heads straight for the beach and spends time on the boats of fishermen to better understand their reality. As described by Rare:

These days, he {Dr. Box} starts each project by going fishing with the local fishers. ‘Sitting in their boats, watching the way they work and listening to the stories they tell’ he says. Many of their stories reveal the same conflict: the risk inherent in relying on fishing in a time of widespread fisheries decline.

Thus, the process of identifying the problems appears quite effective.
Steps Taken to Address the Problem

Rare’s three steps for saving nature with behavioral science are:

- 1. Generate collective demand for change (such as through using the Fish Game);
- 2. Coordinate shifting behavior (such as through public pledges); and
- 3. Strengthen the norm (such as through voluntary sea patrols, maintain buoys marking reserve areas, etc.).

One of the steps taken in Indonesia and the Philippines is to develop a data collection system, which Dr. Box has been running for a long time. The first one with cell phones are often the buyers, who are oftentimes a bit wealthier than the fishers. Thus, the buyers are often the initial focus for the data collection system. This said, why train a semiliterate fisher who does not want to use a logbook anyway? Yet, the benefit to the fisher is that a sort of income statement is created and sent back to the fisher via a text or WhatsApp message showing how much money they received. The fisher now has formal, documented income and they could get a loan, demonstrate collateral, and/or be eligible for community financing. Rare is now looking at how to pay fishers through mobile applications instead of cash. Likewise, the rural economy is often informal and does not touch banks, so the government does not have a good handle of the size of the local economy nor a handle on fishery statistics, which are not very good. Implementing data collecting systems, like OurFish, can solve these small-scale fisheries issues (i.e., provide social protections and social funds) and link into digital banking, which are transformational changes in the context of coastal fisheries.

As further explained:

Steve Box and his team from the Smithsonian developed a digital tool to address the challenge. Called OurFish, it’s a reporting system that taps into something fishers already carry around — their phones. OurFish is an Android app that consolidates three important pieces of information: the person fishing, the fish species being caught, and from where the fish originate. Designed to work with fisher registration cards that fishers obtain when they register with their local fisheries management department, these apps quickly scan fishers’ information from QR codes on the back of their registration cards when they head out and come back in each day. When fishers come back with their catch, buyers weigh and identify fish stock and input the data into the system, which operates using cloud-based computing. OurFish is now actively used in Myanmar and Honduras, and has just gone live in Palau.
Additional steps include:

- In 2011, “Rare, in partnership with National Geographic, launched the first-ever Solution Search, a crowdsourcing competition designed to identify the best examples of community-led solutions to the global challenge of coastal overfishing. ‘Bright spots’ sourced from the Turning the Tide for Coastal Fisheries competition helped to outline the basic elements of Fish Forever, and in 2012, Rare assembled a network of experts and institutions to identify overfishing’s drivers and design and broadly prototype a sustainable solution for the world’s coastal fishers and fisheries.”\textsuperscript{116}

- Rare “partnered with UCSB’s Sustainable Fisheries Group and EDF to design and launch Fish Forever. {…} The partnership then transitioned to a less formal, collaborative relationship in 2016. While all three organizations continue as thought partners in advancing global coastal fishery reform, Rare now directs Fish Forever with ongoing scientific support from UCSB-SFG.”\textsuperscript{117}

- “In-country Fish Forever staff trained and mentored campaign managers to design and implement the campaigns. {…} In the Philippines and Indonesia, most campaign managers were selected from local or national government authorities responsible for Marine Protected Areas (MPAs) or other area-based management systems.”\textsuperscript{118}

- “To operationalize the program, Rare set up an office in Brazil with technical expertise and bolstered existing offices in Indonesia and the Philippines with additional expertise. Country teams were organized into cross-geography management groups that helped to crystallize best practices, spread them across the program and translate them into local action”.\textsuperscript{119}

- Before Fish Forever, “Rare had implemented Pride campaigns in Indonesia and the Philippines focused on MPAs (2010–14). The experience, trust and capacity gained in this work laid the foundation for Fish Forever in these two countries {…}.\textsuperscript{120}

**Results**

To date, Rare’s Fish Forever Program has achieved numerous results. For instance, the July 2018 Fish Forever Report:

{…} describes the results of 41 Fish Forever sites, representing over 250 communities across Brazil, Indonesia and the Philippines. It is the first opportunity to analyze the past five years of design (2012–14) and implementation
Using a comprehensive monitoring and evaluation protocol, the report synthesizes information from three country learning reports, 2,400 in-water surveys of coral reefs, 15,000 individual and household surveys, and the landing records from nearly 56,000 fishing trips — and represents the work of 70 Rare staff and 80 partner organizations who have committed the time of more than 557 global staff to this project.121

This said, Dr. Box is excited to see how these ideas are catching on and spreading. Likewise, a social movement is building where the practices are not being done at just one community, but are spreading out as communities are networking with other communities and with governments. The key is how to do all of this at scale that makes ecological sense. For instance, in Southeast Sulawesi (Indonesia), Rare is reaching 10,000 fishers and working with 215 communities, 22 councils, 11 district governments, and one provincial government across 360,000 hectares of coastal waters. The behaviors are being reinforced and taking root. Each community has a specific area of reserve they are responsible to manage and the provincial government has adopted this approach as a plan for how to manage coastal waters. Instead of a competitive problem, this is becoming a cooperative stance. The same is occurring in the Philippines, where Rare is working on coordination with local governments and convened a gathering with 350 mayors to talk about coastal fisheries reforms and to bring sustainable production to municipal waters. This level of coordination—to underpin food security and well-being—is a major deal.

Important results from the data presented in the Fish Forever July 2018 Report suggests that the Fish Forever Program is working:

Ecologically, fish are recovering — fish biomass is increasing, both inside and outside no-take reserves; Socially, communities are empowered — social resilience, pride and livelihoods are improving; 51 legal and functional management bodies were established across the 41 sites; 63 managed access areas were built or strengthened, encompassing nearly 600,000 hectares of coastal waters with 27,000 hectares secured in fully protected reserves; and strengthened policies and governance provide a clear path to scale.122

Another important result is the development of the Fish Forever Toolkit.

The resulting Fish Forever Toolkit, built iteratively throughout the program, enabled fisheries data collection, fisheries management body development, fisher and community goal-setting and management plan development, and a process for implementing the Fish Forever approach. The Tool kit included: Pride curriculum; Fish Forever Curriculum and E-courses; Fisheries landscape
and goal setting; managed access with reserves design; and adaptive fisheries 
assessment and management.\textsuperscript{123}

In July 2018, Indonesia “officially designated the Dampier Strait as a 
protected TURF (Territorial Use Rights in Fisheries) network. At 211,000 
hectares and encompassing 19 villages, the Dampier Strait network is the 
largest comprehensive TURF-Reserve network in the world.”\textsuperscript{124} 
A further result is the incubation of the Meloy Fund, which is now a 
wholly owned subsidiary of Rare.\textsuperscript{125}

**Challenges and How They Were Met**

There are many challenges facing the marine environment and more specifically Rare’s work throughout Indonesia and the Philippines. It is important 
to note that:

Marine systems tend to recover, even from severe pressure, if marine habitat is 
not irreversibly destroyed. Full recovery can require a decade or more. Marine 
systems are highly dynamic; recovery tends to be uneven, subject to temporary 
setbacks, and difficult to attribute to specific causes or triggers. Given this 
timeframe and the lack of consistent feedback, it is difficult to design and 
maintain a new system of steadily improving management effectiveness.\textsuperscript{126}

This said, one main challenge is how do you sustain the behavioral change 
long enough so the ecology can bounce back. You need to make long-term, 
sustainable change. You can mobilize people, give them a sense of direction, 
get them to act, and have them feel things are changing. However, how do 
you sustain this sense of purpose for the ecology to bounce back and for the 
fisheries to recover? You need to make sure to sustain the political will and 
harness the feedback loop.\textsuperscript{127}

One issue facing fisheries management is that “women face systemic and 
cultural gender-based biases and discrimination in accessing key fisheries 
resources and in being involved in their management.”\textsuperscript{128}

There are also challenges with data.

Most data are based on a three year period. Given the natural variability of 
fish stocks and marine systems in general and the typically slow speed of 
fishery recovery, this is insufficient time to establish causality between manage-
ment action and ecological outcome in analytically irrefutable terms. While the 
results are statistically relevant by themselves, they do not yet provide proof of 
the efficacy of Fish Forever’s management interventions.\textsuperscript{129}
Further, “most of the ecological and social outcome data do not have control groups from non-intervention sites, and this is due simply to time and resource constraints.”

There are challenges related to building local leadership, identifying the solution set, both ending at the same end point, and whether management capacity can be built. Another real challenge is the spatial scale, such as trying to build a province model. For instance, how does provincial governments devolve to village councils? What information do communities need to make their decisions? Can we get enough fisheries registered and can we get the data? Ultimately, fishers and the buyers of fish can be managed as household enterprises and for government officials, it is important they see what is really happening in their coastal fisheries.

An overarching challenge as noted by Dr. Steve Box is that in coastal fishing communities:

‘people have all the normal day-to-day issues that life brings us, but with a layer of uncertainty about the future that makes things even more complicated,’ Steve says. ‘Not knowing how their income would change in the future, not being able to make long-term plans, never sure if when they went out that day, they would come back with nothing or something. Understanding that perspective became ingrained in how I look at developing conservation solutions. A focus on how to identify opportunities to reduce that uncertainty, how to work with humility and compassion, knowing that life is difficult and conservation action will often mean making difficult decisions for families and communities — as they decide to trade off short-term gains against long-term sustainability. It’s much easier said than done, especially if your uncertainty about what the future has in store has always been high.’

Related to this challenge is the challenge of financial market inclusion. Small-scale fisheries are largely in the informal economy and do not touch the formal, financial community. Thus, there are no formal loans and no credit, and fishers can be susceptible to predatory loans and get caught in a debt trap. Further, the informal nature sets a limit for what price you can sell your fish. The challenge is how do you formalize small-scale fisheries and enable local fishing communities to not only capture wealth, but to build wealth and financial resiliency over time in order to overcome the stress associated with financial uncertainty.

With COVID-19, one of the key challenges that is becoming apparent is that in terms of a crisis, people go home. One of the things we have been talking about is how to stop environmental problems from becoming a humanitarian crisis. If fisheries collapse, the source of high-quality protein
goes with it. Likewise, national food supplies and food security based off small-scale fisheries is underestimated, because the data is lacking. If rural economies—whether they are underpinned by agriculture or fisheries—collapse, people move and you get a lot of urban migration. Thus, the challenge is how do you help these communities safeguard these safety nets.134

**Beyond Results**

Fish Forever appears sustainable.

Fish Forever was designed as a ‘mass prototype’ model: rather than focus efforts on maximizing testing of individual site-level pilots, Rare chose to test multiple pilots simultaneously. The goals were to understand not only whether managed access with reserves would work at a site, but also if it could 1) make dozens work simultaneously and 2) better understand the key ingredients needed to scale the approach.135

Rare is also spreading the word. Rare “launched the Financing Small-Scale Fisheries dialogue at Our Ocean 2017 in Malta, and will expand on this initial dialogue during Our Ocean 2018 in Indonesia and Our Ocean 2020 in Palau. Rare also provided expert input on the creation of the Blue Action Fund […]”136

It is stated that “in two to three years, Rare will have made available a world-class, robust data set on coastal fisheries reform, based on internationally accepted monitoring, evaluation and reporting standards — an essential pre-condition for broad adoption.”137

The next steps for Fish Forever are:

- Including women and empowering them as decision-makers;
- Enhancing fishing households’ financial inclusion and providing financial identity;
- Building resilient coastal communities and climate-smart reserve design;
- Creating proof points at provincial (subnational) scale;
- Stimulating investment in small-scale fisheries;
- Supporting participatory data collection and use; and
- Downscaling elements of The Guidelines for local government implementation.138
Rare set up and incubated the Moley Fund, which is an impact investing fund designed to invest in small and medium enterprises by providing capital for more sustainable fishing practices. The Fund overlaps geographically in the Philippines and Indonesia with Fish Forever.

The Fish Forever Program is also looking at blended funding such as development finance linked to government financing, including through municipal budgets and international funding. The key is how to scale up and few are pursuing small-scale coastal fisheries. Likewise, the real trick is how to get the capital down through the layers to the beach, and to figure out what these transfer mechanisms will look like.\textsuperscript{139}

Furthermore, “if this progress continues, within five years {as of approximately 2018}, Rare will have supported 10 of the world’s highest marine biodiversity and fish-dependent countries on a path to nationwide coastal fishery reform.”\textsuperscript{140}

\textbf{Lessons Learned}

According to Fish Forever July 2018 Report, there are several lessons learned:

- The Fish Forever approach works under a variety of settings;
- The program needs to build in greater flexibility and patience for empowering communities to co-manage their fisheries;
- Community engagement is central to change and sustainability;
- Peer-to-peer networks increase demand for the approach. Likewise, the increasing number of peer-to-peer networks, such as mayors’ networks and fisher associations and federations, have intensified demand for the Fish Forever approach;
- Subnational (provincial) engagement and support are essential to scale;
- Reserve networks and connectivity in network design are needed to optimize both governance and ecology;
- Alternative livelihoods and value chain enhancements must be carefully planned and correctly sequenced; and
- Any new country launch must be contingent on the availability of sufficient financial, operational and political resources.\textsuperscript{141}

Dr. Steve Box, who has worked on fisheries his entire professional life, is starting to see trends. An important lesson learned is that the ability to affect change is striking, particularly if you can set a clear path, show communities they do not have to continue to work as they were (i.e., in part by laying out logical arguments), and enable local communities and governments to
take ownership of these sets of solutions. These same pathways are starting to work in Indonesia and the Philippines, to Honduras and Mozambique. While these are very different places—socially, politically, culturally, geographically, and linguistically—there are very similar ways to solve problems. Despite all the differences, there is a common thread and that is to mobilize local communities to help steward their natural resources. Anyone can point out the differences, but the key is to find the similarity and pull on those threads to make those local solutions a global solution. Getting to the right elevation and pulling some of the same levers to replicate in other places—whether it be Guatemala, the Pacific Islands, or Brazil—no one really thought that level of similarity approach was practicable. 142

**Other Resources for Rare’s Fish Forever Work in the Philippines and Indonesia**

**An Ocean Mystery: The Missing Catch**

- [https://www.livingoceansfoundation.org/outreach/films/an-ocean-mystery/](https://www.livingoceansfoundation.org/outreach/films/an-ocean-mystery/)

**Bloomberg Podcasts on Small Scale Fisheries**

- Part 1: [https://www.bloomberg.org/blog/follow-the-data-podcast-why-are-small-scale-fisheries-such-a-big-deal/](https://www.bloomberg.org/blog/follow-the-data-podcast-why-are-small-scale-fisheries-such-a-big-deal/); and
- Part 2: [https://www.bloomberg.org/blog/community-based-conservation-local-approach-global-impact/](https://www.bloomberg.org/blog/community-based-conservation-local-approach-global-impact/)

**CNN’s Interview with Rare’s Rocky Sanchez Tirona**

- [http://nine.cnnphilippines.com/videos/2018/06/14/Profiles-Rocky-Sanchez-Tirona.html](http://nine.cnnphilippines.com/videos/2018/06/14/Profiles-Rocky-Sanchez-Tirona.html)

**FAO’s Voluntary Guidelines on Securing Sustainable Small-Scale Fisheries in the Context of Food Security and Poverty Eradication**

- [www.fao.org/3/a-i4356en.pdf](http://www.fao.org/3/a-i4356en.pdf)
OurFish, Available via Google Play

- https://play.google.com/store/apps/details?id=com.tellybug.fishapp&hl=en

Rare’s Work in the Philippines and Indonesia

- http://www.rare.org/program/fish-forever-in-indonesia/; and
- http://www.rare.org/program/philippines/

Saving Nature with Behavioral Science, Dr. Erik Thulin’s TEDx Cambridge Talk

- https://www.tedxcambridge.com/talk/saving-nature-with-behavioral-science/; and
- Also see: https://behavior.rare.org/cooperative-behavior-adoption/

“Smokey the Bear Should Come to the Beach: Using Mascot to Promote Marine Conservation” paper by Daniel Hayden and Benjamin Dills

- https://journals.sagepub.com/doi/10.1177/1524500414558126

**Case Study #4: Blue Ventures’ Work with Locally Managed Marine Areas in Madagascar**

The author would like to especially thank Ms. Nicola Bassett from Blue Ventures, who wrote the vast majority of the following case study.

**Introduction**

Madagascar’s coastal waters and littoral zone up to 25 meters from the high-tide point are in the public domain (i.e., owned and governed by the Malagasy State). Locally managed marine areas (LMMAs) are a concept/approach rather than a formal legal framework, and the areas are designated/managed under a number of different legal and governance frameworks. The most formal of these is a gazetted Marine Protected Area under the national Code des Aires Protegees (CoAP).

The management of these MPAs, in most cases, is formally delegated in a co-management arrangement between the government (i.e., who maintains
responsibility for enforcement) and the NGOs and community-based organizations representative of local users. Management responsibilities and use rights for local users are defined within an approved management and social safeguards plan; in most cases, use of the resources in the area is limited to local, small-scale users.\textsuperscript{143}

In mangrove areas, forestry legislation allows for the delegation of management and sustainable use rights to community-based associations under the “GELOSE” act, which is also being piloted in the local management of fisheries resources.\textsuperscript{144}

At the heart of the frameworks mentioned above, however, is a customary rule system known as “dina,” which is a legally recognized social contract that allows communities to set and apply rules within their own community. This system has been applied to natural resources since the 1990s, and in most protected areas and management transfer systems, is the main mechanism for the community to ensure local compliance with management plans.\textsuperscript{145}

Many LMMAs are not formally designated as MPAs, or management transfers, but are governed by dina alone. This is effective at the local level, but is limited in that the area is not formally gazetted and there is no formal transfer of exclusive use rights to local people. The dina can also not be applied to users who are not part of the local communities, for example, an industrial fleet or migrant fishers.\textsuperscript{146}

Blue Ventures, a UK-based charity, works throughout Madagascar, including Velondriake. Velondriake is located in Southwest Madagascar and was initially set up using only local dina, led by a local association known as the Velondriake Association (VA)\textsuperscript{147} (Figs. 14.4 and 14.5).

Velondriake was then formally recognized as a protected area in 2015, under co-management between the VA and Blue Ventures (BV) as delegated managers of the protected area, with oversight and support from government services. The overall management objectives and rules were designed in the Velondriake management plan through wide participation and consultation, while the management rules are implemented through a local dina, which has been ratified by regional courts to become a local by law.\textsuperscript{148}

Madagascar’s LMMAs, which are co-managed with BV, are supported by a mixture of funding sources depending on available resources in the area. The majority of funding for BV’s support comes from philanthropic and institutional donors in the form of project grants. The more developed LMMAs, such as Velondriake, are now generating their own sources of income through tourism and fees for alternative livelihood support. New approaches such as blue carbon payments may soon provide additional sources of income to the
community groups. Likewise, “to ensure the long-term financial sustainability of these LMMA’s, BV is working to develop a variety of mechanisms including marine ecotourism programmes, eco-certifications for sustainable fisheries, and payment for ecosystem services such as mangrove REDD+.”

**Identify the Problem**

The majority of southern Madagascar is arid and infertile, and lacks industry and infrastructure. This results in local communities being extremely dependent on marine resources. However, the region’s coastal ecosystems are rapidly degrading as a result of overfishing and the use of destructive fishing practices. The population of settled fishing communities has also grown significantly in the region, adding further pressure on the resources. A lack of access to key health services, such as family planning, along with the lack of access to education and alternative livelihoods, has also contributed to high birth rates and dependency on fishing.

Another problem is that promoting rule enforcement can be a challenge with LMMA’s. The Velondriake’s dina was developed via a bottom-up process and allows for rules to be applied at the village level without escalation to a higher authority. However, there can be a reluctance to punish infractions due to complex webs of social, family and political ties within the community and a desire to avoid conflict. Thus, promoting ownership of the LMMA dina
Fig. 14.5  Map of Velondriake in Madagascar (Credit Blue Ventures)
and the application of rules within the community remains a challenge, especially when compared with traditional dina (for example, concerning theft or domestic violence) which are often applied with little hesitation.152

A further problem is that governing associations often have a limited ability to prevent rule breaking by outsiders. For example, the VA has problems with industrial fishing vessels that have acted with impunity within the Velondriake LMMA, and beach seine fishing has proven difficult to control in the north of the LMMA. Outside of formally designated MPAs, LMMAs also lack exclusive use rights to the resources in the area, meaning they are often competing with industrial fishers such as the national trawling fleet. Fisher communities lack the power to counter outsiders and depend on state authorities to provide “back-up” law enforcement. However, the local and state government agencies are severely under resourced and often do not view fisheries as a top priority.153 Similarly, members of the Velondriake LMMA also have difficulty applying the LMMA dina against migrant fishers that pass through the area or settle temporarily, in part due to problems of communicating the LMMA zoning and associated rules.154

Lastly, the LMMAs throughout Madagascar are chronically underfunded (i.e., lack sustainable financing and are dependent on NGO support) and suffer from capacity and resource challenges.155

Why the Problem Is Important

The reason the aforementioned problems are important is because effective marine and fisheries governance and management measures need to be in place in order for local communities to safeguard their local marine resources for future generations.

Communities with a shared, highly valued resource, such as a fishing ground, are often at risk of falling prey to the ‘tragedy of the commons.’ Fishers often will not limit their catch as they cannot be sure another competing fisher will reduce their catch and thus, catch all the available fish. However, involving the entire community in planning the management of their resources helps to educate and engage them in resource management. This encourages the local communities to take ownership of the management, implementation, and regulation of the LMMA. Ensuring the rules of the LMMA are enforced gives the area a higher chance of success and acts as a catalyst to broad scale change.156

Within the Velondriake LMMA, there are a range of sustainable use management practices in place. For example, there is a 3.2 km² area of no-take zones covering a variety of habitats (e.g., coral reefs and mangroves)
where all extractive activities are prohibited, areas of temporary closure, and also areas of sustainable mangrove harvest. 157

Velondriake also forms part of a network of LMMAs along Madagascar’s southwest coast, set up using different forms of governance. To the north and south, BV has also supported communities to set up LMMAs using *dina* (although not formally gazetted as protected areas), with the aim of increasing connectivity with neighboring reefs and mangroves to help buffer the Velondriake LMMA. Other NGOs are also supporting similar sustainable use MPAs further south along the coast. 158

Furthermore, Madagascar is listed as among the top fifty most important bioclimatic units, 159 and is one of seven key countries identified by the Coral Reef Rescue Initiative. 160

**How Problem Was Identified**

Community leaders from the 32 villages within the Velondriake LMMA make up the Velondriake Association (VA). The VA has an annual, general assembly where they meet to assess activities over the past year, discuss perspectives, and plan for the future. Association members are employed on a per diem basis to conduct outreach and promote community participation across the LMMA. Problems and issues within the LMMA are therefore raised with community leaders, who then bring and discuss these issues with the VA. BV supports the group, working with them to facilitate discussions and develop management strategies. 161

Members of the VA are also part of a wider, nationwide network of LMMA managers called MIHARI. They organize learning exchanges and regular forums at regional and national levels, providing invaluable opportunities for LMMA managers to explore common issues and develop collaborative solutions. 162

**Effectiveness of Process for Identifying Problem**

The process of identifying the problems appears quite effective. For instance, BV and the Wildlife Conservation Society (WCS) supported the village of Andavadoaka, located within Velondriake LMMA, to implement a periodic fisheries closure for octopus in 2004, the first marine resource management initiative in the area. The closure led to visible results in very short time scales, sparking neighboring villages to follow suit and get started on fisheries management initiatives. The VA was formed out of these initial
meetings and by 2006, 24 neighboring villages along 40 km of coastline had joined together to establish a dynamic and locally appropriate management strategy to improve fisheries.\(^{163}\)

This has further catalyzed a national movement to develop LMMAs around Madagascar's coasts. The broader grassroots LMMA network, called MIHARI, has since grown from this movement, and is supporting and connecting over 200 communities in developing LMMAs collaboratively around Madagascar's coastline.\(^{164}\)

### Steps Taken to Address the Problem

BV “has published a framework for setting up an LMMA, which can be found in the online toolkit. An outline of the four keys stages is below:

- 1. Initial assessment—gathering as much information as possible about the resource problem and potential solutions, identifying stakeholders and engaging with them to ensure their support and involvement;
- 2. Planning and design—detailed consideration of the design of the LMMA and planning for the management approaches that will be used. The impacts of management actions should be considered to allow for monitoring and adapting (Theory of Change), and the legal framework will be decided to establish legal protection. Emphasis is placed on using a community-based participatory approach;
- 3. LMMA implementation—a management committee and plan are put together, in order to provide structure and accountability. The rules and regulations decided in the planning stage are established and enforced. As such, potential sources of conflict should be identified as well as methods for conflict resolution. A monitoring plan is put together to identify indicators and methods, and those responsible for monitoring. A process and plan is put in place to get demarcation of LMMA zones and the MPA legally gazetted by the government; and
- 4. Ongoing management—LMMA management is an adaptive process of learning and improvement. This often includes continuous ecological and social monitoring of the LMMA and the communities in order to identify issues, measure success and adapt the management practices in place.”\(^{165}\)
Results

As noted by BV, there have been a lot of results, such as:

- BV’s LMMA programme focuses on three zones along Madagascar’s west coast, which together include over 75 communities, a combined coastal population of more than 40,000 people, and a total marine area of almost 6000 km²;
- Creation of the Barren Isles protected area, the largest LMMA in the Indian Ocean;
- Creation of Velondriake, the first LMMA in Madagascar to embark on registration as a nationally-recognised protected area;
- Expansion of the LMMA model to communities beyond Velondriake, inspiring and guiding the creation of large-scale LMMAs throughout Madagascar;
- Establishment of over 250 community-managed temporary fishing closures at sites around Madagascar, based on a model for community-based fisheries management first developed in Velondriake; and
- Development of the largest community-based monitoring programme for artisanal sea turtle and shark fisheries in the western Indian Ocean.\textsuperscript{166}

As previously mentioned, the success of the initial fisheries closure in 2004, led to the development of a national movement to implement LMMAs around Madagascar’s coasts and a nationwide network of LMMA communities (MIHARI) was established. This network has generated a community of individuals involved in local marine management, developing a platform for sharing experiences, knowledge exchange, and championing the rights of small-scale fishers. As a result of this movement within small-scale fishing communities, there has been a push toward policy reform and several fisheries laws have been reformed to reflect the experiences and insight gained from local management efforts.\textsuperscript{167}

Periodic, locally managed fishery closures have demonstrated a positive impact on fishery catches and villages fishery income.\textsuperscript{168,169}

Challenges and How They Were Met

With respect to challenges, “in recent years Madagascar’s unique and fragile marine environment has experienced severe degradation from climate change and overfishing, which threaten the natural resilience of the ecosystems upon which the region’s vulnerable communities depend. These fisheries are critical...
to the livelihoods, cultures and food security of rapidly growing coastal populations. However, declining catches, rapid population growth and a lack of livelihood alternatives have pushed small-scale fishers into deepening poverty, forcing communities to adopt increasingly unsustainable fishing practices to support dwindling catches.”

**Beyond Results**

According to BV, the results are still modest, but plans are in place to expand ecological protection and improve governance. However, the results have been realized against a worsening background trend, with government crises, frequent governmental changes, and decreases in law and order. LMMA and MPA management still needs significantly more support from governments and in funding in order to be sustainable in the long term.

Nevertheless, the Velondriake LMMA is a pioneer in the region, delivering benefits beyond its boundaries, and stimulating the broad replication of LMMAs across Madagascar and overseas. This said, Madagascar now has at least 65 LMMAs and the underlying octopus periodic fisheries closure model has been replicated in a diversity of countries including Comoros, Indonesia, Mauritius, Mayotte, Mexico, Mozambique and Tanzania.

Furthermore:

Next steps for the octopus ‘no take’ model in the reefs of Southwest Madagascar is to potentially undergo a Marine Stewardship Council certification, an eco-certification granted to potentially increase the value of the octopus. Certified eco-label products can potentially bring in a higher return on octopus, particularly when selling in international markets around the world. This is in discussion with the fishermen in Velondriake, with potential pitfalls of consistent monitoring, surveys, and field management that are difficult to complete without sufficient technical capacity.

**Lessons Learned**

According to Nicola Bassett of Blue Ventures, it is important to recognize the collaborations between fisher communities and an international NGO. While communities can be effective and efficient managers of their natural resources, they may need outside technical and financial support. Academic literature places great emphasis on “community-based” management, whereas all of BV’s supported LMMAs are a co-managed initiative that heavily depend on NGO support. A failure to acknowledge the critical
role of outside agencies in these initiatives hampers our ability to understand these systems and muddies the debate about the role of local users in the conservation of natural resources, and the effectiveness and sustainability of community-based interventions. 175

Although BV does not engage in a formal, adaptive management process with LMMA association members, the management of LMMAs is able to be frequently adjusted to adapt to changing conditions or unexpected outcomes, due to the permanent presence of BV and frequent communications with community members. Adjustments are also made in conjunction with data from ecological, fisheries, and socio-economic monitoring programs. For example, the opening of the first octopus periodic fisheries closure attracted 1,300 fishers from across the region, greatly diminishing per capita yields for Andavadoaka villagers. Discussions over subsequent months led to decisions that all villages should implement their own periodic fisheries closures and that only residents of participating villages should be permitted for fish on the opening day. 176

Another important lesson learned is that it is important to get communities initially involved with conservation via short-term fisheries management measures, to ensure understanding, trust, and confidence. Only once the results have been demonstrated and the communities have bought into the process and concept of conservation should strategies move on to more ambitious conservation measures. 177

Lastly, BV has sought to build a diversified portfolio of incentive-driven models, adopting an entrepreneurial approach to fund both its own operations and those of LMMA associations (e.g., the VA), while developing alternative incomes to fishing for local resource users. In addition to fisheries management, this includes holothurian (sea cucumber) and seaweed mariculture, along with community homestay ecotourism developments. However, while the diversification of funding streams has increased resilience and helps LMMAs appeal to a broader range of donors, it has not served to reduce dependence on donors. 178

Other Resources for Blue Ventures’ Work with Locally Managed Marine Areas in Madagascar

Blue Ventures

- [https://blueventures.org/](https://blueventures.org/);
- LMMA Factsheet: [https://bjyv3zhj902bwxa8106gk8x5-wpengine.netdna-ssl.com/wp-content/uploads/2015/10/BV-LMMA-Factsheet-2015.pdf](https://bjyv3zhj902bwxa8106gk8x5-wpengine.netdna-ssl.com/wp-content/uploads/2015/10/BV-LMMA-Factsheet-2015.pdf);
Financial Analysis

The following financial analysis will look at return and risk.

Return

Sustainably certified commodities and blue procurement models may have the potential to generate revenues greater than their traditional counterparts. For example, there might be premiums offered for products such as ASC or MSC-certified seafood. In addition to price premiums, products adopting a blue procurement model may gain access to new markets.

Risk

Despite the potential, there are risks associated with sustainably certified commodities and blue procurement.

Business Risk

There are several business risks attributable to fishing quotas:

The most common objections to ITQs are that they often lead to a concentration of ownership of fishing quotas. However, this issue can be addressed by
placing limits on the total quota that can be owned by any single company or group of related companies (based on the same principles as the anti-monopoly or antitrust laws in many countries). Another objection to ITQs is that they can result in unearned windfall profits when the original quota holders sell their quotas. This can be addressed by taxing the profits of the quota holders who have paid nothing for their original quotas.\footnote{179}

A related business risk is enforcement of quotas:

\footnote{179} The most common sanctions for violating (i.e., exceeding) quota limits are to impose a fine or to reduce the violator’s quotas for the following year(s). In cases of repeated violations, an individual’s or company’s fishing license(s) can be revoked or criminal penalties can be imposed. ITQ systems may work best in places where the total number of fishing operators is relatively small (e.g., New Zealand), and where there is a tradition of respect for the law and effective law enforcement. Sometimes even in countries that are well known for widespread corruption, quota systems may still be able to work effectively at the municipal or community level. Indeed, some form of IFQs or catch limits is one of the bases for many traditional systems of customary fishing rights.\footnote{180}

Ecological attributes must also be taken into account:

In any fishing quota system, the issue of ecological uncertainty also has to be addressed. The agency administering the quota system must be able to measure the current stocks of particular fish species, which vary from year to year based on ecological factors; and then calculate the total allowable (i.e., environmentally sustainable) catch for each target species. The agency must also determine the most appropriate size and geographical boundaries of whatever fisheries management units serve as the basis for allocating quotas.\footnote{181}

Another risk concerns profitability:

So far, few sustainable fisheries projects have reached a stage where sufficient profitability can be assured. Several factors can explain it: the complexity of fisheries management, which often involves many stakeholders and regulatory bodies; the difficulty in making firm projections of fisheries’ recovery and resulting improved profitability; and the difficulty in making long-term, illiquid investments in developing countries.\footnote{182}

The World Benchmarking Alliance (WBA) and its Seafood Stewardship Index, which measures companies’ performance against the UN SDGs:
{…} identified some examples of best practice, but it found that the long-term sustainability of the seafood industry is being hampered by a lack of oversight of operations and supply chains, impacting measures to eliminate illegal, unreported and unregulated (IUU) fishing, protect ecosystems and respect human rights and working conditions. IUU fishing represents up to 26 million tonnes of fish caught annually. WBA said it is clear that companies are committed to excluding IUU fish in their operations but only about a third of the companies can prove they have specific mechanisms in place to reduce IUU risks in their supply chain.

**Strategic Risk**

Strategic risks include choosing the right suppliers and choosing the best certification standards. This said, certification standards can be revised and updated over time. Getting certified can also be expensive and time consuming. Part of the expense and time could be attributable to the independent audits and the lack of information (i.e., templates, peers’ lessons learned, etc.). In addition, some certified products may not be able to fetch a premium price and/or there could be a long payback period.

**Reputation Risk**

There was a Marine Aquarium Council (MAC), which no longer exists, but which was trying to certify that cyanide was not used to catch marine aquarium fish. However, there were many challenges and because the testing was faulty, MAC had a hard time definitively proving no cyanide was used and the program’s cost was prohibitively expensive.

**Liquidity Risk**

A liquidity risk occurs if cash is unable to be generated in a timely fashion or inventory is unable to be sold.

**Operational Risk**

There are numerous operational risks associated with sustainable commodities and blue procurement.
Legal and Regulatory Risk

There can be legal and regulatory risks associated with inconsistent practices and the lack of transparency with regard to the distribution of fishing licenses, quotas, and rights. For instance:

- Who should get the fishing license or quota? Just local communities? Local communities and foreign fleets?
- How large of a catch is allowed by the quotas?
- How long will the quotas last? One year? Five years? Are quotas renewable? If so, for how long and for how many times?
- Are the quotas divisible and transferable? Is it okay for someone to apply for the quota, only to sell it to someone else?184

It is also important to note that the application forms for fishing licenses are sometimes difficult to understand and to fill out as some fisherfolk are illiterate.185

Illegally sourced goods or fraudulent papers—such as landing records—claiming legally sourced products can lead to legal and regulatory risk. In addition, there is risk of an increase in royalties or increase in the price of commercial fishing licenses for exported products. This situation may occur whether or not the commodities were produced in a sustainable or non-sustainable fashion.

Credit Risk

Credit risk includes default risk, bankruptcy risk, downgrade risk, and settlement risk.

Market Risk

Market risk includes interest rate risk, equity price risk, foreign exchange risk, and commodity price risk.
Risk, Return, Time (Horizon), Taxes, Liquidity, Legal and Unique (RRTTLLU)

Risk and Return

Please see above for the risk and return associated with blue procurement models.

Time Horizon

The time horizon for investments in sustainable commodities and blue procurement models could be short-term or long-term commitments.

Taxes

There are likely a variety of taxes, such as sales taxes and employment taxes. There can also be tax holidays and competition between countries regarding tax policy.

Liquidity

Sustainably sourced and produced, blue economy commodities are likely to continue having liquidity risks in global markets due to insufficient supply.

Legal

Legal considerations associated with blue procurement models will vary from country to country.

Unique

One unique aspect of blue procurement is that it can be difficult to discern the source of one’s inputs due to the global trade of commodities. While this is not really an issue for ecotourism or debt-for-nature conversions, this issue presents a unique situation for companies and countries involved in the global trade of commodities, whether it be seafood or marine ornamental fish.
Policy Analysis

The following policy analysis will look at: defining the problem; establishing goals; selecting a policy; implementing a policy; and evaluating the policy.

Defining the Problem

There are policies that encourage blue procurement models and policies that prohibit unsustainable activities, such as illegal fishing.

Establishing Goals

The Aichi Biodiversity Targets of the CBD are an important collection of twenty targets designed to outline and establish international conservation goals. More specifically:

Target 6: By 2020 all fish and invertebrate stocks and aquatic plants are managed and harvested sustainably, legally and applying ecosystem based approaches, so that overfishing is avoided, recovery plans and measures are in place for all depleted species, fisheries have no significant adverse impacts on threatened species and vulnerable ecosystems and the impacts of fisheries on stocks, species and ecosystems are within safe ecological limits. 186

Similarly, SDG #14, “Life Below Water,” and particularly targets 14.4 and 14.6 state:

14.4: By 2020, effectively regulate harvesting and end overfishing, illegal, unreported and unregulated fishing and destructive fishing practices and implement science-based management plans, in order to restore fish stocks in the shortest time feasible, at least to levels that can produce maximum sustainable yield as determined by their biological characteristics

14.6: By 2020, prohibit certain forms of fisheries subsidies which contribute to overcapacity and overfishing, eliminate subsidies that contribute to illegal, unreported and unregulated fishing and refrain from introducing new such subsidies, recognizing that appropriate and effective special and differential treatment for developing and least developed countries should be an integral part of the World Trade Organization fisheries subsidies negotiation. 187
Selecting a Policy

With respect to sustainable fisheries, there are several frameworks, including the Seafood Stewardship Index:

The World Benchmarking Alliance (WBA) said its Seafood Stewardship Index is the first detailed ranking of these keystone companies based on their sustainability efforts. It presents an overall ranking based on the weighted sum of the results in five key areas:

- Governance and management of stewardship practices;
- Stewardship of the supply chain;
- Ecosystems;
- Human rights and working conditions; and
- Local communities.\(^{188}\)

There is also the MSC and ASC-certified seafood standards.

Implementing a Policy

According to the Seafood Stewardship Index:

Setting leading examples are Labeyrie Fine Foods and Parlevliet & Van der Plas, who share detailed risk assessment tools to monitor specifically for IUU risks in their supply chains.

Meanwhile, 22 of the 30 companies have human rights commitments in place. But they have yet to turn their commitments into procedures. For example, only 20% could demonstrate that they have a remediation mechanism in place.

Overall, Thai Union Group tops the WBA Seafood Stewardship Index 2019 ranking. The company, known for its John West and Chicken of the Sea brands, stands out with robust environmental and social commitments, targets and activities on which it reports publicly.

Second and third in the ranking, respectively, are Mowi, a Norwegian integrated salmon farming company formerly known as Marine Harvest, and Thai-based conglomerate Charoen Pokphand Foods, both demonstrating strengths across most measurement areas. Mowi scored highest on transparency with a strong sustainability strategy detailing how it manages the impacts of its farming operations. Charoen Pokphand Foods, one of the largest shrimp producers in the world, demonstrates strong human rights commitments and group-level sustainability strategies and targets.\(^{189}\)
Regarding fishing nations, the U.S. turnaround in fisheries management is the “great untold story.” This includes improvements in ground fisheries on the West Coast, along with red snapper and grouper in the Gulf of Mexico. As detailed in Charles Clover’s book, *The End of the Line: How Overfishing Is Changing the World and What We Eat*, the Alaskan pollock, New Zealand hoki, and Iceland fisheries were relatively well managed.

In addition, Belize’s fisheries include a managed access system covering 100% of its waters and fishers had to join management councils. Belize is practicing adaptive management. Further, while the initial focus was on the main commercial species of lobsters and conch, Belize is now starting to manage finfish.

Furthermore, in 2017, Indonesia “became the first nation to make its fishing fleet visible to the world via GFW {Global Fishing Watch}. Since then, Peru, Chile, Panama, Mexico, Namibia, and Costa Rica have either published their vessel data to the GFW map or have publicly committed to do so.”

### Evaluating the Policy

When evaluating policies, it is important to understand that good quality, climate resilient management of fisheries can help sustain fish populations and increase productivity (in terms of food for people), while improving ocean structure and resilience. Likewise, ocean systems are fairly resilient and can come back in 7–10 years’ time.

Yet, around the world, fisheries are typically managed for fisheries only, and often managed as species by species. This said, one must ask whether it is reasonable to expect developing countries to build top-down governance systems with expensive, scientific monitoring, and assessment on a stock by stock basis.

It is also important to understand that the overall productivity shift of fisheries is moving toward the poles. Likewise, the tropics are going to see a significant reduction in fisheries productivity. This begs the questions, what do you do with emerging arctic fisheries? Should decarbonation, wildlife, and biodiversity—which could be more valuable than fisheries—be factored in? Also, what does climate mean for the entire world, and for fisheries, when species move and productivity shifts? There are some regional advisory committees, like for the North Sea and Baltic Sea, which use a more flexible access system for countries.

Nevertheless, it is not clear whether the future oceans will sustain past productivity rates and a serious problem that needs to be addressed is what
to do with higher productivity for some stocks and less productivity for others.\textsuperscript{194}

**Future Outlook for Instrument**

One encouraging future outlook for blue procurement is that the International Organization for Standardization (ISO) developed the world’s first international standard (ISO 20400: 2017) for sustainable procurement, which was published in April 2017.\textsuperscript{195}

Another encouraging outlook is that it is likely consumers will demand more sustainable products. According to study conducted by GlobeScan and MSC:

One of the major findings of the study is that seafood consumers are increasingly demanding independent verification of sustainability claims in supermarkets (70 percent in 2018, compared to 68 percent in 2016). In fact, independent labeling is particularly important to consumers buying health supplements and fish oils (76 percent), and pre-packed fresh fish (75 percent). We also learned that 70 percent of seafood consumers in North America say that they would like to hear more from companies about the sustainability of their seafood.\textsuperscript{196}

There are several supply chain tracking mechanisms and related tools applicable to reducing tropical deforestation, such as Trase,\textsuperscript{197} and there are also publicly announced no-deforestation supply chain commitments which are tracked by Supply Change.\textsuperscript{198} Forest 500, a project of the Global Canopy Programme, “ranks 350 of the biggest companies in forest-risk supply chains and the 150 biggest investors in these companies.”\textsuperscript{199} In the future, there is a chance these organizations will expand their coverage to marine commodities or new organizations could fill this current gap. Likewise, Global Fishing Watch (GFW), which is now available on Bloomberg Terminals, will hopefully help to:

1. Improve insurance products for coastal infrastructure, including coral reefs and mangroves that act as natural barriers against extreme weather.
2. Highlight coral reefs’ contribution to tourism. The map identifies where reefs are bleached or experiencing strong fishing pressures, information that can be used by the tourism industry to protect assets on which it heavily relies.
3. Contribute to environmental, social and governance (ESG) analysis between land and sea. The new map view allows subscribers to combine Bloomberg Terminal data and locations of interest with a range of other fishing and environmental data sources, as investors consider and map out a broad range of ESG factors.

4. Understand fishing activity. For instance, fishing vessels catch enough tuna to contribute more than $42 billion to the global economy annually. The interactive map visualises where commercial fishing is taking place, what types of fishing gear are used, and in which countries boats are registered.\(^\text{200}\)

With the emergence of zero deforestation supply chain commitments from many of the world’s largest private and publicly traded companies, including Burger King, Cargill, McDonald’s, and Nestlé,\(^\text{201}\) one should ponder whether such a movement will arise for sourcing seafood. Similarly, there are jurisdictions and companies beginning to implement terrestrial Produce & Protect models. What about developing a similar structure for fisheries? This said, Planet Tracker’s Seafood Tracker Initiative “investigates the impact that financial institutions have in financing global wild-catch fisheries and seafood trade. [Its] aim is to align capital markets with sustainable fisheries management.”\(^\text{202}\)

There may also be more investment firms, such as Aqua-Spark,\(^\text{203}\) that become active in the blue procurement space.

Other Resources on Blue Procurement Models

Aquaculture Stewardship Council (ASC)

- [https://www.asc-aqua.org/](https://www.asc-aqua.org/)

Chatham House’s resourcetrade.earth

- [https://resourcetrade.earth/data](https://resourcetrade.earth/data)

Chefs for Oceans

- [https://chefsforoceans.com/](https://chefsforoceans.com/)
EDF’s Seafood Selector

- http://seafood.edf.org/

FAO’s Code of Conduct for Responsible Fisheries

- http://www.fao.org/3/v9878e/v9878e00.htm

FAO’s The State of World Fisheries and Aquaculture

- http://www.fao.org/state-of-fisheries-aquaculture

FishBase

- https://www.fishbase.us/search.php

FishChoice

- www.fishchoice.com

Global Fishing Watch

- http://globalfishingwatch.org/

Greenpeace’s Sustainable Seafood Work

- https://www.greenpeace.org/usa/2018-supermarket-seafood-ranking/

Marine Stewardship Council (MSC) and MSC’s Track a Fishery

- https://www.msc.org/home; and
- https://fisheries.msc.org/en/fisheries/

Monterey Bay Aquarium’s Seafood Watch

- https://www.seafoodwatch.org/

NEPCon Sourcing Hub

- http://beta.nepcon.org/sourcinghub
NEPCon’s Report: Fake Documents: How to Spot Them and What to do About Them

- http://www.nepcon.org/newsroom/fake-documents-how-spot-them-and-what-do-about-them

Planet Tracker

- Aquaculture: https://planet-tracker.org/tracker-programmes/soft-commodities/aquaculture/
- Seafood: https://planet-tracker.org/tracker-programmes/soft-commodities/seafood/; and
- Soft Commodities: https://planet-tracker.org/tracker-programmes/soft-commodities/

Principles for Investment in Sustainable Wild-Caught Fisheries

- http://www.fisheriesprinciples.org/

Sea Around Us

- http://www.searoundus.org/

Sea of Opportunity: Supply Chain Investment Opportunities to Address Marine Plastic Pollution

- http://plasticreport.vulcan.com/wp-content/uploads/2017/02/Sea-of-Opportunity_Full_Final-Digital.pdf

SeaChoice

- www.seachoice.org

SeaWeb

- https://seaweb.org/

Script, Soft Commodities Risk Platform

- https://www.script.finance/
Sustainability Policy Transparency Toolkit (SPOTT)

- https://www.spott.org/

Sustainable Tropical Fisheries and Aquaculture

- https://www.jcu.edu.au/tropical-fisheries-and-aquaculture

The Sustainability Consortium

- https://www.sustainabilityconsortium.org/

Towards A Blue Revolution: Catalyzing Private Investment in Sustainable Aquaculture Production Systems

- https://www.nature.org/content/dam/tnc/nature/en/documents/TNC_EncourageCapital_TowardsABlueRevolution_FINAL.pdf

Vibrant Oceans

- https://www.bloomberg.org/program/environment/vibrant-oceans/#problem

World Benchmarking Alliance’s (WBA) Seafood Stewardship Index

- https://seafood.worldbenchmarkingalliance.org/

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