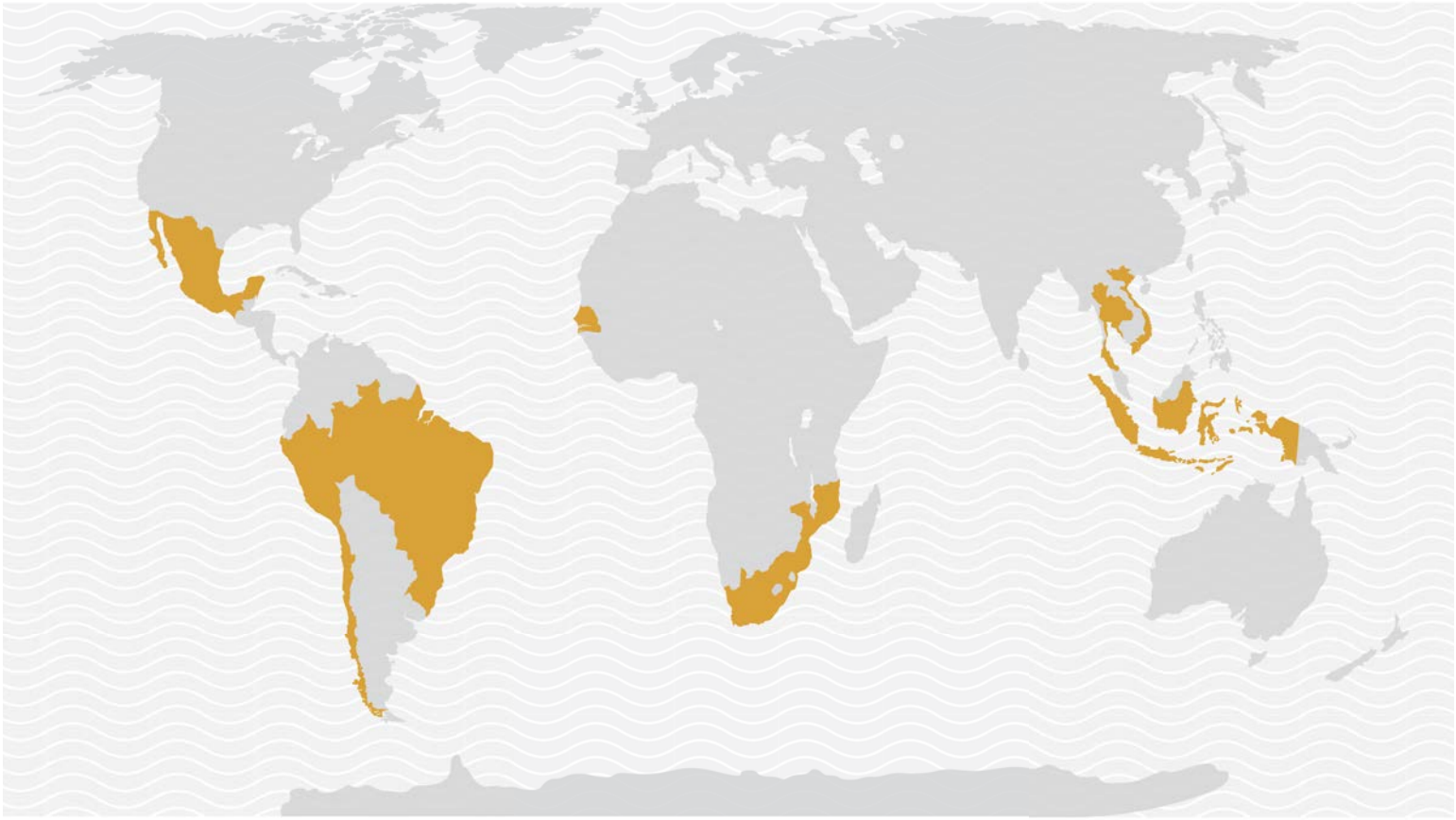
CALIFORNIA ENVIRONMENTAL ASSOCIATES

Country Scoping Project



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EXECUTIVE SUMMARY

INTRODUCTION

Globally, marine fisheries are over-exploited with adverse implications for both the ocean and the billions of people who depend on it for nutrition, livelihoods, and prosperity. Nowhere is the crisis more serious than in small scale fisheries in the developing world. Protecting and rebuilding fisheries promises to bring substantial benefits to the poor and vulnerable communities that depend upon them.

In 2012, the Rockefeller Foundation (RF) launched an Oceans and Fisheries Initiative to determine whether or not the Foundation could have a transformative role if it creates a program focused on fisheries. Through a thoughtful research process involving many of the world's pre-eminent fisheries experts, the Foundation eventually targeted its explorations on market-based approaches for small-scale developing-world fisheries. The vision is that by leveraging the power of progressive market forces, the foundation can benefit small scale fisheries. Over the last decade, both certification (e.g. the Marine Stewardship Council ecolabel) and an approach known as a Fishery Improvement Project (FIP) have emerged. A FIP is essentially a partnership between buyers, supply chains, and source fisheries to improve the management of those fisheries. However, to a great extend the MSC and FIP work has mostly excluded developing world, small scale fisheries. The key innovation that the Foundation has decided to test is whether this FIP approach can be evolved and scaled to provide transformative benefits to small scale fishermen. To help ground truth this notion, the Foundation commissioned California Environmental Associates (CEA) to scope out potential interventions in 11 countries of interest. The mandate was to:

- Define and map relevant stakeholder groups and gather their perspectives
- Assess current conditions and potential for impact on marine and coastal ecosystems and fish stocks and small-scale fishers
- Describe value chains for small-scale fisheries
- Describe formal and informal policy and governance conditions underpinning fisheries management
- Identify key sustainable fisheries management challenges and opportunities to enhance sustainability

Project methodology

This study was designed to assess and compare the potential impact on poor and vulnerable communities of a RF investment in market-based interventions across eleven countries: Chile, Peru, Mexico, Brazil, Senegal, Gambia, Mozambique, South Africa, Thailand, Vietnam, and Indonesia. These countries were selected by the Foundation prior to the initiation of the study. The CEA country scoping study occurred mainly in the first half of 2014. CEA's approach to this project consisted of three major components:

1. **Data analysis:** We conducted a top-down analysis of available data on fisheries landings and aquaculture production, trade, stock status, numbers of fishers, dependence on marine protein, malnutrition rates, presence of certification, existing FIPs, in-country seafood markets, retailer concentration, and existing philanthropic funding, among others. We used quantitative data that was available, but even where figures were available, the quality of data for small-scale fisheries is notoriously poor.

2. **Interviews:** Extensive interviews and site visits with stakeholders across the value chain and fisheries space. CEA conducted more than 500 stakeholder interviews across these countries including with government institutions, NGOs, foundations, bilaterals and multilaterals, academics, and industry, which we hope has led to an even-handed assessment. Together CEA and RF staff, spent a collective 8 months in the field, with intensive site visits in Mexico, Peru, Brazil, South Africa, Indonesia, Thailand, and Vietnam. The work was conducted in close collaboration with the RF team and associated partners including Dalberg, the Coastal Resources Center at the University of Rhode Island, Sustainable Fisheries Partnership, and Oceana. We also used more than 15 expert consultants on a contract basis to improve our regional expertise.

3. **Synthesis:** A cross-country comparison and synthesis attempting to evaluate potential interventions and likely impacts. To help synthesis across the eleven countries, CEA evaluated several components, including:

    - **The need** for interventions in small-scale fisheries to improve ecosystems and livelihoods including:
        - The number of small-scale fishers and their degree of impoverishment and dependence on fisheries
        - Volume and value of small-scale fisheries
        - Status of fisheries and associated ecosystems
        - Importance from an ecosystem and biodiversity perspective
    - **The feasibility** of success, with an emphasis on what can be accomplished in a ten-year period, including:
        - Presence of fisheries that are good candidates for existing market tools (i.e., export oriented fisheries, going to Western markets)
        - Presence of market-based tools to build off of (e.g., MSC certifications, FIPs, Fair Trade, others)
        - Status of fisheries policy and governance as a place to create leverage
        - Partner capacity in terms of the existing NGO and governmental infrastructure
        - Experience from previous efforts in country as a proxy for the viability of this work

- Leverage opportunities, including:
  - Policy momentum and other areas of in-country dynamism
  - Opportunities to partner with or build off of the work of other foundations and aid agencies
  - RF's presence in the country through its existing programs
  - Public funding that can be unlocked through RF engagement
  - Influence and innovation opportunities in each country and globally

Key findings

The majority of this study was focused on conducting the tasks laid out in the original scope: i.e., characterizing stakeholder groups, conditions of marine ecosystems, value chains for small-scale fisheries, policy and governance, and fisheries management challenges and opportunities. Most of these materials lie in the associated appendices of this report. Rather than overviewing that fact base, this summary and report focuses on the assessment and synthesis element of the study.

It is important to caveat that comparative studies such as this one are rarely definitive. Not only are the issues and places dynamic, but the determination regarding which countries are most suitable for engagement and which interventions are preferable depends on, among other things, the values of the foundation, the interpretation of the information gathered, and the degree of risk tolerance of the decision maker. That said, several themes were apparent:

There is a clear need to overcome the barriers preventing the integration of small-scale developing world fisheries into the sustainable seafood movement

This study confirmed RF's ingoing hypothesis that small scale fisheries are being excluded from recent progress around sustainable seafood markets, to their detriment. Market-based incentives for sustainable seafood are increasingly cemented themselves in the developed world. More than 10% of global seafood landings are now certified to the MSC standard and the majority of retailers in North America and Europe have committed to some form of sustainable seafood sourcing policy. Certifications, however, with just a few exceptions, have failed to reach small-scale developing-world fisheries. FIPs appear to be more applicable to the developing world context – there are more than fifty FIPs in the developing world – but their growth has been slow. We see several barriers to the accelerated adoption of FIPs in small-scale developing world fisheries, including:

- **High transaction costs –** The diffuse nature of small-scale fisheries and their supply chains make it difficult to organize stakeholders to participate in FIPs. To the extent there are other costs (stock assessments, meetings, etc.), poor fishermen in small fisheries have a more difficult time bearing them.
- **Uncertain benefits –** FIPs are not yet proven in the developing world, and it is unclear to potential stakeholders whether they can deliver on improvements in fishery performance, price premiums, or access to markets.

- **Weak governance –** Ultimately, FIPs are a tool to leverage changes in fisheries management systems (whether top down or community based management). When fisheries governance institutions are close to or entirely absent, there is no fulcrum upon which to apply leverage.

Furthermore, MSC and the FIP concept were created by environmentally focused organizations. To date, these tools have focused almost exclusively on the ecological dimensions of sustainability. A more explicit emphasis on the well being of fishing communities, spearheaded by Rockefeller, would be a major change. Promoting the livelihood of the fishermen in FIPs would help provide greater benefits to fishing communities, reduce barriers to the uptake and success of FIPs, and ensure that the human dimensions of sustainability are explicitly addressed by the sustainable seafood movement. Interviews across all the target geographies suggested that addressing the livelihood dimensions of fisheries improvement projects would be the most important factor for the movement to be successful in small-scale developing world fisheries.

Feasibility and need are inversely related

The selected countries represent a relatively broad spectrum in terms of both the degree of impoverishment and the strength of fisheries management system. Good fisheries management, at its core, is an issue of governance capacity. It is not surprising that the countries where there was the greatest need (e.g., the most fishers, the poorest people, and the most poorly managed fisheries) were also the countries where feasibility of creating change at scale was most in question. To some extent, this brings up two important questions. First, is there a minimum degree of market engagement and fisheries governance necessary to execute a market-based strategy? Our conclusion was yes – that these are fundamental conditions that need to be in place to pursue this approach. Second, what is the risk tolerance of the Foundation? Investments in a country with relatively strong governance (e.g., Chile) are more likely to succeed but may not address the most vulnerable communities, while investments in a place like Indonesia may face a higher probability of failure but success could garner outsized rewards.

There are dynamic opportunities to improve small-scale fisheries in all the countries identified

In every country investigated during this project, momentum is building for improving small-scale fisheries management. While the level of development of small-scale fisheries reform is in different stages in each country, RF will not be starting from scratch.

With respect to market approaches, MSC has gained a toehold in some of the countries with certifications in Mexico, South Africa, Chile, and the only certified fishery in Southeast Asia, the Ben Tre clam fishery in Vietnam. FIPs are emerging in all of the countries we visited and are placing fisheries on the pathway to stronger management. These FIPs cover a diversity of species, are being run by several different FIP implementers, and a handful are testing innovative adaptations to the FIP approach, such as the community-basket FIP being launched

in South Africa. The emergence of the Fair Trade standard for fisheries is also an exciting new development and is being piloted is in a handline tuna fishery in Indonesia.

Efforts on the demand side in these countries are at an earlier stage, but retailers in several of these countries, especially subsidiaries of EU and North American retailers, are testing the waters on sustainable seafood practices. Tesco in Thailand, for example, recently announced that they would no longer sell parrotfish in their stores. These retailer movements are being complemented by sustainable seafood development in niche markets such as high-end tourist markets and restaurants.

Beyond market-based approaches, there are other compelling windows of opportunity. Chile and South Africa are in the midst of implementing new fisheries policies, fisheries ministers in Peru have expressed interest in creating a new small-scale fisheries policy, Indonesia will be developing management plans for the recently created fisheries management areas, and Brazil's Reservas Extravistas (RESEX) system may be an excellent structure for implementing sound community-based fisheries management.

A clear set of commodities rose to the top as prime candidates for the FIP model

Across all of the countries, several commodities repeatedly rose to the top as prime candidates for fishery improvement projects: crab, shellfish, lobster, octopus, and handline or pole-and-line tuna. These species are often exported to markets interested in sustainable seafood, most are low-mobility species and therefore can be managed with relatively basic tools (e.g., closed seasons, gear restrictions), and are generally labor intense fisheries executed largely by small-scale fishers (tuna is a notable exception being a high-mobility species with a large industrial fleet, but there is an opportunity to reward the more sustainable handline or pole-and-line fishing practices within the broader tuna fishery). These commodities have characteristics that are ideal for the FIP approach and fisheries experts repeatedly cited them as good candidates for market-based approaches across all of the countries in this study. Several other species groups (e.g., small pelagics, snapper and grouper, squid) are also candidates for FIP work, but in our view they face more significant challenges in the near term.

The prime commodities compose a small share of small-scale fisheries landings in these countries:

While these export-oriented commodities (crab, shellfish, lobster, octopus, and handline or pole-and-line tuna) were repeatedly highlighted as the best candidates for FIPs in the near-term, they make up a small fraction of small-scale fisheries landings. The majority of small-scale fisheries product serves regional or domestic markets that have yet to embrace the sustainable seafood movement. In addition to broader fisheries governance reform, tackling this next tier of fisheries will require encouraging local and regional markets to become part of the sustainable seafood movement. These are difficult but worthy endeavors that RF's work may help to expedite in a handful of locations, starting with the most promising markets and the countries with the strongest capacity.

RF could create a new model by building off local markets in a handful of countries:

Among the countries in this study, a few appear to have significant windows of opportunity to use markets outside of Europe and North America to create benefits for small-scale fishers. Opportunities include implementation of the new fisheries policy and local food movement in Chile, small-scale fisheries policy development and a robust gastronomy movement in Peru, and the allocation of baskets of fishing quota to communities and retailer interest in sustainable seafood in South Africa. In the developing world, these should serve as national-level pilots for a new type of market-based fisheries reform effort, one that expands beyond the current export-oriented change model.

Summary recommendations

RF should focus existing tools on the most promising SSF in the DW globally, demonstrating their applicability and directly benefiting hundreds of thousands

The scoping study confirmed that there is substantial opportunity for RF to channel existing market momentum toward developing world fisheries. Many North American and European retailers have made commitments to sustainable seafood, and their supply chains can be expanded to reach numerous small-scale developing world fisheries in the target countries. Building off of these supply chains and existing NGO infrastructure, Rockefeller can create FIPs to cover dozens of fisheries in the most promising commodities groups (e.g., shellfish, crab, lobster, handline tuna). Initial funding should focus on ensuring the success of efforts that are already underway (e.g., expanding MSC clam certification in Vietnam, blue swimming crab FIPs, initial Fair Trade USA pilots) to prove that market-based incentives can work in the small-scale developing world context. Small-scale fisheries targeting these commodities are generally labor intensive operations which will allow this strategy to directly benefit the lives of approximately 100,000 fishers. RF should try to reach greater scale by empowering importing industry groups to create sustainability norms (e.g., NFI crab council, ISSF).

In tandem with these pilots, we would recommend that RF invest in the underlying infrastructure for market-based incentives to promote the expansion of these tools. Investments would include projects such as supporting the piloting of the Fair Trade USA standard for fisheries, building retailer roundtables in target geographies, promoting the adoption of MSC's FIP benchmarking tool, and supporting initial joint Fair Trade USA and MSC certifications. These supporting investments will help to ensure that benefits actually flow to small-scale fishers and their surrounding communities, and that these tools do not cannibalize each other in the marketplace.

RF can make the FIP model more beneficial to vulnerable communities:

One of the tenets of the study was that RF may be able to layer in additional benefits to the FIP approach, such as access to finance or support for alternative livelihoods. To date,

environmentally focused organizations have been the main drivers of the sustainable seafood movement and thus social components of sustainability have taken a back seat to ecological outcomes in FIPs and certifications. MSC and FIP providers have already taken some initial strides to better incorporate social components, but for these approaches to be relevant in the developing world, the human dimensions of sustainability must be brought to the fore. Small-scale fishers in the developing world are often living on the margins of society and therefore engaging in a FIP is a very high-risk endeavor. Layering in social components to these projects that provide clear, tangible, and immediate benefits to the local community may increase fishing community buy-in for these projects, help bridge periods of reduced catch to rebuild the fishery, improve compliance with fishing regulations, and build social infrastructure that can reduce the dependence of the community on fishing. The study confirmed that while there is great interest in these approaches, there are few examples of ongoing work.

We heard many suggestions for what social component additions could be, including community development funds paid for with explicit price premiums (e.g., fair trade), alternative livelihood support, direct investment in supply chain infrastructure (e.g., ice, local processing), mobile finance, and conditional cash transfers. In the initial years of the initiative, RF should test whether adding stronger social components to FIPs and other market-based incentives improves their adoption and impact, and which types of social interventions are the most effective to pair with seafood market incentives. Additional work by RF's other partners (CRC, Dalberg) has scoped this concept out further.

RF can adapt the FIP model to be locally relevant, empowering local markets and driving policy reform in key developing countries:

Only a small fraction of small-scale fishery products in the developing world are currently sold into the European and North American markets at the center of the sustainable seafood movement. To have an impact beyond the subset of fisheries that supply these markets, RF will need to lead at the intersection of market and governance reform to drive more systemic change in small-scale fisheries management. We believe that RF should focus these efforts in regions where there is clear momentum to build from. The following countries present interesting opportunities for RF to help catalyze more systemic change:

- **South Africa—**In 2014, a small-scale fisheries policy was ordered by the courts that supports previously disenfranchised small-scale fishers, co-management, and value added and market-based developments for the small-scale fishing sector. This new policy context and a retail sector that has expressed interest in engaging with small-scale fishers creates the potential for a new model for improving small-scale fisheries in South Africa.
- **Chile—**Chile arguably has the best small-scale fisheries policy in the developing world, and is often looked to as a model. Chile recently passed a new fisheries policy that builds on past successes and the important work of implementation is now underway. There is great potential for FIP work to influence policy implementation, as well as an emerging effort to grow demand for local sustainable seafood. This, coupled with a world-class fisheries academic community have led us to conclude that Chile is an excellent target for driving more

systemic change and can serve as a pilot for what can be accomplished in small-scale fisheries.

- **Peru**—In conversations with government officials and others, it is readily apparent that there is strong interest in creating a small-scale fisheries policy for Peru. The current government understands the challenges and opportunities around small-scale fisheries, is aligned with RF's objectives, and is receptive to collaboration. On the market side, the strong national gastronomy movement is a potential lever for building domestic market interest in sustainable seafood, given that some of the country's most famous chefs are already working on promoting small-scale fisheries products. Harnessing the domestic culinary movement and tying it to momentum around fisheries policy reform would represent a major evolution of the FIP model.

Exclusions

The country scoping study also led us to recommend not pursuing several opportunities as near term priorities.

Pursuing small scale fisheries market-related work in Senegal, Gambia, and Mozambique

In these countries, and Africa more generally, there is an incredible need for small-scale fisheries reform that benefits the lives of poor and vulnerable communities. However, market-based tools do not appear to be well situated to deliver these reforms in the near term. In our opinion, these countries are not ripe for market-based interventions outside of a couple of isolated projects. With low levels of institutional capacity, weak connections to high-value export markets (particularly in Mozambique), and little promise of in-country demand for sustainable seafood, these countries will be difficult for RF to make meaningful progress in within the next decade. These countries appear much better suited to more traditional development-oriented investments and basic capacity building at this time.

Pursuing policy reform work in Southeast Asia

Our interviews and site visits suggest that basic fisheries policy reform in Thailand, Vietnam, and Indonesia is desperately needed, but also complex and long-term engagements that may not yield immediate benefits unless one pursues a long term policy reform agenda.

- **Thailand**—The national fishing act has not been updated in approximately 60 years and past efforts have withered on the vine. The most recent effort brought in support from the FAO, but broad agreement on a new policy could not be reached. Efforts have been rekindled, and a new draft of the fisheries act has been created, but interviewees could not provide a clear sense of whether a new version would actually be passed and if there were clear opportunities for Foundation investment to help shape the policy for the benefit of small-scale fishers. Institutionally, Rockefeller may not be well suited to support an aggressive policy campaign in Thailand, and the recent turmoil has further complicated the prognosis.

- **Vietnam**—The policy process in Vietnam has been described as opaque and requiring a long history of collaboration with the Vietnamese government to be an active participant. While there has been slow movement toward promoting co-management for the last twenty years, there is tremendous work still to be done. With the next policy revision scheduled for 2016, it will be difficult for RF funding to mobilize effective engagement in the policy process.
- **Indonesia**—Meaningful policy reform in Indonesia appears to be a long term engagement, on the order of a 15 to 30 year investment. The philanthropic community has already been active in Indonesia for 30 years and remains meaningfully committed to building fishery management capacity, shaping fishing laws and regulations, and promoting. Rockefeller Foundation's would be important but perhaps not as essential as in other geographies.

Reliance on the MSC as a tool in developing world small scale fisheries

MSC has been a remarkable success story as an ecolabel, covering more than 10% of global fisheries landings. Yet as the gold standard in fisheries management, the MSC is likely to be unattainable for the large majority of the world's fisheries for some time. Looking across small-scale fisheries in the eleven countries in this study, MSC certification is a realistic goal for only a handful of fisheries in the next five to ten years. We believe that those certifications should be supported and that outside those certifications there is an important role for MSC in these countries, such as the use of the benchmarking tool to help create rigorous action plans and track progress in FIPs. In the near term, there is greater potential in using FIPs and fair trade for small-scale fisheries in the developing world. RF should promote uptake of these tools and ensure that they are complementary to the MSC.

Achieving broad success in FIPs for commodities other than crab, shellfish, handline/pole-and-line tuna, lobster, and octopus will be a difficult lift in the next five to ten years:

While there are FIPs underway for fisheries in several other commodity types (squid, trash fish, small pelagics, snapper-grouper) our assessment concluded that the challenges of good fisheries governance for these species (i.e., they require more advanced fisheries management) or the lack of strong market leverage to drive change make them more difficult to address than the commodities identified as priorities. Some specific fisheries for these species may emerge as strong candidates for FIPs, but we believe that it is unlikely that broad progress can be achieved within Rockefeller's timeframe of investment. We believe that retailers should still seek to engage these fisheries and push for change within their supply chains, while still recognizing that substantial progress will be challenging.

LIST OF ACRONYMS USED

ADNAP	Mozambique National Directorate of Fisheries Administration
AMA	Associaçao do meio ambiente
ANC	African National Congress
APRI	Association of Indonesian Blue Swimming Crab Processors
ASEAN	Association of Southeast Asian Nations
BAP	Best Aquaculture Practices
BSC	Blue swimming crab
CI	Conservation International
CIDA	Canadian International Development Agency
CLPAs	Conseils Locaux de Pêche Artisanale
COM-FISH	Collaborative Management for a Sustainable Fisheries Future
CRC	Coastal Resource Center at the University of Rhode Island
CSA	The Centre for Environmental Sustainability at Cayetano Heredia University in Peru
CSR	Corporate social responsibility
DAFF	South African Department of Agriculture, Forestry, and Fisheries
DARD	Department of Agriculture and Rural Development
DFID	United Kingdom Department for International Development
DOF	Department of Fisheries
EDF	Environmental Defense Fund
FAO	Food and Agriculture Organization of the United Nations
FIP	Fishery Improvement Project
FIP++	A Fisheries Improvement Project that incorporates livelihood components for the benefit of fishers
FMO	Fish Marketing Organization
FONDEPES	Fondo Nacional de Desarollo Pesquero (Peru)
FUNBIO	National Fund for Biodiversity
GAP	Good Agricultural Practices, part of GLOBAL G.A.P.
GDRH	Fédération Nationale des GIE de Pêche
GEF	Global Environment Facility
I-LMMA	Indonesia Locally Managed Marine Area
ICAFIS	International Collaborating Centre for Aquaculture and Fisheries Sustainability

ICMBIU	Instituto Chico Mendes de Conservação da Biodiversidade
IDPPE	Mozambique National Institute for the Development of Small-Scale Fisheries
IFAD	International Fund for Agriculture Development
IIP	Mozambique Fisheries Research Institute
IMACS	Indonesia Marine and Climate Support Project
IMARPE	Instituto del Mar Peru
INIP	Mozambique National Fish Inspection Institute
IOTC	Indian Ocean Tuna Commission, a tuna Regional Fishery Management Organization
IUCN	International Union for the Conservation of Nature
IUU	Illegal, unreported, and unregulated
JICA	Japan International Cooperation Agency
LINI	The Indonesian Nature Foundation
LMMA	Locally-Managed Marine Area
MARD	Ministry of Agriculture and Rural Development
MCD	Center for Marine and Coastal Development
MMAF	Indonesia Ministry of Marine Affairs and Fisheries
MPA	Marine Protected Area
MDPI	Masyarakat Dan Perikanan Indonesia
MOF	Vietnam Ministry of Fisheries
MSC	Marine Stewardship Council
NFI	National Fisheries Institute
NGO	Non-governmental organization
NORAD	Norwegian Agency for Development Cooperation
NZAID	New Zealand Agency for International Development
OECD	Organization for Economic Co-operation and Development
PES	Payment for ecosystem services
PQ	Prime Quality
PRODUCE	Peru Ministry of Production
ProPESCA	The Artisanal Fisheries Promotion Project
RENAMO	Mozambique National Resistance
REPAO	The West African Fisheries Policy Network
RESEX	Reserva Extrativista (Brazil)
ROPs	Reglamentos de ordenamiento pesquero (fisheries management plans)
SANIPES	Servicio Nacional de Sanidad Pesquera (Peru)
SASSI	The Southern African Sustainable Seafood Initiative

SFP	Sustainable Fisheries Partnership
SSC	Small scale commercial
SSF	Small-scale fishery
SWIO	South Western Indian Ocean
TAC	Total Allowable Catch
TNC	The Nature Conservancy
TURF	Territorial Use Right for Fishing
UCSB	University of California at Santa Barbara
VASEP	Vietnam Association of Seafood Exporters and Producers
VINAFIS	Vietnam Fishery Society
WCS	Wildlife Conservation Society
WWF	World Wildlife Fund

COUNTRY OPPORTUNITY SUMMARIES: SOUTHEAST ASIA

Regional Overview

Southeast Asia is hugely important to the global seafood industry. In marine capture landings, Indonesia is the world's third largest producer; Vietnam is ninth, and Thailand is fourteenth. What is more remarkable is that of the other nations listed in the top fifteen for global marine catch, most tend more toward industrial-scale fisheries, and a large portion of their catch is often from distant water fleets. As a region, Southeast Asia likely has the world's highest catch from small-scale fisheries, and Indonesia and Vietnam in particular have a high catch from SSFs (e.g., 90 percent of fishing vessels in Indonesia are five gross tons or less). The three Southeast Asian countries in this investigation comprise over eleven percent of the global seafood catch (Indonesia: 6.5 percent; Vietnam: 2.8 percent; Thailand: 2 percent). A major challenge common to the three Southeast Asian countries featured here is that each has a *de facto* open access system for SSF, and most are multispecies fisheries that can be difficult to manage. Each country also tends to have weak government enforcement of existing fishing laws. Despite the considerable amount of funder attention currently focused on Indonesia as a whole, some feel that the region has received less fisheries investment from western funders than is warranted given its percentage of the global catch.

Southeast Asia has some of the highest domestic per capita seafood consumption in the world, as well as high rates of dependence on marine protein. Vietnam, Indonesia, and Thailand have the highest, third highest, and fourth highest rates of seafood consumption in this study, respectively. (The Gambia is second.) Despite the huge domestic market for seafood, there is a very limited local market for sustainable seafood that commands a premium, as price is the most important factor for most domestic consumers. Each country has a different orientation to seafood exports. One small-scale product exported to western markets that is common to all three countries is blue swimming crab; each country has a crab FIP sponsored by the NFI Crab Council (other partners vary by country).

Indonesia is home to likely the largest small-scale fishery sector in the world. By far, it has the highest small-scale fisheries landings, number of fishers, and the best base from which to work in terms of traditional resource management systems that can limit access by outside fishers. Indonesia has the most variety and volume of commodities exported to western markets (including, importantly, large tuna stocks), most familiarity with FIPs, and highest NGO capacity and other sources of funding to leverage. The case for working in Indonesia is strong despite fundamental worries about weak rule of law.

In **Thailand**, if political will for proactive fisheries management were to increase, then some external assistance and resources may help manage Thai small-scale fisheries far more effectively. The Department of Fisheries has set a target to implement co-management in at least ten communities by 2020, and there is a long history of small-scale fisheries associations in Thailand. But, in general, minimal attention and resources have been directed to improving small-scale fisheries management with no clear levers to change this paradigm. Among these three nations, Thailand has the lowest volume and variety of SSF products exported to western countries. Despite the difficulties of developing a program in Thailand, working on the trawl fishery presents an interesting opportunity.

Vietnam has an enormous overcapacity problem, and working from a top-down level in Vietnam may be fruitless due to ineffective central fisheries management. However, Vietnam is an interesting prospect because it has a number of commodities sourced by western buyers, a huge need and appetite for investment and financial resources, and an organized provincial leadership that is, in some places, excited about sustainability and certification. Vietnam has a high number of commodities exported to western markets and has the only MSC-certified fishery (small-scale *or* industrial) in the region.

COUNTRY OPPORTUNITY SUMMARIES: INDONESIA

Overview

The archipelagic nation of Indonesia is home to 240 million people and consists of more than 17,000 islands. It is the world's second largest producer of marine products and has the second largest number of small- and medium-scale fishers. Most of these approximately two million fishers are poor and, along with many other poor people within Indonesia, depend heavily on the long-term health of marine resources as a source of cash and protein.

Although developing more sustainable fisheries in Indonesia is challenging due to *de facto* open access rules and weak governance, conditions are slowly becoming more favorable for reform. The national political climate has gradually improved in recent years; the marine-focused NGO community has matured in capacity and programs; private sector and government agencies are slowly becoming more attentive and more willing to work together on fisheries management; and a number of fisheries and ecosystems in the east of the country, though under increasing pressure, are still relatively healthy.

Of the twelve million tonnes of fish harvested in Indonesia in 2011, 41 percent was sourced from wild-capture fisheries, 34 percent from cultured seaweed and algae, and 22 percent from cultured fish. Indonesia's fishers operate about 550,000 boats, 90 percent of which are classified as smaller than five gross tons. That means that at least 90 percent of the country's fishers can be classified as managing small- to medium-scale operations.

Various tunas, shrimp, crab, grouper, snapper, seaweed, and algae make up Indonesia's most important marine export products. Assorted snapper, mackerel, and trevally, and many other smaller pelagic and nearshore fish from highly mixed and highly localized fisheries are important for domestic markets. For 2014, Indonesia's Ministry of Marine Affairs and Fisheries (MMAF) has set a production target of about twenty million tonnes of fish, about six million of which is from capture fisheries and nearly fourteen million from cultured fish. If that target is reached, it will represent a significant increase in production from the twelve million total tonnes produced in 2011. In short, both wild-capture fisheries and aquaculture are trending upwards in the country, and the government is actively promoting both.

Governance

The Indonesian government's current vision for fisheries exploitation contains a critical tension between short-term economics and long-term sustainability. On the one hand, the government is encouraging direct investment and greater fishing effort in exploiting relatively healthy fish stocks in eastern Indonesia. It wants fisheries production to meet growing domestic consumption and, at the same time, to ensure that fisheries make a substantial contribution to the country's economic growth, poverty alleviation, and job creation. This growth orientation is explicit in the MMAF mission statement.

On the other hand, the government is trying to pursue a sustainable "blue economy." Alongside the stated need to increase use of the country's fish resources for protein and revenue, MMAF has established a mandate to set Indonesia's fisheries industry on a more sustainable path and to pursue a progressive "blue economy" that reduces overfishing, expands protected areas, and improves the quality of product through the value chain. Government leaders are aware that most of the fisheries in the western part of the country have already been overexploited, and that the "underexploited" fisheries in eastern Indonesia could be easily depleted unless new policies and regulations shift incentives away from short-term gain to improved, long-term stewardship. The public commitment to sustainable fisheries is a welcome shift within MMAF, but meaningful change on the water and a clear definition of what is meant by "blue economy" has yet to materialize.

Indonesia operates under an open access regulatory system. In Indonesian law, it is a fundamental right of citizens to be able to exploit fish resources. The only significant constraints on the open access system are protected area designations; traditional management systems in places like Aceh, Maluku, and Papua; and very specific gear restrictions or species protections that have been enacted (e.g., national bans on dynamite and hookah fishing). Every fisheries expert in Indonesia agrees that this open access default is one of the most important hurdles to overcome in trying to improve the state of small-scale fisheries and the livelihoods of small-scale fishers in Indonesia.

Key Fisheries and Commodities

The following section highlights key fisheries and commodities for small-scale fisheries in Indonesia. This is a working list not necessarily ranked in order of importance:

- **Yellowfin tuna:** Yellowfin tuna is an important export commodity, with the largest markets in Japan, the United States, and the EU. Significant momentum is building around hand-line and pole and line yellowfin tuna fisheries in Indonesia. Efforts in these fisheries include MDPI's[1] Fair Trade[2] initiative, data collection, and community engagement projects in Ambon and Nusa Tenggara; TNC's work with tuna processors in Bali, particularly with PT Primo Indo Ikan; SFP's FIP and active

[1] MDPI is the nonprofit CSR spinoff of the Anova fishing company.

[2] This refers to Fair Trade USA, which has a pilot yellowfin tuna FIP in Indonesia.

[3] Fishing and Living. http://fishing-living.org/[illegible]-tool/. Accessed June 2014.

collaboration with PT Intimas Surya, a major tuna processor in Bali; and WWF's tuna FIP in eastern Indonesia's Arafura Sea. Unlike many small-scale fisheries in the developing world, MSC certification is not entirely out of reach for the yellowfin tuna fishery in Indonesia,[3] and some of the FIPs mentioned above have set a certification target for 2016.[4] While not the most labor-intensive fishery (see blue swimming crab below), the number of hand-line and pole and line tuna fishers in Indonesia is at least in the thousands.

- **Blue swimming crab:** Across Indonesia, between 80,000 and 100,000 small-scale fishers use mostly small boats with bottom set gillnets or traps to capture blue swimming crabs (BSC).[5] Almost 90 percent of the product is exported to the United States, making it an ideal target for market interventions. Because of its short life cycle and limited mobility in its adult life stages, BSC can likely be effectively managed in relatively small spatial areas with basic regulations (e.g., minimum size restrictions). The most advanced work is happening in a small coastal community, Betahwalang, just outside Demak, Central Java, as part of a fishery improvement project originally led by SFP, but now managed by Indonesia's Asosiasi Pengelolaan Rajungan Indonesia (APRI, or the Indonesia Crab Management Association) and Rare. Betahwalang alone has approximately 1,400 to 1,500 fishers whose primary fishing target is the BSC. Dozens more people, including many women, are involved in BSC sorting, picking, and transport. A second community near Kendari, South Sulawesi, has also begun the process of improving its BSC fishery with the help of APRI and its thirteen member companies. Success at these two sites would prompt APRI to expand its effort to additional coastal communities.
- **Snapper/grouper:** Snapper and grouper are of very high importance to small-scale fishers in Indonesia, and are fished off the coast of every Indonesian island. It is quite varied and includes snapper and grouper species caught on reefs and in nearshore shallow waters, as well as in deeper waters far offshore that require small-scale fishers to make multi-day trips. Some species, particularly snapper, are exported to the United States and the EU, but grouper is largely for domestic and regional consumption. (The live grouper trade is geared to markets in Hong Kong.) Across Indonesia, there are at least tens (if not hundreds) of thousands of snapper/grouper fishers. This fishery is almost certainly a more challenging target than crab or tuna, simply because it occurs everywhere (making traceability extremely difficult) and is usually fished simultaneously with many other species (including parrotfish, rabbitfish, mackerel). But there is already some engagement underway in Mayalibit Bay, Raja Ampat; Karimunjawa National Park, Central Java; the Aru, Arafura, Timor, and South Java Seas; and several other locations. A range of NGOs and companies are involved, including Rare, TNC, WWF, PT Kemilau Bintang Timur, PT Intimas Surya and its affiliated partner, PT Inti Makmur, and PT Primo Indo Ikan. Many of the processors that are already engaged in tuna FIPs also process and export snapper and grouper, so these processers may provide a good entry point for driving improvements in the fishery.

[3] Fishing and Living. http://fishing-living.org/msc-benchmarking-and-monitoring-tool/. Accessed June 2014.
[4] Kochen, Momo. Personal Communication. May 2014.
[5] Prabawa, Arie, APRI Director. Personal Communication. May 2014.

- **Octopus:** According to FAO catch statistics, octopus fishing has grown fivefold in the last ten years. While the upward trend is accurate, the actual percent of growth in this fishery in recent years is difficult to know. (One fisheries expert in Indonesia said octopus is "still flying under the radar" despite its recent growth, and fishers are simply not reporting their octopus catch to anyone.) Nonetheless, the volume of octopus being caught and delivered to buyers and processors is certainly on the rise. Octopus is usually caught by hand or net with the assistance of basic tools (that can reach into crevices and caves) by freediving fishers. More investigation is required to understand the octopus fishery, what markets it is reaching, how many small-scale fishers are involved (though it is at least in the thousands nationwide), and what interventions might make sense to ensure its sustainability. It remains a potential target commodity. SFP, among other NGOs and companies, is now taking a closer interest.
- **Spiny lobster in southern Lombok:** In South Lombok, numerous communities have created lobster grow-out operations in their bays that provide income for hundreds of fishers. Using passive fishing gear, fishers collect wild seed lobsters and grow them out to a size of just a couple of inches long. These lobsters then travel via multiple middlemen and are eventually exported to Vietnam where they are grown out to marketable size (i.e., 500-700 grams). The ultimate destinations for the product are regional markets in mainland China, Hong Kong, and Taiwan.
- **Indian mackerel**: Indian Mackerel is fished throughout the country, but in Mayalabit Bay, Raja Ampat, Conservation International (CI) and Rare are starting to work with hundreds of small-scale fishers to make the catch more sustainable and to improve handling and processing for the local markets where the mackerel is sold.
- **Sea cucumbers:** Sea cucumbers are harvested throughout the country, but especially in central and eastern Indonesia. They are consumed domestically, but are more often dried and shipped to international markets where large communities of ethnic Chinese consumers are concentrated. In several locations in Indonesia, management practices have improved to the point that sea cucumber harvesting is already a steady, reliable, and sustainable source of income for small-scale fishing communities (e.g., specific sites near Ambon), and Rare and the LMMA network are working in places like Karimunjawa National Park, Central Java, and the Kei Islands, Maluku, to help hundreds of fishers.
- **Small pelagics:** There is perhaps no group of fish that is more important to the food security of small-scale fishing communities in Indonesia than small-pelagic fish. However, it would be very difficult to address these fisheries with a market-based approach. Essentially, all production is destined for local consumption, and the mix of species caught is highly variable. Addressing overfishing would likely require a full campaign geared towards rights-based management, licensing reform, and spatial controls. The difficulty of overcoming these challenges is evidenced by the fact that no environmental group is currently prioritizing work on small-scale small pelagic fisheries in Indonesia.

Markets and Supply Chains

According to official statistics, Indonesia exported about $4.9 billion worth of fish in 2013, up from $3.85 billion in 2012. In 2014, MMAF is targeting sales valued at $5.1 billion. Most of Indonesia's wild-capture export product goes to the US, Europe, Japan, and China, particularly its tuna, crab, shrimp, and snapper. While most of the high-value captured and cultured fish leave the country, the majority of captured fish—about 75 percent—stays within Indonesia (e.g., reef fish, small pelagics). A series of useful supply chain analyses have been completed in recent years, especially for fishing done in and around the Nusa Tenggara chain of islands in south central Indonesia. Official estimates put domestic consumption at 38 kilograms per capita per year for Indonesia's quarter-billion-strong population.

Fishers and Communities

While available data is weak, it is likely that at least half of the country's two million-plus small-scale fishers are at or below the poverty line. (A recent estimate suggests that about 110 million Indonesians live on $2 per day.) As a general characterization, as one travels from west to east across the country, the proportion of impoverished fishers relative to local overall population generally increases, as do the number of fishers who fish for both commercial and subsistence purposes.

Indonesia's small-scale fishers, like small-scale fishers everywhere, seek greater predictability in the quality of their catch, safer conditions (often expressed as not having to go out as far, for as long, or in poor weather to meet financial obligations), and a higher price for their fish. There are a variety of intervention points that can help fishers realize these goals: exclusive resource access rights, either delineated by area or by species and conferred on the individual or on a collaborative group; access to competitive sources of small capital to buy equipment and level the playing field between fisherman and middleman; training in better post-catch product handling; access to better market information; developing alternative income sources; etc.

Factors Favoring Work in Indonesia

International markets: Several of Indonesia's most important fisheries reach international markets. It is those markets (and, specifically, the ultimate buyers and retailers) that have started to put pressure on Indonesia-based suppliers to clean up their practices and set a path towards better, long-term management. It is the international market that is driving change in yellowfin tuna capture and in the BSC fishery, for example, pressure that could grow to include snapper/grouper, since a good portion of it goes to the US and Europe. Leveraging the pressure of sustainability demands from the international market will be an effective approach for the foreseeable future as Indonesia will continue to be an important source of tuna, crab, and other species that matter to the international markets for years to come.

Momentum is building: While it would be too much to say there is already a critical mass of fisheries reform efforts in Indonesia, it is not that far off. SFP, WWF, and many other NGO and private industry partners have helped initiate eight to ten FIPs in Indonesia, more than in any other single country. In addition, there are four separate initiatives underway to improve

yellowfin tuna practices specifically. Yellowfin tuna is a high value, high profile product. If Indonesia's tuna fishery can successfully move towards sustainability, it could provide a model for improving tuna fisheries in other parts of the Pacific and Indian Oceans.

NGO capacity: Located within the Coral Triangle, Indonesia has long been the recipient of funds for marine biodiversity conservation projects. These funds have helped build up a substantial and skilled set of NGOs in the country with significant experience working in Indonesia. With so much capacity in place, the Rockefeller Foundation would have to spend comparatively little effort to cultivate and build the capacity of marine- and fisheries-focused conservation organizations.

Indonesia's steady economic growth: Indonesia is in the midst of a long-running and relatively stable period of economic growth. Annual GDP growth has been well over five percent for the last decade, and despite a relative slowdown in 2013, robust growth is expected to continue in the coming years. This period of economic growth is cementing Indonesia's position as a powerhouse in Asia. Government budgets, both at the federal and subnational level, are robust, and capacity and infrastructure continue to improve, although transparent budget allocations and the ability to gets funds out the door remain problematic.

Indonesia's Ministry for Marine Affairs and Fisheries is looking for assistance: The Ministry is actively seeking input to help define and guide what it means to pursue a "blue economy" based on more sustainable business practices. The private/public partnerships being created right now (and described elsewhere in this paper) indicate that a window is open now to influence—albeit gradually—what Indonesia's fisheries trajectory will be.

Constraints

A low fisheries management baseline: There is essentially no meaningful fisheries management currently in place in Indonesia, which will make it difficult to achieve catalytic change in the short term. Open access rights in much of the country, very poor data on the health of important commercial and subsistence stocks, and weak enforcement of even the few regulations that do exist mean that a great deal of work still needs to be done. Building the foundation for broader fisheries reform could be an incredibly valuable investment in a country so important to the global trade in fish, but wins in the short term may be hard fought and difficult to quantify.

Decentralized government: Indonesia is an incredibly vast and diverse country. After the fall of Suharto the country rapidly decentralized its government, giving substantial authority to district and provincial governments. While this system allows for a wide degree of latitude and innovation when working at the subnational level, it is a major barrier for scaling local-level solutions into a broader provincial or, especially, national framework.

Potential Interventions

1. Focus investments on a **handful of key commodities** including tuna, blue swimming crab, and potentially snapper/grouper.

   - **Tuna** is perhaps the most economically and politically important fishery in Indonesia, and achieving a sound management plan could be an important first step in improving broader fisheries governance in the country. Investment in tuna could support the ongoing interventions in the hand-line and pole and line yellowfin tuna fisheries. Grantmaking could focus on fishery improvement projects (e.g., projects run by SFP, MDPI, and TNC), with an initial focus on improving data collection and engaging businesses and local communities in the effort. Where applicable, the Rockefeller Foundation could also support additional Fair Trade[6] certifications, building off the initial audit done on a hand-line tuna fishery near Ambon in June 2014. After two to three years, armed with improved knowledge about the fishery and a strong constituency, this effort could then evolve into a push to create and implement a fisheries management plan nationwide or in key fishery management areas (FMAs; see the map at the end of this section). This could be coupled with support for the fishery to gain MSC certification.

   - A nationwide **blue swimming crab** (BSC) fishery improvement project was initiated approximately five years ago, but progress has been quite slow. The effort appears now to be gaining more traction, after having zeroed in on a couple of specific sites, most notably in Demak, Central Java. Initial grantmaking could focus on seeing through the work in Demak and proving a model of BSC fisheries management. If successful, funding could then evolve over the next five to seven years into replicating the management model and creating management plans in different districts and/or provinces. As a nearshore, low mobility species, regulation of the BSC fishery will have to occur at the local level and will therefore require a different type of fisheries management approach than tuna.

   - While **snapper and grouper** perhaps represent the most important fisheries for small-scale fishers in Indonesia, reforming them is likely to be more challenging than either tuna or BSC. Like BSC, thousands of boats fish for snapper and grouper, and they are fed into a supply chain that is quite complex; but unlike BSC, management systems are not as simple as just size and gear restrictions at the source. The Rockefeller Foundation could support some of the interventions that are already underway, including SFP's FIP work in Makassar or engagement with processors who also export snapper or grouper and are already involved in tuna FIPs (e.g., PT Intimas Surya, PT Primo Indo Ikan).

2. Because FIPs are focused on export fisheries, other interventions may be needed to address the Rockefeller Foundation's interests in the livelihoods and well-being of the small-scale fishers themselves (i.e., Rockefeller's FIP++ idea). Interventions could include investments in **alternative or compatible fishing enterprises**, such as aquaculture or mariculture (seaweed, algae, grouper, crab, shrimp) or the aquarium fish trade, perhaps

[6] This refers to Fair Trade USA's pilot small-scale fishery standard.

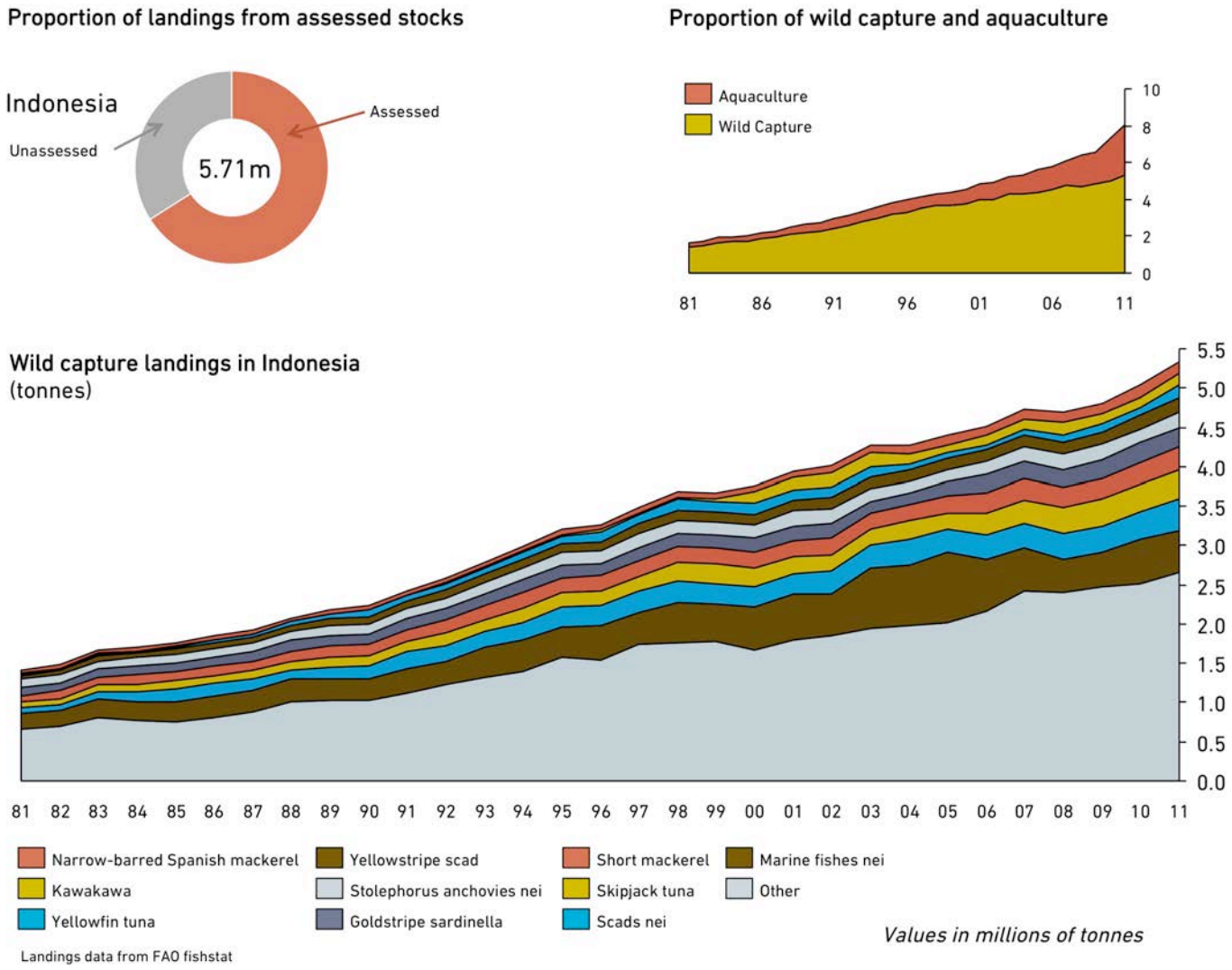
with the Indonesian Nature Foundation (LINI). Potential models include the Wildlife Conservation Society's work in southern Lombok supporting communities practicing lobster grow-out, or Mercy Corps' new coastal community-focused, NZAID-funded project in the Malukus.

3. Invest in **Locally Managed Marine Areas (LMMAs)**. Building on customary or traditional laws in Indonesia (e.g., sasi, adat), the Indonesian LMMA network helps communities develop management plans for their traditional fishing grounds and enshrine them in common law. LMMA management plans typically include a combination of no-take zones and seasonal closures. These plans have proven effective at rebuilding species including trochus, clam, sea cucumber, rabbit fish, and snapper. Since LMMAs are most relevant in places where there is still a foundation for customary law, the model is somewhat limited to relatively low population areas in eastern Indonesia. ILMMA, the NGO leading the movement in Indonesia, also believes in organic growth and investing substantial time to understand the desires and structure of local communities. This methodical approach may therefore not fit the Rockefeller Foundation's objective of relatively quick, catalytic change. That being said, few other small-scale fisheries interventions can more clearly demonstrate impact on poor and vulnerable communities than LMMAs.

4. Fund **stock assessments** that involve fishers, local leaders, and relevant fishing companies. Until fishers and regulators have a better understanding of the health of the fishery stocks, they will have no incentive to alter management, before total collapse. Solid information about stock levels in single-species fisheries is also a necessary precursor to implementing appropriate input controls, catch limits, and catch shares. TNC and MDPI are pursuing this approach with tuna and snapper fishers and processors. This effort might be well complemented by USAID's Indonesia Marine and Climate Support Project (IMACS) data collection program, which is likely to get funding approved for a second phase.

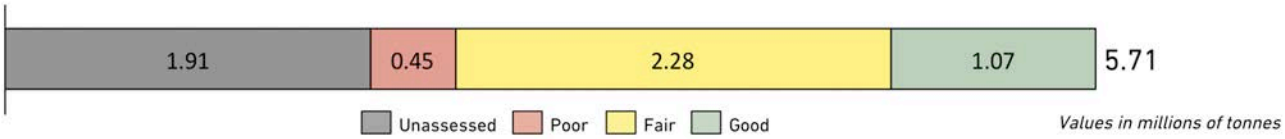
Indonesia: Landings, Stock Status, and Trade-Related Data

Indonesian landings (and aquaculture production) have steadily grown over the last 30 years; national landings are highly diversified.



Roughly 20% of Indonesian landings' stocks are in good health; 40% of national landings are fully-exploited without known mortality estimates.

Proportion of wild capture landings by stock status

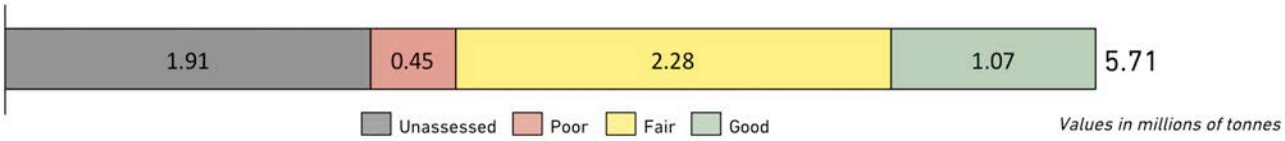


Stock status of Indonesian stocks reported by FAO FIRMS database

Species	Biomass Status	TAC Compliance	Mortality Status	Overall Fishery Health Score	2011 Landings (tonnes)
Bali sardinella	Overfished	Low	Unknown	D	32,475
Banana prawn, white banana prawn	Overfished	Low	Unknown	D	83,619
Bigeye tuna	Above BMSY	Medium	Unknown	B	50,235
Blue swimming crab, Flower crab	Unknown	Unknown	Unknown	D	42,411
Mahi-mahi, common dolphinfish	Not Overfished But at or Below BMSY	Low	Unknown	C	8,552
Mahi-mahi, common dolphinfish	Overfished	Unknown	Unknown	D	
Narrow-barred Spanish mackerel	Overfished	Low	Unknown	D	143,735
Skipjack tuna	Above BMSY	Medium	F<Ftrp	A	359,167
Snappers nei, Red snappers	Unknown	Low	Unknown	D	118,608
Snappers nei, Red snappers	Unknown	Low	Unknown	D	
Wahoo, ono	Overfished	Low	Unknown	D	106
Yellowfin tuna	Above BMSY	Medium	F<Ftrp	A	164,498
Yellowfin tuna	Above BMSY	Medium	F<Ftrp	A	

Roughly 20% of Indonesian landings' stocks are in good health; 40% of national landings are fully-exploited without known mortality estimates.

Proportion of wild capture landings by stock status



Stock status of Indonesian stocks reported by FAO FIRMS database

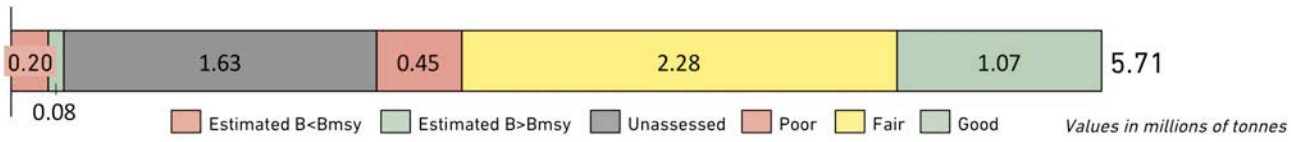
Stock or species groups	State of Exploitation	Uncertainty	2011 Landings (tonnes)
Bigeye tuna	East F; West F	Low	56,428*
Skipjack tuna	East: F, West: N	East: M, West: L	372,688*
Yellowfin tuna	East: F; West: N	Low	170,212*
Albacore	Fully-exploited	Low	11,483
Bali sardinella	Fully-exploited	High	32,475*
Banana prawn (W Pac)	Fully-exploited	High	83,619*
Banana prawn (Indian)	Fully-exploited	High	
Bigeye scad	Fully-exploited	High	10,699
Common squids nei (W Pac)	Fully-exploited	High	141,723
Common squids nei (Indian)	Fully-exploited	High	
Croakers, drums nei	Fully-exploited	High	78,171
Cuttlefish, bobtail squids nei (W Pac)	Fully-exploited	High	25,552
Cuttlefish, bobtail squids nei (Indian)	Fully-exploited	High	
Flyingfishes nei	Fully-exploited	High	13,997
Giant tiger prawn (W Pac)	Fully-exploited	High	26,417
Giant tiger prawn (Indian)	Fully-exploited	High	
Goldstripe sardinella	Fully-exploited	High	246,175
Hairtails, scabbardfishes nei	Fully-exploited	High	57,228
Indian mackerel (W Pac)	Fully-exploited	High	19,688
Indian mackerel (Indian)	Fully-exploited	High	
Jacks, crevalles nei	Fully-exploited	High	84,575
Kawakawa	Fully-exploited	High	139,102

Stock or species groups	State of Exploitation	Uncertainty	2011 Landings (tonnes)
Marine fishes nei	Fully-exploited	High	516,681
Mullets nei	Fully-exploited	High	51,466
Octopuses, etc. nei	Fully-exploited	High	7,674
Ponyfishes(=Slipmouths) nei	Fully-exploited	High	84,278
Ponyfishes(=Slipmouths) nei	Fully-exploited	High	
Scads nei	Fully-exploited	High	405,808
Sea catfishes nei	Fully-exploited	High	90,980
Sea catfishes nei	Fully-exploited	High	
Stolephorus anchovies nei	Fully-exploited	High	204,839
Stolephorus anchovies nei	Fully-exploited	High	204,839
Threadfin breams nei	Fully-exploited	High	53,779
Threadfin breams nei	Fully-exploited	High	53,779
Skipjack tuna	N	Medium	372,688*
Albacore	North: O, South: N	Low	11,483
Octopuses, etc. nei	Over-exploited	Medium	7,674
Southern bluefin tuna	Over-exploited	Low	672
Chacunda gizzard shad	Underexploited	High	8,371
Hairtails, scabbardfishes nei	Underexploited	High	57,228
Kawakawa	Underexploited	High	139,102*
Narrow-barred Spanish mackerel	Underexploited	High	151,450
Short mackerel	Underexploited	High	291,863
Toli shad	Underexploited	High	2,699

*Also assessed by Fish Source

Estimates of unassessed stocks only cover an additional 5% of landings, of which 80% are in poor condition.

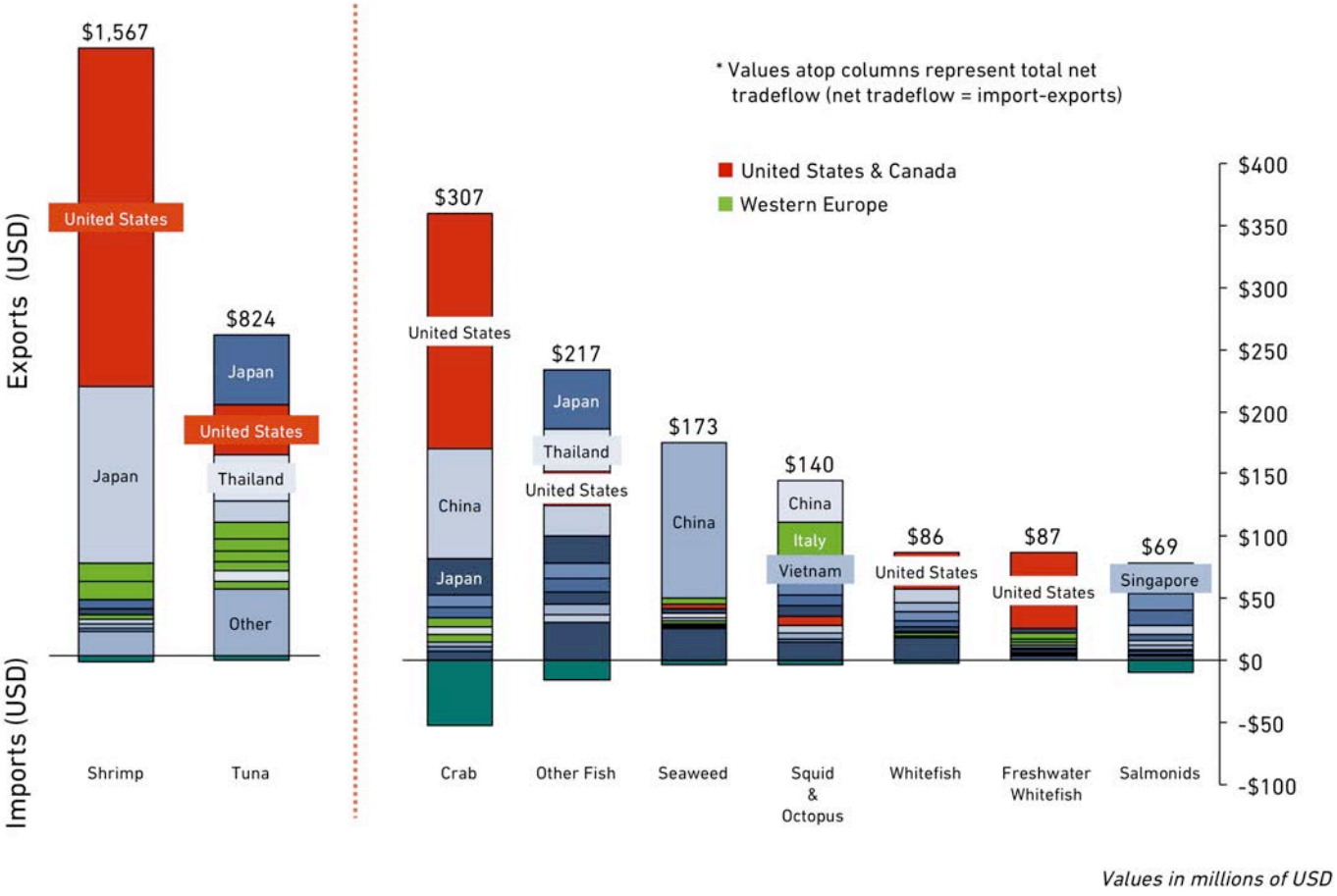
Proportion of wild capture landings by stock status



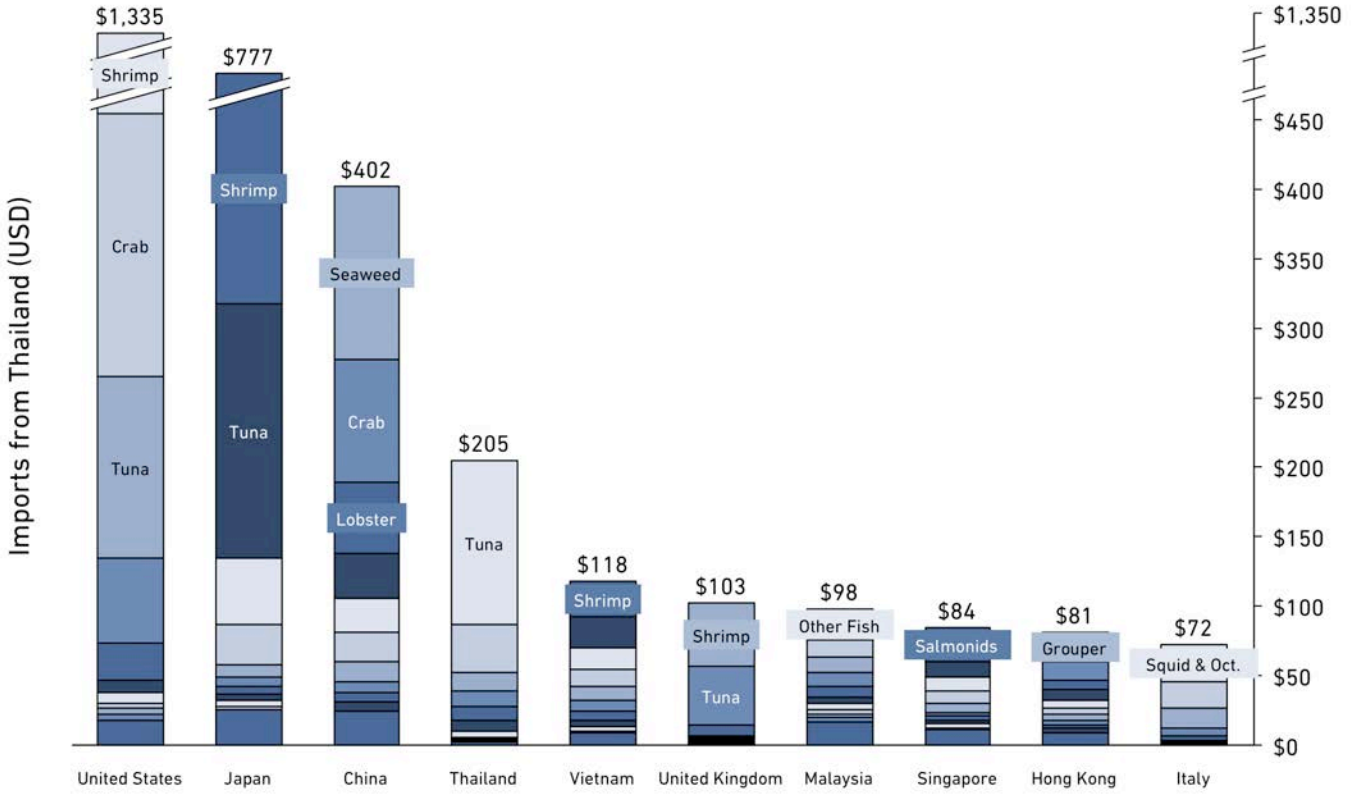
Costello et al. stock B/Bmsy estimates

Common Name	Estimated B/Bmsy	Confidence Intervals		2011 Landings (Tonnes)	Total Landings (Tonnes)
		Lower	Upper		
Barramundi(=Giant seaperch) (Indian)	0.64	0.09	4.45	90,064	197,571
Barramundi(=Giant seaperch) (W Pac)	0.99	0.25	3.71		
Bombay-duck (Indian)	0.43	0.06	3.52	7,215	
Bombay-duck (W Pac)	0.53	0.08	4.11		
Goatfishes (Indian)	0.74	0.10	5.41	77,629	
Goatfishes (W Pac)	0.77	0.12	4.87		
Greater lizardfish (Indian)	0.68	0.07	7.35	21,663	
Greater lizardfish (W Pac)	0.79	0.09	6.32		
Chocolate hind (Indian)	1.00	0.29	3.45	44,322	81,655
Chocolate hind (W Pac)	1.48	0.45	5.26		
Indian halibut (Indian)	1.84	0.47	7.33	21,999	
Indian halibut (W Pac)	2.69	0.72	9.34		
Rainbow sardine (Indian)	2.26	0.58	8.44	15,334	
Rainbow sardine (W Pac)	2.92	0.75	10.77		

Shrimp and tuna are Indonesia's primary seafood exports; crab is an important export to the U.S.



Western markets import a lot of tuna, shrimp, and crab from Indonesia.



Values in millions of USD

COUNTRY OPPORTUNITY SUMMARIES: THAILAND

Overview

If you take a stroll through almost any market in Thailand, the importance of seafood to the country's economy and culture is impossible to ignore. The pungent smell of fish sauce fills the air, and there are seemingly endless stalls of fresh and prepared seafood. The narrow nation stretches along more than 2,600 kilometers of coastline that provides more than 1.6 million tonnes of seafood and supports the livelihoods of more than 100,000 fishers. This production serves a voracious domestic demand of almost 33 kilograms of seafood per capita per year, almost twice the global average. The remainder is either exported or reduced into fish meal for the booming aquaculture market in the region.

Years of essentially unchecked exploitation, however, have severely degraded Thailand's ocean ecosystems and the productivity of its fisheries. The Gulf of Thailand, on the Eastern border of the country has been described as a case study in ecosystem overfishing. Thousands of trawl vessels plunder the Gulf with fine mesh nets that catch fish indiscriminately; not even the juveniles are left to mature. The higher value fish are separated and sold into the food supply chain, while the remaining "trash fish" are sold to fishmeal producers. Closer to shore, thousands of small-scale fishers ply the water with traps and gill nets among other gears landing species ranging from crab to squid to mackerel. On the Western side of the country, the Andaman Coast has fared somewhat better, as one interviewee said, "at least there is still some fish in the Andaman Coast." But fisheries in the Andaman are still believed to be severely overfished.

Governance

The main law governing commercial fishing in Thailand is the Fisheries Act of 1947. Almost sixty years old, the act has been described as an anachronistic piece of legislation that is insufficient to effectively regulate modern fishing activities. Delegation of authority is not clearly laid out in the fisheries act, and subnational government fisheries initiatives rely on the ambiguity of the existing legislation to support their regulatory authority. A new draft of the fisheries act is currently under review, but prospects for passage remain uncertain. One provincial fishing association that had worked on revising the policy said they had "given up" on its passage, while the Department of Fisheries representative we spoke with thought it would pass within a year. Regardless, revision of national fisheries policy was highlighted as a key priority across several of our interviews.

Fishing regulations in Thailand are quite basic and include vessel and fishing gear licensing, gear restrictions, and area closures. The systems that are in place, however, are typically not enforced. According to one interviewee, there are approximately 4,800 licensed industrial trawlers in Thailand, but there are probably more than 10,000 actually fishing in Thai waters.[7] Similarly, closed seasons exist but are poorly enforced. As one interviewee said, if you go to the local market during the mackerel closed season, you will find female mackerel with eggs in them.[8] There is, however, some anecdotal evidence of successful seasonal closures, most notably the recovery of giant prawns in Chumphon Province after a seasonal closure of critical fish habitat.

Potentially the most important regulation for small-scale fishers is their exclusive access to fishing areas within three kilometers of the shore. This small-scale area is set to expand out to 5.4 kilometers for ten of the coastal provinces in the near future,[9] but small-scale fishers claim that intrusions by industrial trawlers into their exclusive fishing zone are common.[10]

Key Fisheries and Commodities

In Thailand, small-scale fishing is defined as vessels less than ten gross tons. Large-scale vessels accounted for approximately 94 percent of marine seafood production by volume and 87 percent by value in 2004.[11] The following section outlines the top four seafood commodities by value for small-scale fisheries in Thailand in 2004.

1. **Blue Swimming Crab (2.1 billion Baht landing value)**
   Although the small-scale blue swimming crab (BSC) fishery landed only 24,000 tonnes in 2004, the high price commanded for crab makes it the most valuable small-scale fishery in Thailand. Small-scale fishers account for approximately 80 percent of BSC landings. Most of the product is exported to the United States, but somewhat surprisingly, local markets pay a higher price for swimming crabs than the export market. Given its high price and importance to the US market, BSC is the most obvious candidate for a market-based intervention. A FIP for BSC is already underway in two provinces along the Gulf of Thailand.

2. **Banana Prawn (1.8 billion Baht landing value)**
   Banana prawns are the second most valuable capture species for small-scale fishers, yet their production is dwarfed by enormous volumes of shrimp aquacultureproduction. Interestingly, nobody with whom we spoke in Thailand emphasized banana prawns as an important commodity for small-scale fishers. With most shrimp in Thailand exported to the United States, it is worth further investigation to determine whether wild-capture prawns have any potential for market interventions.

[7] Seilert, Heiko. Personal communication. May 2014.
[8] Charunas, Meksumpun. Kasetsart University. Personal Communication. May 2014.
[9] Thailand Department of Fisheries. May 2014. Personal Communication at the Blue Swimming Crab Fishery Improvement Project Meeting. Kasetsart University.
[10] Sriboya Island Fishing Association. Personal Communication. May 2014.
[11] Asia Pacific Fishery Commission, 2008. A Review and Synthesis of Capture Fisheries Data in Thailand.

3. **Squid (640 million Baht landing value)**
   Squid is an important product for both domestic consumption and regional markets in SE Asia. Small-scale fishers catch squid using traps, trammel nets, and falling nets. Our conversations with local fisheries experts, however, indicated that industrial vessels are the main suppliers of squid for the export market. In a study of one community, there were twenty small-scale vessels catching squid, but just five of them sold their product to a larger buyer in Bangkok.[12] A conversation with a squid producer in Rayong corroborated this anecdotal evidence by maintaining that most small-scale squid products remained in local markets. With limited squid exports from small-scale fisheries, and a Thai market with little interest in sustainable fishing, squid is not a good candidate for market interventions at this time.

4. **Indo-Pacific Mackerel (338 million Baht landing value)**
   Small-scale fishers capture mackerel primarily using gillnets. Although it is an important species for small-scale fishers, its catch volume is less than ten percent of large-scale fishing fleets in Thailand.[13] Mackerel is almost entirely consumed in local Thai markets, and what little product is exported is sent primarily to Taiwan, Japan, and the United States. Similar to squid, a relatively low price and its consumption principally in the Thai market makes mackerel a poor candidate for market-based initiatives.

Markets and Supply Chains

Thailand is the world's third largest exporter of seafood products by value, trailing only China and Norway. Key export products include shrimp (primarily from aquaculture), tuna, squid, sardine, crab, mackerel, and mollusks.[14] Shrimp and tuna are by far the most important export commodities, accounting for 43 percent and 27 percent of the country's seafood exports by value, respectively.

Thailand has also emerged as one of the leading seafood processors in the world. As domestic production of marine capture fish fell from 2.7 million tonnes in 1998 to just 1.6 million tonnes in 2010, processing plants looked to international fish supplies to keep their factories up and running. Thailand now imports almost $2 billion worth of seafood annually, most of which is processed and re-exported.[15] Tuna accounts for more than 50 percent of imports by value, but mackerel, squid, sardine, and salmon are other important import species.[16] The growth of seafood processing is a priority for Thailand, and a key part of the country's initiative to become the "Kitchen of the World."[17]

[12] Charunas, Meksumpun. Kasetsart University. Personal Communication. May 2014.
[13] Asia Pacific Fishery Commission, 2008. A Review and Synthesis of Capture Fisheries in Thailand: Large Versus Small-Scale Fisheries.
[14] FAO Fish Stat. Global Commodities Production and Trade Data.
[15] SEAFISH. Seafood Export Profiles: Thailand.
[16] FAO Fish Stat. Global Commodities Production and Trade Data.
[17] Thailand Office of Agricultural Affairs. "Thailand: Kitchen of the World."

The vast majority of small-scale seafood production in Thailand is destined for domestic consumption and sold fresh.[18] Small boats deliver their daily catch to landing zones that are often little more than small lagoons. Here, local villagers may purchase seafood directly, but most of the catch is sold to local middlemen. The local middlemen then sell the product to local fish markets, local hotels and restaurants, or to another intermediary for delivery to wholesale or end markets outside of the region.

The blue swimming crab supply chain is indicative of the complexity of small-scale fisheries supply chains. A local crab fisher will sell his crabs to a middleman as soon as the fisher arrives on shore. This middleman will then sell the live crabs to a cooking plant. From the cooking station, the crabs will be sold to a supplier who will deliver the crabs to a picking plant. Picked crab meat will then be delivered to a processing company for pasteurization, canning, and export to the United States.

The local middlemen play an important role in the fishing supply chain. In addition to being the primary purchaser of fish from small-scale fishers, they are often a financial resource for fishers. It is not uncommon for local middlemen to make loans to fishers to invest in new fishing gear or to perform repairs. The middleman's role as creditor makes small-scale fishers heavily dependent on them, and gives them a dominant position in price negotiations.

An important actor in Thailand's seafood supply chain is the Fish Marketing Organization (FMO). FMO runs fourteen wholesale fish markets throughout the country; at these markets, certified fish agents bring seafood for auction to retailers, restaurants, and seafood wholesalers. In 2008, about twenty percent of the domestic seafood consumption market flowed through state-run wholesale markets.[19]

Fishers and Communities

There are an estimated 158,000 fishers in Thailand.[20] The demographics of this group are now tilted towards older individuals, an indication of the declining economic fundamentals of fishing and better job opportunities in other sectors for the younger generation.[21] In our interviews with small-scale fishing communities, we found that there was a wide variation among small-scale fishers. Many were part-time, opportunistic fishers who were engaged in other forms of employment. Others were full-time fishers with no other livelihood options. Perhaps the most economically challenged communities are the sea gypsies, nomadic fishers who travel up and down the Andaman Coast but do not own any land.

There is a strong history of fishers' associations in Thailand, many of which were formed to battle industrial fishing interests. The Thai government has recognized the value of these

[18] FAO, 2008. Present and Future Markets for Fish and Fish Products From Small-Scale Fisheries.
[19] Laowapong, Amporn. 2010. Fisheries Value Chain: Kingdom of Thailand.
[20] Thailand Department of Fisheries, 2008. The Master Plan: Marine Fisheries Management of Thailand.
[21] Ibid.

groups and has set forth a goal in its latest master plan for every province to have at least one fishing association.

Factors Favoring Work in Thailand

Healthy subnational government budgets and capacity: A major advantage in Thailand is that a lot of money in the government system flows down to the lower levels of government. According to one interviewee, it is not necessarily spent in the best way, but if you can get a government on board you can get things to happen. The same interviewee also said that government capacity in Thailand can be quite strong, and he has personally seen the Department of Forestry evolve into an organization that has a genuine interest in natural resource management. Those that are involved in coastal management are not quite as progressive, but the potential is there.

In-country Rockefeller office: Fisheries will be a new sector for the Rockefeller Foundation and will require a significant amount of learning and dialogue with grantees, academics, government officials, and private sector stakeholders. Having a local office in which Rockefeller staff speak the language and understand the local political and cultural context will undoubtedly speed the learning process and limit missteps in the early phases of a fisheries program.

Support for co-management: The Department of Fisheries is actively supporting co-management of nearshore resources throughout the country. In their latest master plan, the Department has set a target for ten communities to develop and implement co-management plans for their coastal resources by 2018. This is not the most ambitious target, but could be a good foundation to build off of for the management of low-mobility species, such as blue swimming crab or shellfish.

Constraints

Limited marine NGO capacity: Our investigations of fisheries and marine conservation activities in Thailand unveiled very few NGOs working in the region. IUCN has an office in Bangkok and has activities for their Mangroves for the Future and Building Coastal Resilience programs in Thailand. WWF has a handful of staff working on marine issues, although a recent round of employee turnover has left them with a rather inexperienced marine team. Environmental Justice is playing a major role in drawing attention to slave labor issues in industrial fisheries. There are also a handful of local NGOs, many of which have worked with communities to protect their interests from industrial fishers. Sustainable Development Foundation, Andaman Foundation, and Wildlife Foundation were mentioned as good local NGOs, but it is not clear whether they are a good match for the market-based lens that Rockefeller is considering. Although Rockefeller would not be starting from ground zero, a substantial Thailand effort would require investments to build grantee capacity.

Limited importance of small-scale fishing: Compared to other countries in Southeast Asia, small-scale fishing is a relatively small component of the fishing industry. Small-scale fisheries landed just six percent of fish by volume and thirteen percent of fish by value. Not

surprisingly, industrial fishing and the fish processing sector garner the lion's share of attention from regulators and industry.

No demonstrated political will to manage fisheries: The current Thai fisheries master plan is quite candid about the problems the marine fishing sector is facing; overfished fisheries, overcapacity, and declining economic fundamentals of fishing. Despite clear recognition of the problems facing the industry, the Department of Fisheries has yet to take any meaningful steps to reduce fishing capacity and enforce the laws that are currently in place.

Potential Interventions

1. **Support ongoing efforts for the Blue Swimming Crab FIP**
   The National Fisheries Institute (NFI) Crab Council, an association of major crab importers in the United States, has been supporting a fishery improvement project (FIP) for the Blue Swimming Crab (BSC) Fishery in Thailand. Initially, the FIP was going to cover large swaths of Thailand, but it has since been scaled back to focus on two provinces on the Gulf of Thailand: Chumphon and Surat Thani. These two provinces, however, account for almost 30 percent of Thailand's BSC landings.[22] Blue swimming crab is a logical commodity group on which to focus as it is the most important species by value for small-scale fishers in Thailand,[23] and an estimated 80 percent of the landings are exported to the United States.

   The BSC fishery received failing scores on almost all principal indicators in its pre-assessment[24] and is now in the process of developing an action plan for the FIP. A substantial amount of work will come out of this action plan, which the Rockefeller Foundation may choose to support. This could include scientific research, development of management plans, research on and potential support for crab banks, or support for WWF to manage the FIP process. It is important to note that this FIP appears to be a long-term project with a likely lifetime of five to ten years.

2. **Support the anti-slave labor campaign in the Gulf of Thailand trash-fish fisheries** [25]
   The labor practices within Thailand's industrial fishing fleets, especially the high-seas fleets, have long been under scrutiny. The issue has taken center stage recently after a well-publicized report from the Environmental Justice Foundation outlined the atrocious labor practices in the fishing industry.[26] Thailand is already classified on the US State Department's Tier 2 watch list for compliance with the Trafficking Victims Protection Act,[27] and failure to make progress would make ascension to Tier 3 not entirely out of the

[22] Thailand Department of Fisheries, 2011. Quantity of Marine fish landed at major landing place by species group and province, 2011.
[23] Asia Pacific Fishery Commission, 2008. A Review and Synthesis of Capture Fisheries in Thailand: Large Versus Small-Scale Fisheries.
[24] Poseidon, 2011. Pre-Assessment of the Thai Blue Swimming Crab Fishery.
[25] SFP has spearheaded an Asian Feed Fisheries Roundtable, which last met in July 2013. Functioning as a 'Supplier Roundtable,' it aims to address the improvements required in multiple species and gears in the region.
[26] Environmental Justice,2013. Sold to the Sea: Human Trafficking in Thailand's Fishing Industry.
[27] US Department of State. http://www.state.gov/j/tip/rls/tiprpt/2011/164221.htm. Accessed May 17th, 2014.

question. This would place Thailand among an ignominious group of countries including Iran, Eritrea, North Korea, and Papua New Guinea, to name a few.[28]

The Rockefeller Foundation could provide additional support to the labor advocacy campaigns already under way, with a specific focus on the trash-fish fisheries in the Gulf of Thailand. This could include continued hard-hitting communication and advocacy efforts, bringing pressure to bear on major fishmeal producers and shrimp exporters in the region such as CP Foods, engaging retailers in the US and the EU, and supporting the ongoing Asia Feed Fisheries Roundtable. While this effort is not an ideal fit with Rockefeller's Revaluing Ecosystems program, it is perhaps the best opportunity in Thailand to directly impact the lives of poor and vulnerable communities. This would not be an easy battle though, as Thailand's industrial fishing fleets hold substantial influence and political clout, and we have heard that some within the industry have resorted to bribery and threats of violence to stave off investigations.

Unfortunately, we were unable to connect with any trash-fish fishery experts in Thailand, so further conversations will be necessary to test the best approaches and feasibility of this type of program.

3. **A softer market-based approach for reforming trawl fisheries**
In our conversations with small-scale fishing associations, conflicts with the industrial trawl fishing fleets were consistently identified as the primary concern. While using the slave labor issue as a wedge into reforming trawl fisheries may be an good opportunity, it also carries with it substantial risks for the Rockefeller Foundation and their continued license to operate within Thailand. Thus, a more measured approach for improving the management of trawl fisheries may be more appropriate. This effort could encompass support for the Asia Feed Fisheries Roundtable that Sustainable Fish Partnership is convening, as well as any fishery improvement projects that this process may spawn. This effort could be complemented with support for small-scale fisheries associations in their ongoing negotiations with trawl fishery interests.

4. **Support community managed shellfish beds and mangrove protected areas on the Andaman Coast**
A recent project on the Andaman Coast run by Terre des Hommes and the Department of Fisheries (DoF) created community-managed shellfish beds and protected areas. The project helped construct structures for shellfish culture, and created protected areas in mangrove areas that are critical habitats for cockles, mud crabs, and early life stages of blue swimming crabs. With a budget of approximately €600,000, the program was implemented in fifteen communities. In addition to creating the protected areas and shellfish beds, the project included capacity building and alternative livelihood components, such as business planning training for fishers and supporting the development of an ecotourism industry.

The Rockefeller Foundation could choose to replicate this type of program along the Andaman Coast and fund follow-up work in the communities that were originally a part of

[28] Note that Thailand was downgraded to Tier 3 status after writing this assessment.

this development project. A Rockefeller engagement may try to focus more heavily on the development of an ecotourism market, which would create alternative livelihoods and a higher end market for local fish product. But even with that emphasis, this project would be rather traditional, plodding development work and may not be a good fit for Rockefeller. Some, however, have argued that this type of on-the-ground community-based effort is the only effective way to create change.

5. **Support local efforts for fishers to sell to higher end markets**
The large tourism market in Thailand provides a relatively large "premium" market for local seafood products. But, given the current dynamics of the supply chain, fishers never see a premium price for products that supply higher end hotel and restaurants. Rockefeller could undertake an initiative to try and directly connect small-scale fishers to these buyers, bypassing middle men, and yielding a substantially higher price. In 2013, IUCN signed an agreement with Marriott hotels in which the hotel giant will source locally produced seafood for its establishments in Thailand.[29] Expanding this type of initiative could positively impact numerous fishing communities in tourism markets in Thailand.

   In addition to tourism markets, there may be opportunity to market small-scale fisheries products to premium markets based on their "healthy" characteristics. Earth Net Foundation, a local NGO that has worked on small-scale agriculture issues, has developed an organic and artisanal fish program. The organization is connecting small-scale fishers to premium markets and marketing their products as formalin-free (a formaldehyde preservative that is commonly used in Thailand). Targeting health conscious consumers may widen the market potential for this type of approach as there is much more demand for "healthy" products than "sustainable" products.

   The main drawback of this type of work is that it is unclear what the overall impact would be. Although there are substantial benefits to be gained for fishers by bypassing the middleman, several fishers expressed that they did not want to take on the additional work required to sell their product directly to consumers or local tourist establishments. In addition, the local fish buyer is often a provider of capital to the fishers, which enables them to invest in new fishing gear, boats, and boat repairs. From the buyer's side, hotels only want to deal with a single fish buyer that can consistently deliver the product that they need, rather than multiple fishers. This does not mean that direct consumer sales (whether hotels, restaurants, or fish markets) are impossible, but to implement such a program successfully will require well thought-out and implementable ideas, which may vary substantially from community to community.

6. **Anti-trawler campaign focusing on effective licensing, monitoring, control, and surveillance**
In every community we visited, the number one concern of small-scale fishers was the impact of industrial trawlers on their operations. They complained about the sheer volume of catch from these large vessels, intrusions into their three kilometer exclusive fishing zone, and destruction of their fixed gear. To date, the Department of Fisheries has been impotent in enforcing existing regulations on the industrial fleet. Recently, the DoF received funding to implement a vessel monitoring system on 100 industrial vessels, but after

[29] IUCN, 2013. Living in a Changing Climate Newsletter. Issue #9.

installation, the vessels simply "turned them off."[30]

Rockefeller could focus on improving vessel licensing, monitoring, and enforcement of Thailand's industrial trawl fleet. This could include organizing local fisheries associations, directing grants to the Department of Fisheries to develop and implement a rigorous MCS program, and perhaps using EU IUU regulations as a threat to drive change. This would not be an ideal match for Rockefeller's Revaluing Ecosystems framework, but it would address the number-one concern of small-scale fishing communities. It would also be challenging to build the political will for proper enforcement. When we asked DoF why they fail to enforce the industrial fleet, they said they were "afraid," an indication of the political power the industry wields.

7. **Develop a market-based campaign on seafood processors in Thailand**
Thailand is the world's third leading seafood exporter, and has become a processing hub for seafood products all throughout Asia. We have not devised what a specific program might look like, but it seems that Thailand's large processing sector could be an important area on which to focus for any market-based seafood initiative in Asia. The potential to influence this sector needs to be tested through further conversations with seafood industry experts in the region.

8. **Support ASEAN fishery improvement protocol**
Supported by a grant from USAID, ASEAN is in the process of developing a FIP protocol. With few fisheries in the region that are anywhere near MSC certifiability, some fishery stakeholders believe there is a need for a new FIP protocol that is more relevant for the region. The protocol will borrow from some of the principles of the MSC and social standards such as Fairtrade,[31] but it will most certainly be a less rigorous set of guidelines than the MSC benchmarking tool for FIPs. In a best-case scenario, the ASEAN FIP protocol would help usher fisheries onto the path to improved management, but in a worst-case scenario they would simply lower the sustainability bar and further limit engagement with existing sustainability initiatives. The protocol is expected to be completed this summer and will be piloted in a handful of fisheries from November through January. Funding for the project extends until March, 2015.

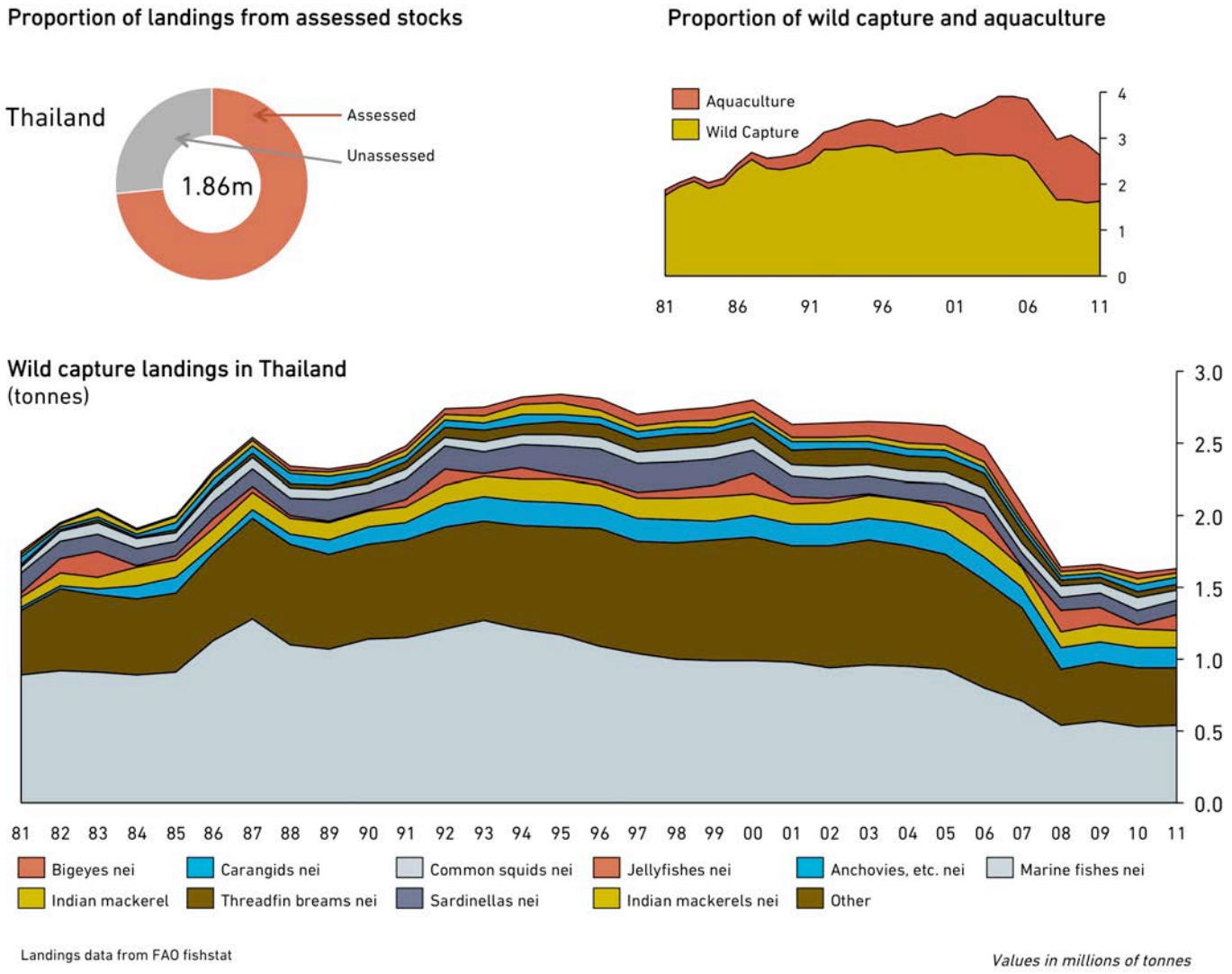
The Rockefeller Foundation could choose to support a handful of fisheries to implement the ASEAN protocol, or it could try and engage end-markets to create purchasing preferences for fisheries following the protocol. We, however, view this as a high-risk initiative, and would not recommend support at this time.

[30] Thailand Department of Fisheries, 2014. Personal Communication.

[31] This is a general reference to the principles of Fairtrade International, rather than specifically to Fair Trade USA and its pilot small-scale fishery standard.

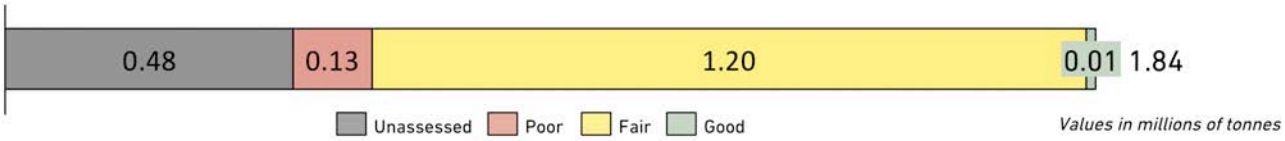
Thailand: Landings, Stock Status, and Trade-Related Data

Thai landings have fallen by near half from peak landings, while aquaculture now comprises nearly 40% of Thai seafood production.



65% of Thai landings are from stocks that are fully exploited (yellow), however almost all of these FAO estimates are highly uncertain.

Proportion of wild capture landings by stock status



Stock status of Thai stocks reported by Fish Source

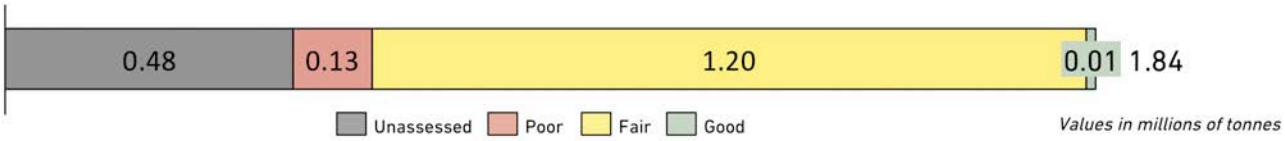
Species	Biomass Status	TAC Compliance	Mortality Status	Overall Fishery Health Score	2011 Landings (tonnes)
Longtail tuna, tonggol tuna (W. Pac)	Overfished	Low	Unknown	D	17,191
Longtail tuna, tonggol tuna (Indian)	Overfished	Low	Unknown	D	
Blue swimming crab, Flower crab	Overfished	Low	Unknown	D	20,582
Yellowfin tuna	Above BMSY	Low	F<Ftrp	B	186

Stock status of Thai stocks reported by FAO FIRMS database

Stock or species groups	State of Exploitation	Uncertainty	2011 Landings (tonnes)
Anchovies, etc. nei (W Pac)	Fully-exploited	High	142,834
Anchovies, etc. nei (Indian)	Fully-exploited	High	
Banana prawn (W Pac)	Fully-exploited	High	7,091
Banana prawn (Indian)	Fully-exploited	High	
Bigeye scad	Fully-exploited	High	19,913
Carangids nei	Fully-exploited	High	51,826
Common squids nei (W Pac)	Fully-exploited	High	93,489
Common squids nei (Indian)	Fully-exploited	High	
Croakers, drums nei	Fully-exploited	High	13,425

65% of Thai landings are from stocks that are fully exploited (yellow), however almost all of these FAO estimates are highly uncertain (cont.)

Proportion of wild capture landings by stock status



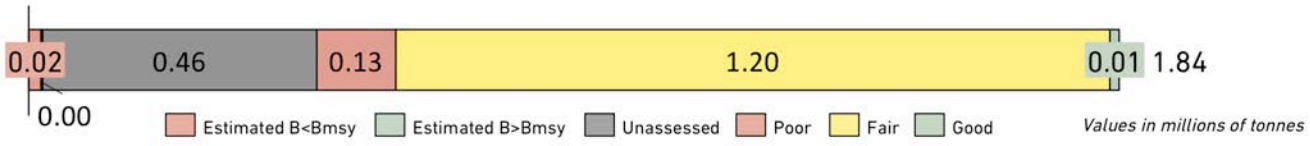
Stock status of Thai stocks reported by FAO FIRMS database

Stock or species groups	State of Exploitation	Uncert-ainty	2011 Landings (tonnes)
Cuttlefish, bobtail squids nei (W Pac)	Fully-exploited	High	22,997
Cuttlefish, bobtail squids nei (Indian)	Fully-exploited	High	
Frigate and bullet tunas	Fully-exploited	Medium	6,015
Giant tiger prawn (W Pac)	Fully-exploited	High	1,423
Giant tiger prawn (Indian)	Fully-exploited	High	
Indian mackerel (W Pac)	Fully-exploited	High	54,185
Indian mackerel (Indian)	Fully-exploited	High	
Indian mackerels nei (W Pac)	Fully-exploited	High	147,852
Indian mackerels nei (Indian)	Fully-exploited	High	
Indian scad (W Pac)	Fully-exploited	High	34,061
Indian scad (Indian)	Fully-exploited	High	
Kawakawa (W Pac)	Fully-exploited	High	14,550
Kawakawa (Indian)	Underexploited	High	
Largehead hairtail (W Pac)	Fully-exploited	High	10,190
Largehead hairtail (Indian)	Fully-exploited	High	
Lizardfishes nei	Fully-exploited	High	32,656
Marine fishes nei	Fully-exploited	High	498,766

Stock or species groups	State of Exploitation	Uncert-ainty	2011 Landings (tonnes)
Mullets nei	Fully-exploited	High	6,395
Octopuses, etc. nei (W Pac)	Over-exploited	Medium	7,690
Octopuses, etc. nei (Indian)	Fully-exploited	High	
Penaeus shrimps nei (W Pac)	Over-exploited	High	14,533
Penaeus shrimps nei (Indian)	Fully-exploited	High	
Rays, stingrays, mantas nei (W Pac)	Over-exploited	Medium	3,376
Rays, stingrays, mantas nei (Indian)	Over-exploited	Medium	
Sardinellas nei (W Pac)	Over-exploited	Medium	62,580
Sardinellas nei (Indian)	Fully-exploited	High	
Sea catfishes nei	Fully-exploited	High	1,879
Seerfishes nei	Fully-exploited	High	8,793
Sergestid shrimps nei (W Pac)	Over-exploited	High	5,040
Sergestid shrimps nei (Indian)	Fully-exploited	High	
Sharks, rays, skates, etc. Nei	Over-exploited	Medium	1,428
Threadfin breams nei (W Pac)	Fully-exploited	High	49,384
Threadfin breams nei (Indian)	Fully-exploited	High	

Academic estimates of unassessed stock health covers 1% of total Thai landings.

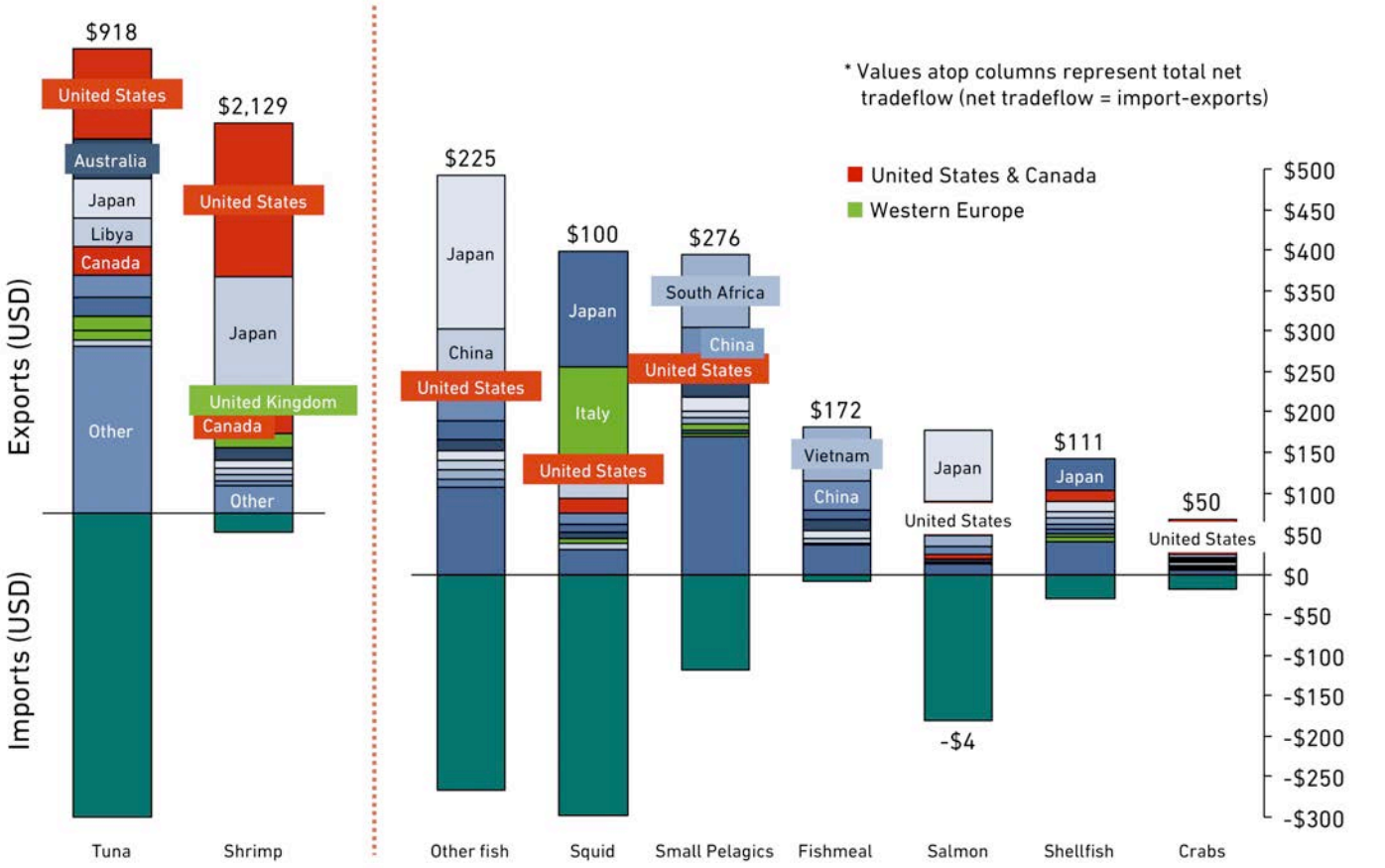
Proportion of wild capture landings by stock status



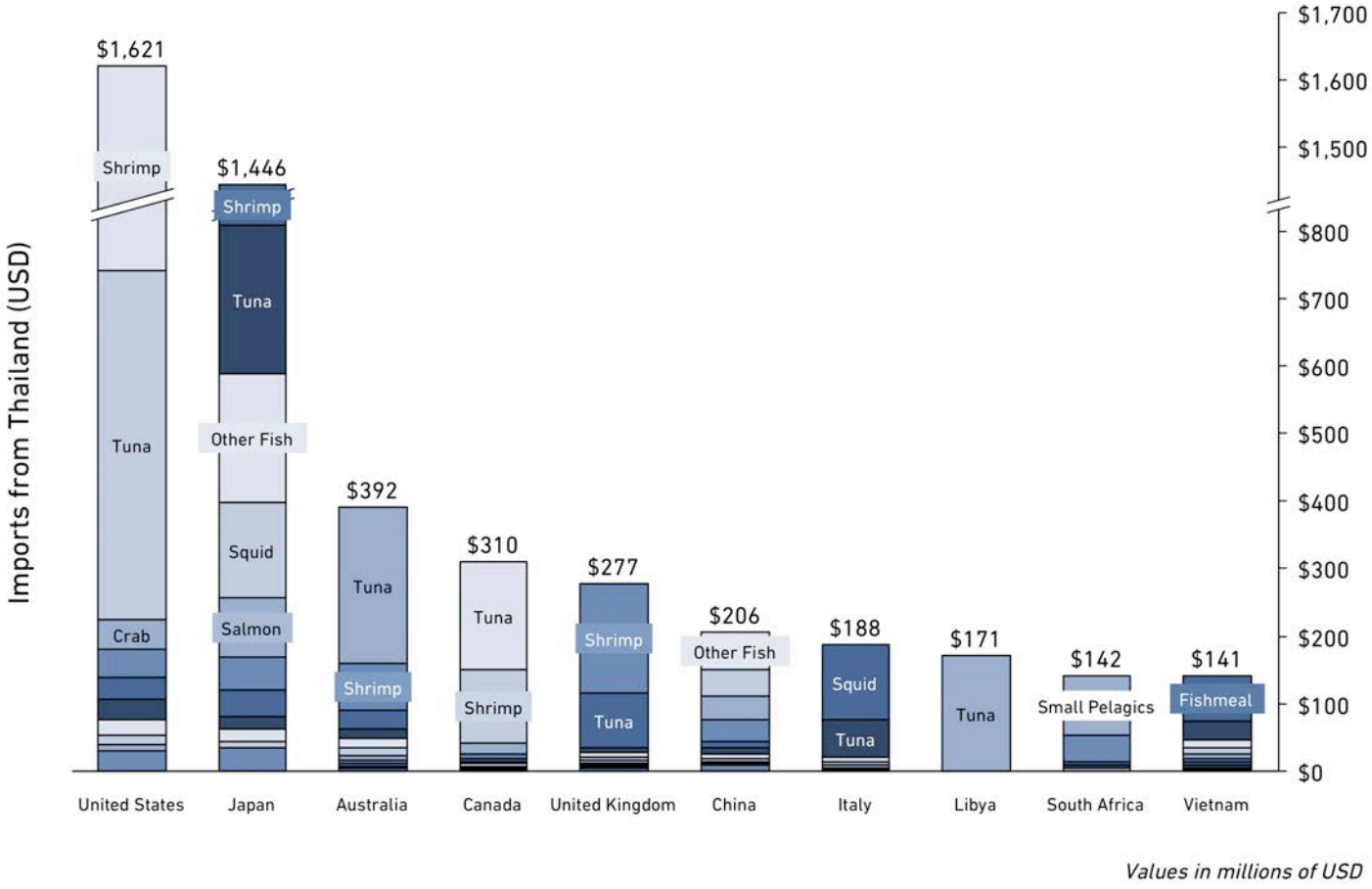
Costello et al. stock B/Bmsy estimates

Common Name	Estimated B/Bmsy	Confidence Interval		2011 Landings (Tonnes)	Total Landings (Tonnes)
		Lower	Upper		
Monocle breams	0.21	0.03	1.29	3,342	21,254
Eeltail catfishes	0.23	0.03	1.84	547	
Sillago-whitings	0.29	0.04	2.03	2,751	
Barramundi(=Giant seaperch)	0.31	0.05	2.10	47	
Barramundi(=Giant seaperch)	0.33	0.05	2.30		
Eeltail catfishes	0.35	0.05	2.62	547	
Sillago-whitings	0.35	0.05	2.77	2,751	
Tonguefishes	0.44	0.06	2.91	4,951	
Tonguefishes	0.48	0.08	2.90		
Dorab wolf-herring	0.50	0.08	2.88	4,836	
Dorab wolf-herring	0.52	0.08	3.22		
Indian halibut	0.64	0.08	5.36	1,473	
Indian halibut	0.76	0.10	5.94		
Daggertooth pike conger	1.12	0.27	4.62	3,233	3,233
Daggertooth pike conger	1.22	0.26	5.71		

Thailand is a seafood processing hub. They import huge amounts of seafood, process it, and export the value added products.



The U.S. and Japan are Thailand's largest seafood export markets; Western nations import shrimp and squid almost exclusively



COUNTRY OPPORTUNITY SUMMARIES: VIETNAM

Overview

Densely populated and full of entrepreneurial spirit following economic liberalization, Vietnam has become a center of economic growth in Southeast Asia, projected at nearly nine percent annual growth through 2050.[32] Combined with an extensive coastline (over 3,200 kilometers) and an exclusive economic zone larger than its land areas, these factors have facilitated growth of marine fisheries capacity at the blistering pace of eighteen percent per year since the early 1990s.[33] With an annual marine catch of over two million tons, Vietnam is now the ninth-highest producer of marine fish, supplying three percent of the world's marine capture seafood. The country is now home to 90,000 small-scale fishing vessels and 120,000 total fishing vessels and growing. While this growth has supported an increasing population and seen the number of small-scale fishers reach 500,000 and growing, catch per unit effort (measured by tons/horsepower capacity/year) dropped 60 percent from 1990 to 2005.[34,35] The country's fishery resources are essentially open access, with unenforced seasonal closures and limitations on the numbers of fishing vessels.

With 500,000 coastal marine fishers, Vietnam has a very high number of small-scale fishers per capita.[36] It is also the poorest country outside of Africa, poorer than South Africa, and closer to Senegal, the Gambia, and Mozambique in GDP per capita than it is to Thailand or Indonesia.[37] Marine fishers are in the highest numbers in the southern part of the country, where the Gulf of Thailand, nutrient-rich and expansive Mekong Delta, and South China Sea provide rich opportunity for fisheries production.

Governance

From a top-down perspective, the prospect for the Rockefeller Foundation to make country-level system change in Vietnam is unwelcoming. The central government's fisheries

[32] PwC GDP projections from 2011 through 2050.

[33] Dr. Nguyen Huu Dzung. "Enhance positive impacts of WTO accession on the fisheries economy and seafood trade of Vietnam".

[34] Dr. Nguyen Huu Dzung.

[35] Tuong Phi Li, et al. "Fisheries Subsidies, Supply Chain, and Certification in Vietnam: Summary Report". September 2009. Report by VIFEP, UNEP, and WWF.

[36] Interview with the Division of Fisheries.

[37] World Bank: World Development Indicators. Updated May 7, 2014.

management capacity can be described as ineffective and out of touch with the realities on the ground and in the water. The Ministry of Fisheries (MOF), once seen internally as a decent governing body, was consolidated under the Ministry of Agriculture and Rural Development (MARD) in 2007. This consolidation has led to a decrease in fisheries management acumen.

In response to increasing overcapacity and overfished resources, the federal government, in 2006, began the process of creating a fisheries development master plan that outlined a vision through 2020. This plan set a target for the maximum number of fishing vessels at 50,000 and for marine catch sustainable volumes to be between 1.5-1.8 million tons annually.[38] However, these efforts have been an utter failure, and there is a reluctance to enforce these measures at the provincial level, as the leadership knows that most SSF have no other livelihoods on which to fall back. More recently, the MARD has created a plan to send more fishing effort further offshore and to reduce effort in nearshore areas. To achieve this aim, the government has stated an intention to fund infrastructure and larger boats to encourage this shift, though there is little guarantee that the offshore waters are in any better shape than nearshore waters, particularly given regional competition for the shared resources.

When viewed from a bottom-up perspective, on a province-by-province level, the opportunities appear far more promising. Recognizing its limited power to manage the nation's fisheries, a practice of increasing the authority of provincial governments to manage their own fisheries has led to some positive changes. While obliged to comply with federal decrees, provincial fisheries leaders have latitude to think creatively in addressing fisheries management challenges, and many are hungry for investment, market access, and are progressive about the connection between sustainable management and increasing livelihoods. The robust organization and already high level of integration between the local levels of government—including DARD (Department of Agriculture and Rural Development), and the district and commune levels of government—means a more streamlined ramp-up process, at least in progressive provinces.

However, careful attention must be paid to implementation and structure when working in Vietnam. Capital-intensive projects, especially when administered through central government can be targets for massive corruption. Through the course of this investigation, many have noted that the $100+ million World Bank co-management project has been structured so that much of the funds can be siphoned into the pockets of bureaucrats and contractors. Rumors of corruption and misspent funds are pervasive. It is recommended that any Rockefeller work performed in Vietnam focuses the lion's share of funds on competent, trusted non-government implementation partners, or secondarily, progressive but fully vetted provincial partners.

Such partners in Vietnam are few and far between; fisheries-related NGO capacity is currently low, though the organizations that do work in Vietnam appear to be both savvy and effective beyond their size. WWF leads a significant amount of fisheries work in the Mekong Delta; the Center for Marine and Coastal Development (MCD) is effective at government policy on several

[38] Dr. Nguyen Huu Dzung. "Enhance positive impacts of WTO accession on the fisheries economy and seafood trade of Vietnam".

levels; and IUCN has a good national reputation and strong core staff. The nation's fishery trade associations and advocacy organizations (e.g., VINAFIS, VASEP, ICAFIS)[39] are well-organized, respected, influential, and progressive, if underfunded. Due to the slow process of building trust in Vietnam, it would be difficult to fund an outside organization to establish a front-line presence in Vietnam.

Key Fisheries and Commodities

Fisheries in Vietnam are not easily classified into small-scale and industrial scale; they are more commonly classified by the government as nearshore and offshore. Offshore fishing vessels have a core engine of over 90 horsepower and have an offshore license. All vessels operating in less than 30 meters of depth in the Gulf of Tonkin are considered nearshore, and other areas in depths less than 50 meters are considered nearshore. About two-thirds of Vietnam's 120,000 fishing vessels are considered small-scale.

Southern Vietnam around the Mekong Delta is far more ecologically productive than central and northern Vietnam and the majority of fishing, processing, and exporting occurs there. The primary small-scale fisheries in Vietnam are mixed-species gillnets (mackerel, shrimp, cuttlefish), small trawl (shrimp), longline and pushnet. The following section outlines the top four seafood commodities by value for small-scale fisheries in Vietnam in 2004.

1. **Clam**
   The Mekong Delta is a very productive area for hard clams, and six provinces in this area have significant clam harvest: Ben Tre, Tien Giang, Soc Trang, Tra Vinh, Ca Mau, and Bac Lieu. There are an estimated Ben Tre and Tien Giang have significant exports to Mediterranean countries in Europe, as well as some to the US. There are somewhere between 50,000-70,000 clam fishers in this part of Vietnam. Catch volume estimates are not available, but are considered to be modest.

2. **Blue swimming crab**
   The blue swimming crab fishery in Kien Giang province provides livelihoods for about 20,000 fishers, and about 80 percent is exported to the US. Catch volumes are unclear. This fishery is involved in a FIP with WWF-US & WWF-Vietnam, the NFI Crab Council, VASEP, and the Vietnamese government. The FIP began in 2010 and, with sustained funding, seeks to achieve MSC full assessment by 2017.

3. **Longline tuna**
   Tuna is caught primarily by longline in the three central provinces of Vietnam (Kanh Joha, Binh Dinh, and Phu Yen), targeting bigeye and yellowfin. Tuna has received much more market attention than other commodities in Vietnam. WWF is working with this fishery, though noted that the fishers in this fishery are relatively well-off as compared to smaller-

[39] VINAFIS: the Vietnam Fishery Society. ICAFIS: International Collaborating Centre for Aquaculture and Fisheries Sustainability, the sustainability arm of VINAFIS. VASEP: Vietnam Association of Seafood Exporters & Producers.

scale fisheries in Vietnam. Longline accounts for 28 percent of the tuna fleet structure.[40] Vietnamese longline tuna fishing is growing rapidly.

4. **Handline snapper**
   An offshore handline snapper fishery in Bin Thuan province focuses on eight snapper species. Snapper exported to the US totaled approximately 37,500 kilos in 2011 and 2012, though dropped to 7,000 kilos in 2013.[41] This is a relatively well-organized fishery with fisher participation in management and a focus on sustainability.

Additional fisheries of interest

The NFI Crab Council has scoped out possible market connections for a red swimming crab fishery in northern Vietnam. A much larger fishery than the blue swimming crab fishery in Kien Giang, and about 50 percent is exported to the US. SFP is also scoping scallop (southeastern Vietnam), lobster (central Vietnam), and anchovy (southwestern Vietnam) fisheries, some of which export to western markets, in varying degrees.

Markets and Supply Chains

Vietnam's small-scale fisheries have a relatively high rate of export both within Asia and to western markets, making it a potentially good fit for Rockefeller's model from that perspective. Interestingly, as in Thailand, fishers state that the highest price for their products comes from *domestic* markets, but they still often prefer to sell into export markets since they can sell in larger quantities, making the transaction process cheaper and more efficient.

As in other countries, Vietnamese fishers are partly beholden to middlemen. The practice of collusion and price-setting among middlemen is common, and the demonstrated capacity of fishers to sidestep middlemen and sell directly to subsequent steps of the supply chain is weak. The barrier seems as much cognitive as real; fishers express a concern with increased vulnerability if they attempt to cut out the middleman and come on hard times, lacking another avenue for investment in their business. They display only partial knowledge about what happens to their catch after it is sold to the middleman, many having no idea that it ends up exported to markets paying a high price.

Many processors are foreign-owned companies, at once making them less enmeshed in the social fabric of Vietnam, from a corporate responsibility point of view, but more concerned with their image internationally, which could be a point of leverage. As in all the countries in this study, it has been suggested that the vertical integration of steps—from buying product from fishers to cooking, picking processing, and exporting—presents an option for improving price paid, reducing non-compliance with measures, and improving livelihood outcomes throughout the value chain, but its feasibility in Vietnam still needs to be tested.

The domestic market in Vietnam is decidedly not ready for a developed market for "sustainable" seafood that commands any sort of price premium, as GDP per capita in Vietnam is about

[40] Thanh Viet Nguyen. Vietnamese Tuna Fisheries Profile. WCPFC and DECAFIREP. Hanoi, November 2011.
[41] SFP whitepaper to the Rockefeller Foundation, May 2014.

$1,600. However, poor food quality and hygiene practices have led to outbreaks of food poisoning across the country and have left many concerned about food safety and have stimulated a willingness to pay a bit extra for assurances of quality. Going forward, there may be opportunity in niche markets to pair the concepts of food safety and sustainability. This demand is likely to be generated from specialty stores in major cities (e.g., Ho Chi Minh City and Hanoi), restaurants, hotels, and tourist destinations, though this market is of modest size.

Fishers and Communities

A high percentage (60 percent) of Vietnam's population lives on the coast, and eight percent of jobs in the country are fishing-related (about 4.5 million fishers). However, the majority of these fishers fish freshwater, inland waterways such as the Mekong River Delta, which may put them outside the scope of this investigation. Still, about 500,000 fishers are categorized as marine small-scale fishers, a very significant number. Central and southern Vietnam have the highest numbers of fishers.

While reliable data is difficult to find, Vietnam appears to have a high percentage of women in the total fisheries workforce, at about 38 percent, and women represent over 70 percent of the fishery processing workforce in Vietnam. Roughly 825,000 women are involved in the fisheries workforce in Vietnam (including large- and small-scale fisheries, and aquaculture).[42]

In some cases, fishing actually brings in more income than other available livelihoods, such as rice farming. For example, clam fishers in the more commercially developed clam fisheries have higher incomes than nearby rice farmers and clam farming communes have set up eligibility rules to limit who can participate in the clam fisheries in order to prevent broad access and overfishing.

Factors Favoring Work in Vietnam

High levels of government organization and integration provide an existing framework and structure to work with, especially in favorable provinces. Increasingly de-centralized fisheries management means that provinces have growing latitude to implement regulations by their own interpretation. Progressive provinces in southern and central Vietnam are eager for investment, increased export market connections, and certification. Sustainability is a known and sought-after concept in these progressive provinces (Bin Thuan, Ben Tre, Tien Giang, Soc Trang, Kien Giang). WWF and MCD both have good reputations and a strong presence in Vietnam.

[42] Sarah Harper, UBC PhD student. Information on women in the workforce from CRC Gender & Fisheries webinar on June 10, 2014.

Constraints

- There is low number of implementation partners and existing implementation partners currently have capacity limitations to expand work.
- Massive corruption in the World Bank project suggests that there is a risk of appropriation of philanthropic funds by non-target individuals and groups.
- Provincial and local government officials are obliged to work within the framework of the federal government's decrees, which are often out of touch with realities on the ground.

Potential Interventions

Listed in relative order of recommendation:

1. **Support Mekong Delta clam certification/FIP/Fair Trade**[43]
   There are six provinces in the Mekong Delta (southern Vietnam) with significant clam fisheries, one of which is Ben Tre. There are 20,000 clam fishers in Ben Tre province alone, and an estimated 50,000-60,000 clam fishers in the Mekong Delta, currently living on annual incomes of around $1,000 per year. The Rang Dong hand-harvest Asian white clam fishery in Ben Tre is the only MSC-certified fishery in the three Southeast Asian countries included in this investigation. The Rang Dong fishery has a robust cooperative organization, and sustainable seeding and harvesting practices and its 2,000 fishers sell the vast majority their product into European and US markets for a premium price. Neighboring clam fisheries in Ben Tre and other provinces have seen the success of the Rang Dong fishery and are eager to follow the same path.

   A former director of DARD in Ben Tre is now working independently as a member of VINAFIS and an independent consultant, and has set the objective of certifying a large chunk of the clam fisheries and is mobilizing the various levels of government, WWF, and institutions like VINAFIS to achieve this goal. The objective is to build a big enough base to be able to secure larger contracts with suppliers to give these clam fisheries more market leverage. They also have the goal of creating a supply chain linkage like the one created for farmed pangasius and shrimp in Vietnam (which has recently suffered due to US. anti-dumping regulations). Specifically, Xa Tan Thanh and Xa Phu Tan communes in Tien Giang province are actively pursuing MSC pre-assessment, and several communes in Soc Trang province may follow.

   This could be a chance to build on the success of the Ben Tre certification in a place that is eager for assessment and includes strong, motivated local leadership. MSC certification has shown the possibility of achieving a 35 percent increase in the product sale value of Rang Dong clams, demonstrating clear livelihood benefits. Compared to more mobile species, clams are relatively easily managed, and because they are seeded on sand/mud flats, it is far easier to turn them from an open access system into a rights-based system. This could be an opportunity to develop a foothold of certification of small-scale fisheries in

[43] This refers to Fair Trade USA's pilot small-scale fishery standard.

the developing world, demonstrate that rigorous certification even in the developing world is replicable for fecund, sedentary species like clam, and provide a base from which to build.

2. **Support ongoing efforts for the Blue Swimming Crab FIP**
The National Fisheries Institute (NFI) Crab Council, an association of major crab importers in the United States, and WWF, have been operating a FIP for the Blue Swimming Crab (BSC) fishery in Kien Giang province, Vietnam. Among all FIPs run by NFI in Thailand, Indonesia, the Philippines, and Sri Lanka, this one is the strongest, is making the most progress, and has strong coordination from WWF.

   Support for this FIP could include: (a) the addition of livelihood elements, specifically a study on additional or alternative livelihoods that the FIP has identified as a need; (b) support for ongoing stock assessments and the maintaining of catch log books, which have tenuous funding; (c) support of the existing Phu Quoc crab bank or additional crab banks (which are very economical at about $4,000 and raise awareness in communities); (d) support for WWF to continue or expand its work here; (e) support to the province to expand capacity to oversee the FIP process; or (f) could be used as a case study on vertically integrating the supply chain for the in-country steps immediately after the fisherman sells the product, allowing for greater monitoring of restrictions such as minimum size limitations. Supplier market leverage could make an impact here.

3. **Support ASEAN fishery improvement protocol**
Supported by a grant from USAID, ASEAN is in the process of developing a FIP protocol. With few fisheries in the region that are anywhere near MSC certifiability, some fishery stakeholders believe there is a need for a new FIP protocol that is more relevant for the region. The protocol will borrow from some of the principles of the MSC and social standards such as Fairtrade,[44] but it will most certainly be a less rigorous set of guidelines than the MSC benchmarking tool for FIPs. In a best-case scenario, the ASEAN FIP protocol would help usher fisheries onto the path to improved management, but in a worst-case scenario they would simply lower the sustainability bar and further limit engagement with existing sustainability initiatives. The protocol is expected to be completed this summer and will be piloted in a handful of fisheries from November through January. Funding for the project will run out in March of 2015.

   The Rockefeller Foundation could choose to support a handful of fisheries to implement the ASEAN protocol, or it could try and engage end markets to create purchasing preferences for fisheries following the protocol. We, however, view this as a high-risk initiative, and would not recommend support at this time.

[44] This is a general reference to the principles of Fairtrade International, rather than specifically to Fair Trade USA and its pilot small-scale fishery standard.

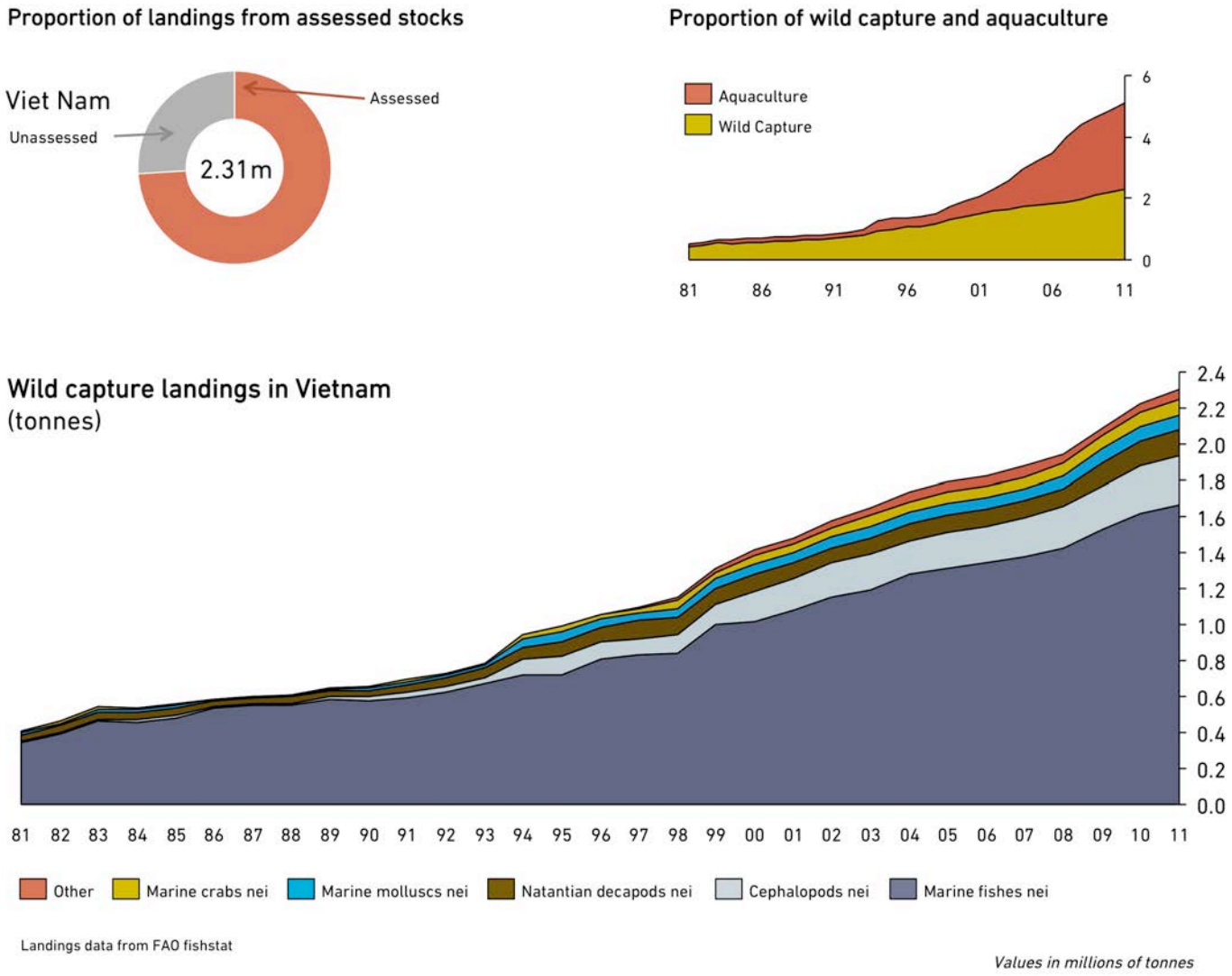
4. **Support Co-Management work in Vietnam**

Co-management is seen as the key tool to move Vietnam's fisheries from open access to access limited systems. Co-management has developed effectively in a few areas of Vietnam, especially some of the more entrepreneurial provinces in the Mekong Delta (Ben Tre, Kien Giang) and Binh Thuan in central Vietnam. Recognizing its inability to manage fisheries on its own, the central government is motivated to expand co-management around Vietnam. The World Bank's $120 million co-management and infrastructure improvement project—while poorly run, ineffective, and rife with corruption—provides at least the basis of something to build off of, and a series of lessons learned.

University of Connecticut professor Robert Pomeroy has worked on fisheries in Vietnam for many years and has a plan for a comprehensive co-management effort in Vietnam that focuses on provinces not touched by the World Bank project. While likely somewhat expensive, long-term, and not a perfect fit with Rockefeller's model, there is an argument to be made that this is one of the more durable changes that could be achieved. Viewed one way, Vietnam's major problem is a lack of funding for monitoring and enforcement; well-executed funding that is smartly designed to avoid corruption could lead to significant improvement in the key, highly productive nearshore coastal areas of Vietnam (central and southern). Robert Pomeroy has proposed this project to other foundations and groups of foundations engaged in oceans work, suggesting the opportunity to leverage a potentially large pool of resources. The Vietnamese-run NGO Center for Marine and Coastal Development (MCD) is the likely candidate to implement this work.

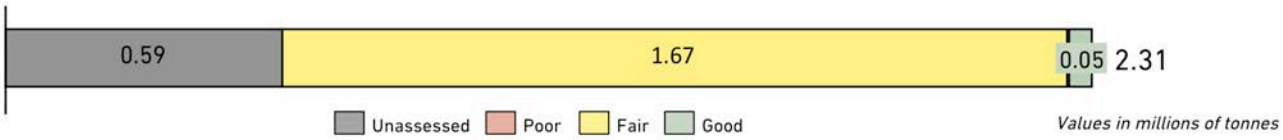
Vietnam: Landings, Stock Status, and Trade-Related Data

Little is known about wild capture landings in Vietnam, 70% of landings are unidentified; aquaculture produces the majority of seafood in country.



Over 70% of total landings are attributed to unidentified marine fish that are fully-exploited (yellow), a rating about which FAO is highly uncertain.

Proportion of wild capture landings by stock status



Stock status of Vietnamese stocks reported by Fish Source

Species	Biomass Status	TAC Compliance	Mortality Status	Overall Fishery Health Score	2011 Landings (tonnes)
Yellowfin tuna	Above BMSY	Medium	F<Ftrp	A	15,359
Mahi-mahi, common dolphinfish	Not Overfished But at or Below BMSY	Low	Unknown	C	0
Skipjack tuna	Above BMSY	Medium	F<Ftrp	A	29,492
Swordfish	Not Overfished But at or Below BMSY	Medium	F<Ftrp	B	382
Blue swimming crab, Flower crab	Overfished	Low	Unknown	D	0
Lyrate hard clam	Not Overfished But at or Below BMSY	High	Unknown	A	6,300

Stock status of Vietnamese stocks reported by FAO FIRMS database

Stock or species groups	State of Exploitation	Uncertainty	2011 Landings (tonnes)
Tuna-like fishes nei	Over-exploited	High	0
Marine fishes nei	Fully-exploited	High	1,670,016

**Also assessed by Fish Source*

COUNTRY OPPORTUNITY SUMMARIES: AFRICA

Regional Overview

As a major global supplier of seafood with relatively weak fisheries management and poor fishing communities, Africa is a unique region in which to test new market-based approaches to fisheries management that balance ecosystem sustainability and livelihood needs. Small-scale fisheries (SSFs) for the four identified African countries—Senegal, The Gambia, Mozambique, and South Africa—are at very different maturity levels. In late April 2014, the Council of African Ministers for Fisheries and Aquaculture met and approved a Policy Framework & Reform Strategy for Fisheries and Aquaculture in Africa that largely supports the approach the Rockefeller Foundation wishes to pursue, emphasizing the importance of coordinated management, supporting livelihoods, and the socioeconomic value of fisheries to communities. The Framework will be presented for adoption to the heads of African states in June 2014.

The current conditions and opportunities in the SSF sector are different in each of the four target countries:

With **Senegal**'s recent hardline stance on illegal and foreign fishing, SSFs now have the breathing room to improve management and market access for artisanal fishers and the domestic supply chain. The country, however, is struggling with the application of co-management at the local level and overcapacity of its SSF fleet. **The Gambia** is a tiny player comparatively—in both landings and participants—but has taken some baby steps toward certification with the full support of fishers, seafood processors, and major buyers. A modest investment in its sole fishery improvement project (FIP) may provide West Africa with its first Marine Stewardship Council (MSC)-certified fishery and provide proof of concept. At this point, it appears that any investment in The Gambia must be linked with a Senegalese investment, so for the purpose of this interim report the two countries will be linked as a unit.

South Africa is, by far, the most developed country among the four from a management and markets perspective, and it is currently undergoing a radical SSF reform involving expanding access to previously excluded communities with a focus on market development. It is, at the moment, a politically charged and uncertain, yet hopeful, environment.

Lastly, **Mozambique** is the least accessible region, marked by extreme poverty, with fishing serving as an occupation of last resort. Mozambique struggles with overexploitation in nearly all of its nearshore fisheries. However, it has secured significant international aid and investments in the last several years to vastly improve market infrastructure, technical training, and knowledge of its fisheries resources, which may jumpstart a revolution.

COUNTRY OPPORTUNITY SUMMARIES: SOUTH AFRICA

Overview

South Africa is a very promising but complicated candidate given its current focus on SSFs and livelihoods. While South Africa is far wealthier than other African countries, it still exhibits race-based income inequity. According to the last census, the income of white families in South Africa, on average, was six times greater than the income of black families, and unemployment among black families is also far more prevalent. Southeast of Cape Town, extremely poor townships were set up from the 1940s to 1960s through apartheid legislation such as the Group Areas Act. Areas like the Cape Flats region are dominated by tin shack communities, and communities like Ocean View were created when black families were forcibly resettled during apartheid.

Within this cultural context, a Small-Scale Fisheries Policy was adopted in July 2012 to transform the SSF sector. The goal is to include previously disenfranchised fishers, embrace co-management, and emphasize value-added and market-based development activities for the entire SSF sector. In May 2014, the president signed the Marine Living Resources Amendment Act into law, which codifies the SSF Policy and allows the country to implement and fund the Policy.

Governance

South Africa's SSF industry and politics are both complex and contentious. Historically, fishing access was strictly regulated and granted to rights holders who were predominantly white and relatively affluent fishermen, while black South Africans mostly participated in the fishery as lesser-paid crew members. This inequity created a climate of rampant poaching by non-rights holders, particularly for two of the country's highest value species: rock lobster and abalone. It also fueled a civil rights movement in fisheries management focused on social justice, food security, and sustainable livelihoods.

In 2005 that fight culminated in a lawsuit brought before the Equality Court system, a system established to resolve apartheid-era discriminatory practices and provide reparations. The highly politicized lawsuit was fueled by social activist and fisher organizations, including Masifundise Development Trust and Coastal Links. The Court determined that the government had wrongfully excluded fishers and ordered the government to develop corrective policies. In response, South Africa convened a national task force in 2007 to draft a new policy that would become known as the Small-Scale Fisheries (SSF) Policy. A key attribute of the policy included

movement away from individual quota systems and top-down fisheries management for small-scale fisheries focuse on single, commercially important, and seasonal species and. Instead, the policy provided collective fishing rights to established community-based legal entities and access to a basket of species. This collective right would be unique to the small-scale fishing sector and their basket of resources would be tied to regional abundance and health of fisheries populations. The intent was to create year-round access to resources that could be collectively marketed and sold to provide steady income to fishers and support co-management of the broader ecosystem. Through a participatory management approach, communities would be incentivized to crack down on and self-regulate poaching of massively overfished, high-value species within their basket (such as rock lobster and abalone) further enhancing the long-term sustainability of fisheries resources and the resilience of SSF communities.

The SSF Policy stalled in implementation after its adoption in 2012. Despite this, many communities continued to organize and establish the community-based legal entities envisioned under the Policy that would be necessary to access community fishing rights. It is important to note that the SSF Policy will permit far greater participation in South Africa's nearshore fisheries than has been allowed in decades.

Key Fisheries and Commodities

Historically, the SSF subsistence sector landed ten percent of the total landings, or 50,000 tonnes annually. The highest volume of catches is landed in the Western Cape—nearly 90 percent of total landings. Organized SSFs are composed of fishers who have previously acquired rights to fish lobster, abalone, and hake in nearshore fisheries using handline and traditional lines. More disparate and poorly organized fisheries include the oyster, mussel, mullet, and other fisheries using net and beach seine fishing techniques; these fisheries are typically less sophisticated and capital intensive, and the catch is sold for local consumption. After the Equality Court ruling, a temporary allocation termed "interim relief" was designed to grant short-term access to fishers who had been excluded until a corrective policy could be implemented. These interim relief holders harvest under an annual allocation that must be renewed each year. Interim relief holders fish very small seasonal quotas of rock lobster and unlimited amounts of linefish. This is in contrast to long-term commercial rights holders, who are granted larger allocations of rock lobster for ten year periods. Snoek, the largest commercially important linefish, is referred to as an exclusive fishery of the small-scale fishing sector. It is not targeted by the industrial fishery; however, estimates by the University of the Western Cape suggest that commercial fisheries are capturing more than three million tonnes of snoek through hake bycatch annually. (This is referred to as "the industry's dirty little secret.")

All of South Africa's nearshore fisheries (except mussels) are considered to be over-exploited or collapsed and are under a recovery fisheries management plan. The linefish sector includes a range of species that are distributed differently around the coast and is considered to be in good health. The SSF sector is estimated to land roughly 6.5 million tonnes of snoek. Abalone and rock lobster suffer from extensive poaching—both by participants fishing outside of the system and also by rights holders who overharvest sometimes by as much as 300 to 400

percent of their quota. The Department of Agriculture, Forestry, and Fisheries (DAFF) does take poaching into consideration in its stock assessments.

Species important to communities include the following species by region:

- **Western Coast:** Snoek (and other linefish such as Cape bream, Cape salmon), mussels, West Coast rock lobster (summer season), squid, mullet
- **South Coast:** Abalone, rock lobster (year-round), snoek, yellowtail (and other linefish), reef fish
- **Eastern Cape/KwaZulu-Natal:** East Coast rock lobster, abalone (more abundant in the southern sections of the coast), cob, Cape salmon (and other linefish), mussels, oysters, squid

Seafood is primarily exported to the EU (Spain, Portugal, and Italy), the US, and Asian markets (Hong Kong and China). Snoek, for the most part, is not exported, primarily due to poor quality and handling that creates significant barriers to meeting health and sanitation standards. Counterintuitively, South Africa's domestic market is supplied by imported hake, as its MSC certified fishery is almost entirely exported to markets that can afford to pay the price premium. It also imports approximately 23 million tonnes of snoek (which is actually New Zealand barracuda) sold on the retail market. Wild-caught abalone is a very small fishery due to substantial poaching, which has decimated its numbers. South Africa's most valuable exports are listed below.

Table 2: Most Valuable Seafood Exports in 2012 [45]

Species	Export Value (South African Rand)	Export Value as a Percent of Total Seafood Exports
Cuttlefish and Squid	168,000,000	38%
Lobsters	110,000,000	25%
Albacore/Longfinned Tunas Fillet/Liver/Roe Frozen	51,000,000	11%
Fish, Prepared Or Preserved, Whole or Pieces	38,000,000	9%

Markets and Supply Chains

Certification and eco-labeling could play a more prominent role in the domestic value chain. From 2010 to 2011, the growth of expenditures for Fairtrade[46] products in South Africa exceeded global averages, increasing by 297 percent. Seafood products sold by South Africa's major food retailers and seafood restaurants reflect this trend. Increasingly, retailers and

[45] South African Revenue Services

[46] This refers generally to Fairtrade products, rather than specifically to Fair Trade USA's pilot small-scale fishery standard.

restaurants offer only sustainably sourced products that carry either the MSC label or are green listed by the South African Sustainable Seafood Initiative (SASSI). As noted above, South Africa's commercial hake fishery is MSC-certified in both deep-water and nearshore fisheries. SASSI orange-listed seafood is increasingly rare, and red-listed seafood will almost certainly not be found in retail outlets and restaurants. Further, SSFs that are not certified face competitive disadvantages in the EU market. While snoek is one of the largest volume fisheries caught by the SSF, it almost exclusively supplies local markets in poor communities in the townships. Due to the quality of the product, the retail and wholesale market imports roughly twenty million tonnes of snoek (which is actually barracuda) from New Zealand. Hake is also imported from other regions for national consumption, as much of the South African MSC-certified hake is bound for export markets.

By in large, the Western Cape SSF is marked by fishers who run relatively capital-intensive operations—motorized boats, fish finders—and who sell directly to markets. They are commercial fishers on a smaller-scale. The Eastern Cape is marked by a subsistence fishery, traditionally small-scale fishers most of whom struggle with intense poverty: They fish to feed their families—typically very close to shore in areas they can access with small boats—and sell whatever they have left to local markets where they are largely at the whim of individual buyers (often the tourist industry or individual tourists themselves).

Fish landed legally may either be landed by fishers, or, in the case of high-value species such as abalone and rock lobster, by certified divers. Fish are sold to on-the-ground traders called langanas who typically exploit the power imbalance of the relationship. Some more organized small-scale fishers who have been operating with commercial licenses negotiate advance contracts with processing plants for marketing agreements that allow them to hold their fish until the prices rise, but many opt to choose "over the scale" agreements with immediate, far lower, payments for preset amounts. For most small-scale fishers operating at the edges of poverty, however, the langana is his first stop and usually his last stop in the value chain. After a good eight hours of fishing, exhausted and hungry, fishers often have no means of preserving, holding, or processing their fish and are very much at the mercy of the langana, who often colludes with other langanas ahead of time to fix the selling price. In this system, the fisher has no leverage. To compensate, he often ends up fishing as hard and as much as he can to boost his volume in order to make a profit after paying his fuel, bait, and crew fees. Unwittingly, he floods the market, further bringing down the value of his catch and reducing his profit margin. It is a vicious downward spiral.

After buying from small-scale fishers, the langana may either further aggregate fish and sell to other buyers or agents who then supply the factories, restaurants, and processing plants, or he may load the fish right into his truck and sell straight to local markets or individuals. (This latter approach is how much of the snoek that is landed gets to extremely poor communities in the Townships.)

The relationship with the langana is a complicated one. Though he may take advantage of fishers in paying little for their catch, he provides a service in fulfilling a role that many fishers do not want to fill (selling and distributing fish after being on the water all day). Langanas also operate as a safety net, granting emergency loans of 10,000 to 20,000 South African Rand when the fisher needs cash quickly, often before the Christmas holidays when the rock lobster fishery has not yet opened. These loans are typically coupled with agreements to sell all of a fisher's

catch at a set price for the remainder of the season, often at lower rates than he could get in the market (this is in addition to the repayment and interest that he is required to pay). Langanas in urban areas are often operating through gangs or use drugs and alcohol as a mechanism for payment or control. They will exploit fishers who are the weakest in the communities, often plying fishers with alcohol before negotiating prices or identifying which fishers are in the throes of hardship to negotiate below-market prices.

With the support of the South African government and the NGO community, the region is now beginning to form a novel SSF FIP. The overarching objective of the small-scale FIP is to create an effective prototype for good governance and coordination in the SSF sector that will allow for the long-term recovery of the stocks (and ecosystems), while improving the livelihoods of the fishing communities. This "human-centered approach" pulls in NGOs who have traditionally participated in FIPs (fishing associations, WWF, MSC), as well as NGOs primarily interested in civil rights and livelihood benefits. If successful, this process could form the basis for restoration of highly exploited, high-value fisheries, including rock lobster, abalone, and line fisheries. It may also identify new potential strategies involving community incentive packages that could support a supply chain approach. The World Bank, the New Partnership for Africa's Development, and other international bodies continue to recognize the importance of extracting more value out of the supply chain to meet livelihood needs versus expanding access to already overexploited fisheries.

Additionally, many communities are exploring a range of value chain approaches. There are models in all four coastal areas that emphasize:

- Closed-loop market economies within communities (fish caught, processed, and sold locally);
- Models that experiment with corporate-fishers partnerships involving seafood processing (such as a potential arrangement where community members might buy a share of the processing plant in exchange for a direct supply agreement);
- Pilots where private companies are provided resources and training to connect local fishing communities to the export market for valuable species, and;
- Efforts that develop community capacity to exercise control over the entire value chain (where the community can hold, process, and conduct value-added activities on site, and then export to international or regional markets).

Just as in Senegal, there is considerable concern among academics and community NGOs about expanding the export market and potentially injecting SSF communities into a global economy that will benefit neither the resource nor the communities.

Fishers and Communities

The number of small-scale fishers is difficult to pinpoint given the complexity of the allocation process and changing policy. While official estimates put South Africa's fisheries participant numbers at 30,000, one academic study suggested this was a massive underestimate and the number was likely to be at least 100,000. After implementing the SSF Policy, DAFF expects the

number of fishers operating inside the formal management system to jump by at least 20,000. According to WWF, fisheries play a critical role in providing direct and indirect livelihoods for over 140,000 people in South Africa.

Fisher poverty profiles vastly differ across the country. Income inequality margins in South Africa are among the highest in Africa. Historically, poor black fishers were marginalized and excluded from high-value fisheries; according to Masifundise, this disenfranchisement further "locked them into poverty." Merle Sowman, a noted academic at the University of Cape Town, found that among fishing households, poverty vulnerability is markedly different: in the Eastern Cape, fishing households are more likely to experience high levels of food insecurity and be classified as ultra-poor compared to other fishing households.

Table 3: Poverty Profiles of Subsistence Fishing Households[47]

Region	Food Insecure *(at least 60% of income spent on food)*	Poor *(Bottom 40th percentile)*	Ultra-poor *(Bottom 20th percentile)*
West Coast	43%	18%	6%
South Coast	49%	28%	6%
Eastern Cape	78%	57%	35%
KwaZulu'Natal	46%	49%	20%

Government social grants provide significant income to many poor South Africans. According to the South African Social Security Agency, approximately sixteen million South Africans receive social grants.

Factors Favoring Work in South Africa

South Africa's SSF Policy is unique in that it blends social justice and fisheries policy. South Africa could set a precedent for the benefits of a custom-tailored FIP focused on a mixed-species basket as a model for other countries to follow. As the only African country with an MSC-certified fishery (industrial hake), South Africa has the most receptive domestic market in Africa, and it is growing increasingly attuned to the importance of seafood eco-labeling and certification. Harnessing the power of the markets may become an attractive strategy to help structure a new equitable and sustainable SSF in South Africa.

[47] Sowman, 2006.

Constraints

South Africa's fisheries are deeply politicized, and the legacy of apartheid is a deep stain that makes community dynamics especially challenging. In late May 2014, after the national election the president signed the Marine Life Resources Act Amendment into law, clearing the way for implementation of the SSF Policy. The election, however, also resulted in weaker political representation by the African National Congress (ANC) on the West Coast—the dominant champion for implementation of the SSF Policy. The election also ushered in new appointments and changed leadership at the Fisheries Ministry and DAFF. While DAFF recently announced it intends to direct nineteen million Rand toward funding implementation of the SSF Policy, that commitment still falls short of what is required for implementation. It is uncertain whether the country will prioritize the implementation of the policy in the year ahead.

South Africa is also facing a series of critical proof points for the effective implementation of the SSF Policy. A disastrous rights allocation in the linefish fishery that was made at the eleventh hour in 2013, before the SSF Policy was signed into law, was summarily withdrawn by the fisheries minister this past May, after the election. This allocation must now be sent back to the drawing board and re-issued under the guidelines of the SSF Policy. Simultaneously, DAFF is also facing a reallocation of long-term rights for one of its most valuable fisheries, rock lobster. This allocation also creates potential for the SSF Policy to come to a grinding halt if the fisheries department is unable to come up with a workable system. All of these allocations will be closely watched by various highly invested parties who will likely wage legal battles to slow, halt, and throw out the SSF Policy.

Lastly, there is still widespread poaching and organized criminal activity within many of South Africa's most valuable fisheries that the country has been unable to disrupt. While South Africa experimented with a green court system years ago that reduced poaching by 75 percent, that system was dismantled for unknown reasons.

Potential Interventions

1. Channel resources to WWF SS-FIP in South Africa around nearshore species. WWF has a pilot in Kleinmond that links roughly 100 rights-holders and community members. They are working with a range of stakeholders including Cape Nature (which conducts management, monitoring, and enforcement of the Kogelberg Nature Reserve), with processing plants, and with the retail, wholesale, and food service industry through the SASSI program. As part of this initiative, the community has formed cooperatives and has developed a workplan to guide improvements on the ground. We also learned during our site visits that WWF may be considering a second site to run a pilot in parallel in Doringbaai, roughly five hours north of Cape Town on the West Coast.

2. Support pilots in South Africa to **link SSF cooperatives to microfinance/small and medium enterprise incubation funds** in order to support income-generating value-added activities in connection with FIPs. This may be done by providing matching funds for grants to the South African government, especially through the Department of Industry and Trade, or via a contribution to the Fisheries Investment Fund as established by the Partnership for African Fisheries. The Fund is expected to be up and running with $150 million in private capital within the next five to six months.

3. Connect **Rockefeller alternative livelihood project (Digital Jobs Africa)** in South Africa to local fishing communities. The WWF SS-FIP in Kleinmond, in particular, would benefit from more focus on alternative livelihoods, as this is not an area where WWF in South Africa is particularly strong. Establishing a fit between Rockefeller's initiative on jobs and a potential oceans and fisheries initiative may enhance on-the-ground success of FIPs where alternative livelihood is not yet a focus.

4. Fund a **market analysis of SSF baskets** in South Africa in terms of end market price premiums to shape the strongest development package (local vs. regional vs. international) with maximum community impact and sustainability returns. Such a project could potentially be done through MSC or SFP. A market analysis of potential basket species could inform DAFF's efforts as it shapes the basket of species that will be allocated for the SSF. This would help inject a market and sustainability focus into a program where this perspective may be lacking and would identify opportunities in the export and national markets, but also in developing-country-to-developing-country trade (which, according to MSC, is growing).

5. Support public-private investment in anti-poaching efforts through the **funding of a green court system** to crack down on criminal poaching operations in Africa (specifically in South Africa, and possibly elsewhere). This would be a very high-risk but high-return initiative. Green court efforts to prosecute environmental crimes (poaching, illegal fishing) could be a very valuable means for preventing organized criminal activity involving a range of species (not just abalone and rock lobster but also rhino, bushmeat, etc.).

6. Support **local labeling efforts connected with species important to food security**, particularly in the linefish fishery, to incentivize reduced food waste and better handling in South Africa's linefish fishery. New Zealand supplies roughly twenty million tonnes of snoek, a highly sought-after species, to South Africa's domestic markets (though the purported imports of snoek from New Zealand are in fact barracuda). The retail reliance on imported linefish has reduced the urgency to work cooperatively to solve South Africa's

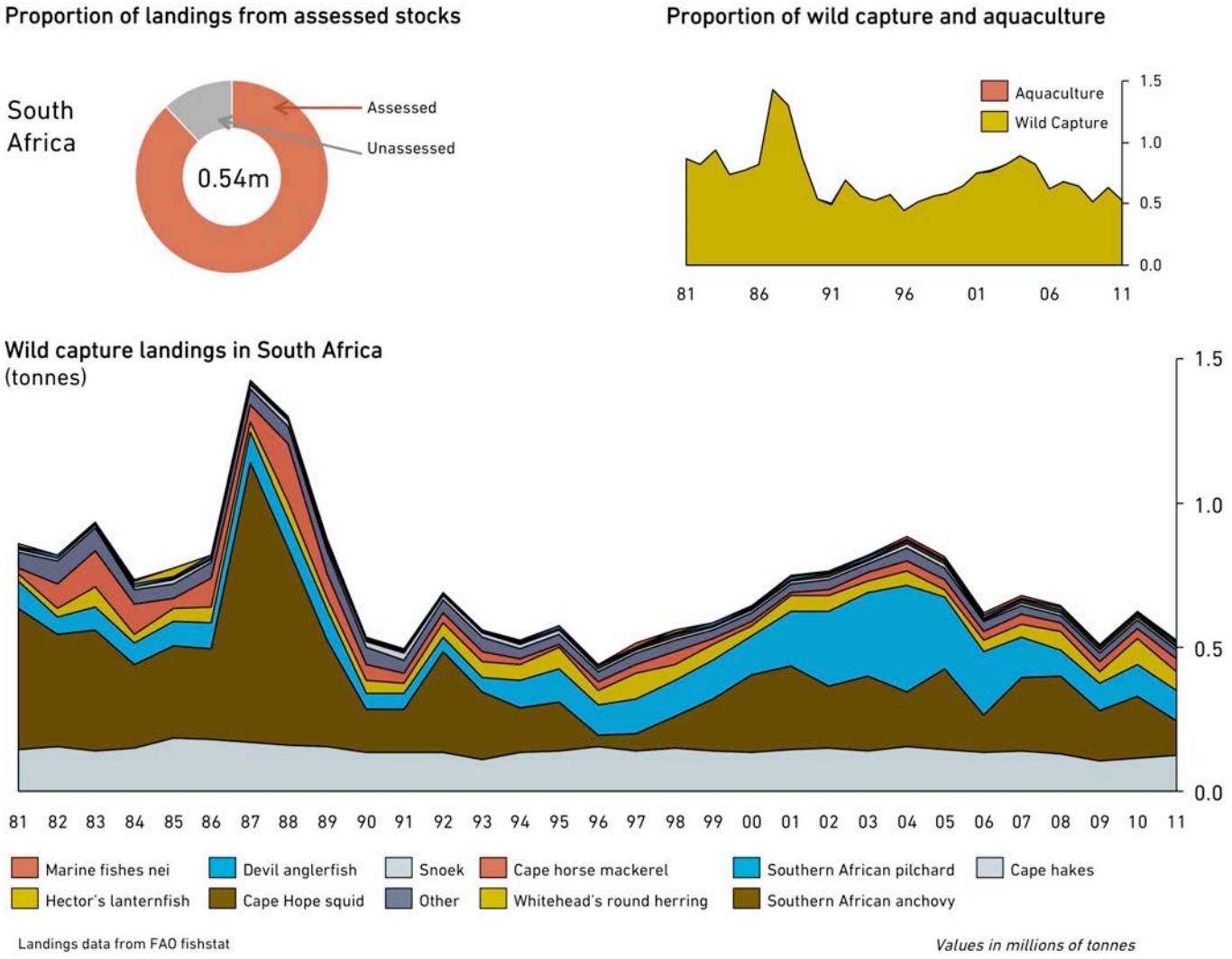
linefish value chain and cold chain challenges. During our visit, we also encountered high-end food service establishments marketing Norwegian salmon as linefish—a term which is used locally to refer to South Africa's linefish. This demonstrates the potential value of local eco-labeling to distinguish South African-caught species.

7. Support **reseeding efforts for wild shellfish fisheries** in South Africa (mussels, oysters, abalone). Several government agencies, private companies, and cooperatives are exploring the potential for reseeding along South Africa's coast. There are a variety of obstacles to assess in this effort including biological challenges (ensuring genetic variability), but reseeding and shellfish farming were among the most common alternative livelihood approaches for the SSF that emerged during interviews and site visits. There are also initial private incubators that are exploring the potential to cultivate rock lobster farming facilities.

8. Support **four pilot efforts** to test various approaches in connecting SSFs to the market in each of the coastal provinces. The goal would be to assess the strengths and weaknesses of the models to drive improved price premiums and create local jobs. Models might include local closed-loop tourism, connecting SSFs to export markets through corporate service providers, partial shareholder relationships with SSFs and export companies, and supporting full value-chain operations—catch, process, marketing, distribution—at the local level. This would engage a range of partners including TransCape, University of Cape Town, Stellenbosch University, Rhodes University, and others. In theory, this would help to construct a series of archetypes with clear metrics for job creation and on-the-water impact.

South Africa: Landings, Stock Status, and Trade-Related Data

South Africa's landings are comprised primarily of hake and small pelagic species and has remained roughly constant since 1990.



Most of South African landings' stocks are assessed; roughly half are in poor condition.

Proportion of wild capture landings by stock status

Stock status of South African stocks reported by Fish Source

Species	Biomass Status	TAC Compliance	Mortality Status	Overall Fishery Health Score	2011 Landings (tonnes)
Deep-water Cape hake	Not Overfished But at or Below BMSY	High	F<Ftrp	A	123,826
Shallow-water Cape hake	Above BMSY	High	F<Ftrp	A	

Stock status of South African stocks reported by FAO FIRMS database

Stock or species groups	State of Exploitation	Uncertainty	2011 Landings (tonnes)
Cape hakes	Fully or over-exploited	Medium	123,826*
Devil anglerfish	Over-exploited	High	7,792
Kingklip	Over-exploited	Unknown	2,858
Patagonian toothfish	Fully-exploited	Medium	189
Snoek	Fully-exploited	Medium	9,662
Southern African anchovy	Fully-exploited	Low	119,872
Southern African pilchard	Fully or over-exploited	Medium	105,403
Whitehead's round herring	Underexploited	Low	64,695
Albacore	Fully or over-exploited	Low	3,464
Southern bluefin tuna	Over-exploited	Low	24
Cape horse mackerel	Fully-exploited	Medium	45,268
Cape rock lobster	Over-exploited	Low	1,757

**Also assessed by Fish Source*

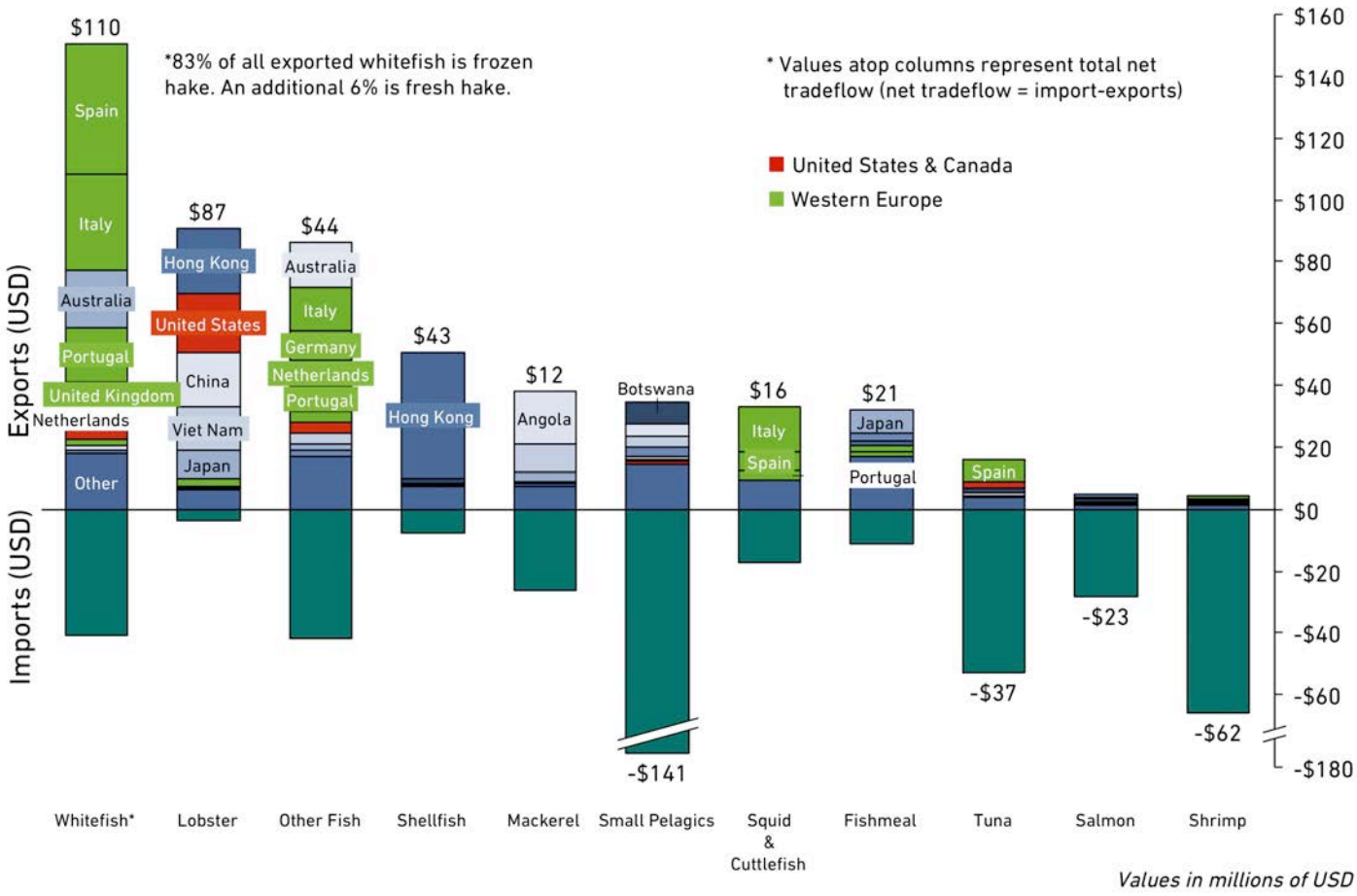
Academic estimates of unassessed stock health covers 2% of total South African landings.

Proportion of wild capture landings by stock status

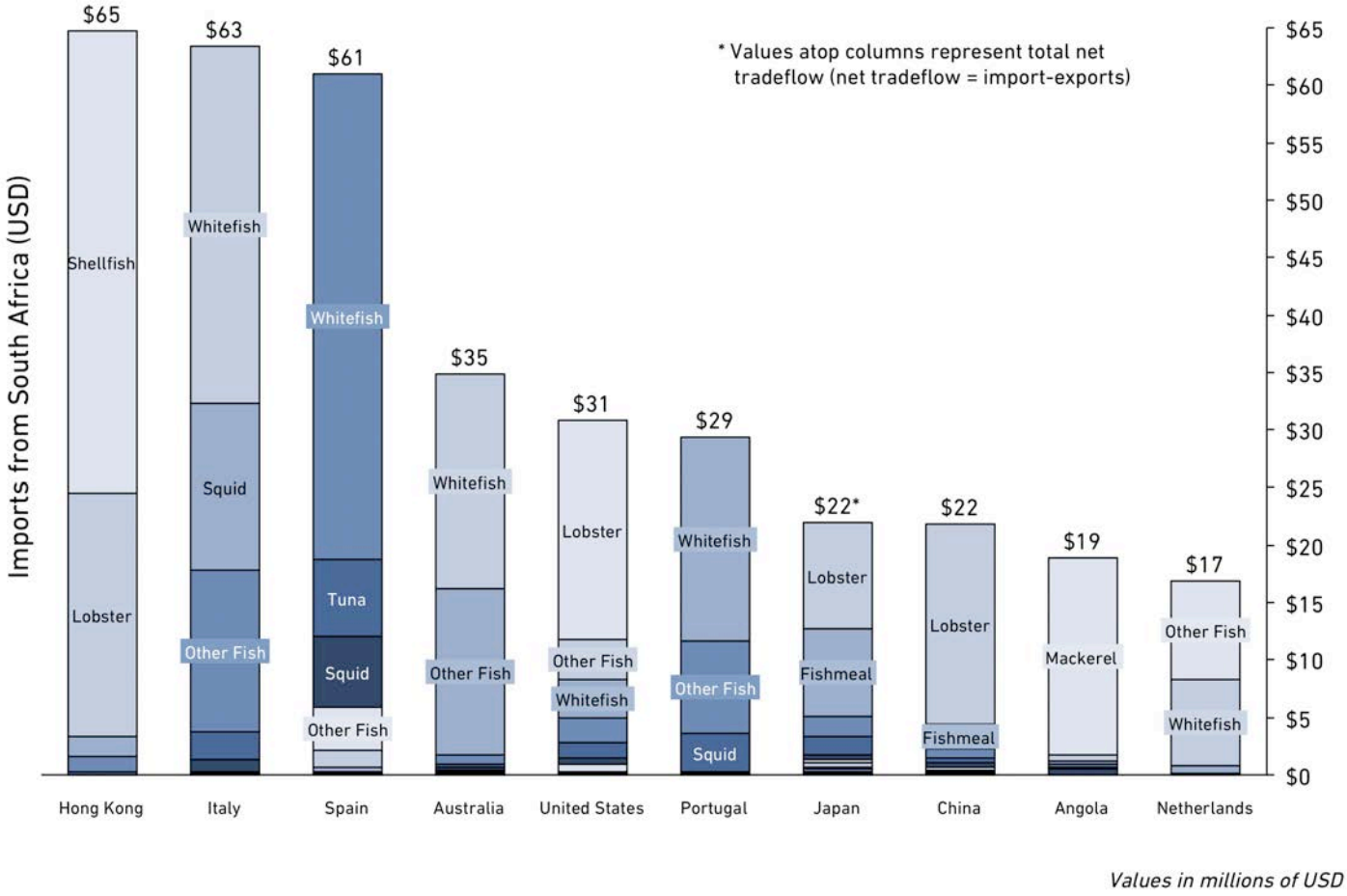
Costello et al. stock B/Bmsy estimates

Common Name	Estimated B/ Bmsy	Confidence Interval		2011 Landings (Tonnes)	Total Landings (Tonnes)
		Lower	Upper		
White steenbras	0.06	0.01	0.71	0	3,768
White stumpnose	0.20	0.03	1.41	99	
West coast sole	0.21	0.02	2.26	0	
Santer seabream	0.21	0.03	1.53	61	
Panga seabream	0.26	0.04	1.68	1,184	
Geelbek croaker	0.30	0.05	2.24	296	
Southern meagre(=Mulloway)	0.29	0.04	2.26	490	
Southern meagre(=Mulloway)	0.31	0.04	2.19		
Mud sole	0.63	0.10	4.22	436	
Cape bonnetmouth	0.83	0.13	5.21	437	
Cape elephantfish	0.92	0.19	4.54	765	
Silver scabbardfish	1.13	0.34	4.30	5,057	6,907
John dory	1.14	0.29	3.79	1,031	
John dory	1.96	0.37	6.71		
Blackbelly rosefish	1.50	0.60	6.57	819	

The majority of South African whitefish is exported to Europe, whereas lobster is primarily destined for U.S. and Asian markets.



Southern Europe is South Africa's biggest export market. South African exports are more concentrated by commodity than by export market.



Values in millions of USD

COUNTRY OPPORTUNITY SUMMARIES: MOZAMBIQUE

Overview

Mozambique's artisanal fishing community is sizable and, on the whole, breathtakingly poor. Many fishers lack access or the infrastructure to bring quality seafood products to high-end markets, especially given that the sector is spread out over a remote and rural coastline. The export markets are very weak. However, new capacity and projects in the region (e.g., projects led by Rare and ProPESCA) may change the landscape and improve the likelihood of successful intervention. Additionally, the government's growing interest in developing a national tuna fishery and expanding the artisanal sector's access to this highly lucrative fishery is intriguing. While many opportunities exist to improve price points along the value chain that would no doubt alleviate extreme poverty in the region, it is clear that a significant increase in capacity on the ground and long-term commitment is needed to help guide a transformation of the industry.

Governance

Since 2003, Mozambique's policy reforms have transferred managerial authority over many industries from the centralized government to the provinces and districts. It is only recently that the SSF was meaningfully included in this devolution. This is a critical step, as management and enforcement have been deeply lacking in the centralized approach: for every one fisheries officer, there are 10,000 fishers. The Fisheries Master Plan of 2010 is a long-term plan to be implemented through 2019. The government of Mozambique's overall national fisheries management goal is to ensure the preservation of fishery resources while maximizing economic income for the country. The government is also committed to promoting the involvement of the coastal communities in the sustainable development and management of living aquatic stocks.

SSF management is the responsibility of a separate institution under the Ministry of Fisheries through the National Institute for the Development of Small-Scale Fisheries, referred to as IDPPE. Mozambique possesses a theoretically ideal and highly distinctive institutional framework to support its SSF. Research is provided by a separate institution referred to as Fisheries Research Institute (IIP); however, data for the artisanal fishery is weak due to the extensive coastline and remoteness of many fishing communities. Licensing and regulation of the SSF is under the authority of a third institution, referred to as National Directorate of Fisheries Administration (ADNAP). Yet another institution, National Fish Inspection Institute (INIP), is responsible for ensuring fish quality and for regulating seafood imports and exports.

Key Fisheries and Commodities

The seafood supply chain in Mozambique is dominated by the artisanal sector. The fisheries targeted in the sector include mangrove crabs, rock lobsters, octopus, oysters, seaweeds, linefish caught by gillnets and handlines, clams, and shrimps. In 2011, SSF landings accounted for 86 percent of domestic landings, totaling 166,000 tonnes. The industrial fishery, by comparison, is primarily an export market. It is much smaller, landing only 27,000 tonnes in 2011, yet it accounts for 50 percent of Mozambique's total fisheries value. Shrimp is, by far, the most significant of export products, making up 85 percent of seafood exports by value (92 percent if aquaculture production is included), and is predominantly sold to Spain and Portugal (see table 4). The majority of small-scale harvests are sold domestically to very poor rural people and the traditional markets. Crabs, lobsters, and shrimp are exported to South Africa and sold to the domestic tourism markets and centers (particularly Maputo and other high-end coastal tourist resorts in the north).

Table 4: Mozambican Seafood Product Export Values[48]

Seafood Product	Export Amounts (in Tonnes)	Value of Exports (in USD)
Frozen shrimp and prawns	7,311	48,287,000
Fresh fish	451	2,921,000
Dried fish	248	1,589,000
Frozen crabs and other crustaceans	191	1,529,000

Data for the artisanal fishery is scarce. A census of fishers was completed two years ago, but results are not yet available. While the institutional framework for SSF management in Mozambique is regarded inside and outside the country as "ideal," a single-minded focus on the valuable shrimp fishery has skewed much of the country's data collection efforts. This industrial fishery is collapsing. However, the new ProPESCA project mentioned below will provide Mozambique with the most complete assessment of its SSFs to date. By 2015, twelve different fisheries important to the artisanal fishery will have stock assessments—a huge step forward for a country that has conducted just nine total stock assessments in its history.

Markets and Supply Chains

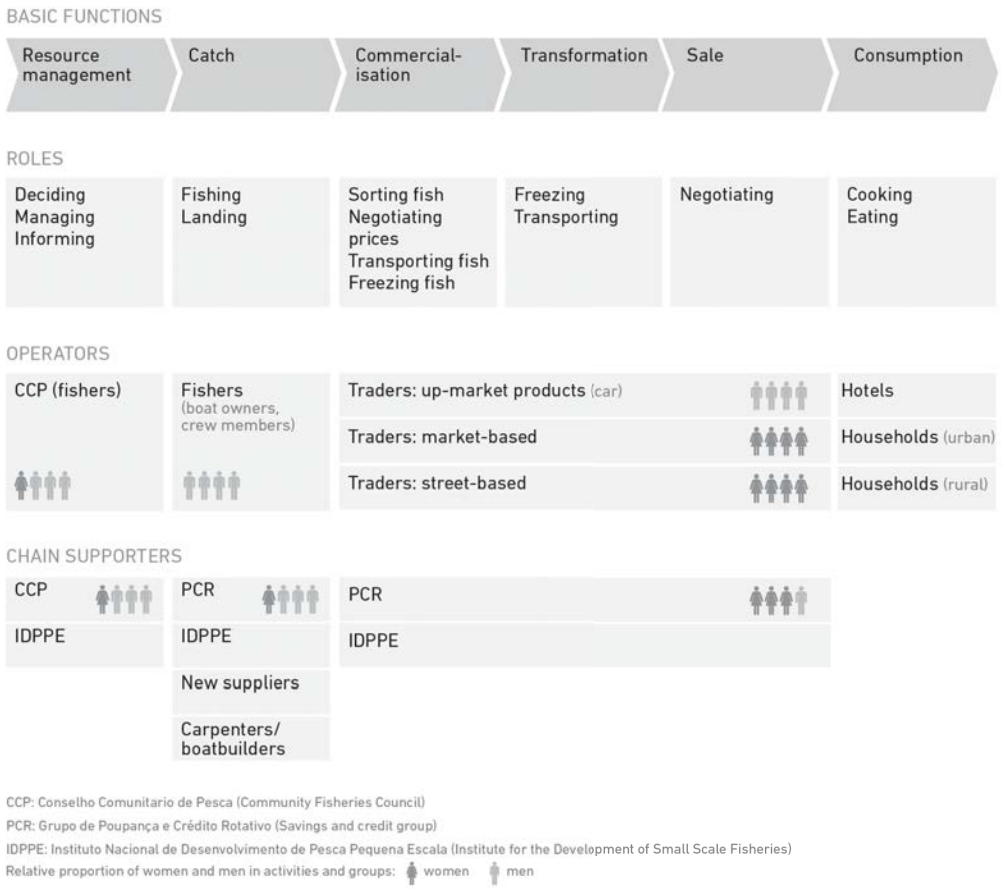
While more than 80percent of fish caught is artisanal, artisanal fishers have no real access to price premiums or market benefits. The Mozambique government has engaged a variety of experts and consultants recently to help transition "trash fish" to prime high-value exports (fillets). Currently, however, the supply chains for the artisanal fishery are quite short and literature on the supply chain/market dynamics is lacking.

[48] "Competitiveness of Mozambique's Fisheries Sector." USAID, 2010.

The vast bulk of fresh caught fish is sold locally and most fishers fish for finfish (with Mozambique's most valuable commodity, shrimp, as a top bycatch species). Local buyers and processors operate in a wide-spread network throughout Sofala Bay in the central part of the country. Some fishers will actively fish discarded bycatch from the industrial shrimp fleet. Cheap fish finds its way to urban or poor communities after being dried, salted, or smoked. Dried fish is an important source of animal protein (One interviewee at CARE-WWF Alliance suggested that 70 percent of animal protein in Mozambique comes from the sea). As is generally the case in most African small-scale fisheries, women play a dominant role in processing fish for local, low-value markets, while men conduct processing of all high-value fisheries.

There are several small companies that buy from artisanal fishers for higher-value species. They sell fish, octopus, and lobster domestically. Shrimp that is caught can be found in regional markets (South Africa), but also in hotels and restaurants. Some plants have been able to reach EU and Asian markets but entry to these markets is getting more difficult due to lack of traceability and failure to meet hygiene and health standards.

Figure 1: Mozambique's Value Chain[49]



[49] NORAD, 2014.

The Norwegian Agency for Development Cooperation (NORAD) and the International Fund for Agriculture Development are both leading international donors working with the Mozambican government to improve the artisanal value chain across both wild capture fisheries and aquaculture.

Several promising efforts have focused on enhancing fishers' access to markets:

- The Artisanal Fisheries Promotion Project (ProPESCA) is a multilateral project launched in 2011 by the International Fund for Agriculture Development (IFAD) with a mandate to increase the volume of higher-value fish caught sustainably, as well as the income from traded fish. The project initially focused on creating 24 "growth poles" by connecting landing sites to markets through enhancements to road and market infrastructure, value chain assessments, and technical training to develop and market high-value fisheries products at the community level. IFAD has also launched a three-year effort, ProDirpa, to focus on improving livelihoods by strengthening the management of natural resources important to artisanal fishers.
- FIPs are active in the deepwater shrimp fishery. In 2009, the government partnered with MSC and WWF to assess nearshore and deepwater shrimp fisheries. In 2011, the government launched a FIP for the deepwater shrimp fishery, and it continues to support this effort. WWF is focusing its efforts on creating a data collection system called SmartForm that will enable traceability (a huge missing link in connecting Mozambique's artisanal fisheries to a certified value chain). Interviewees also told us that the shrimp industry is exploring potential approaches to minimize artisanal impact in the shallow-water shrimp fishery (such as payment for ecosystem services in exchange for reduced fishing activities).
- Blue Ventures is supporting community mapping involving octopus in the Northern Mozambique region in collaboration with a Mozambican-based NGO, Associaçao do meio ambiente (AMA), and Bioclimate as funded by the United Kingdom's Department for International Development (DFID). Blue Ventures has spearheaded a successful octopus project in Madagascar and has demonstrated the value of management to improved price points. Octopus is a short-lived species that responds quickly to management measures. It is also a high value species for the EU and Asian markets. This is an interesting project but it is not yet clear if there is a strong commitment to a market-based approach on the ground.
- NORAD is partnering with a number of entities in Mozambique to develop different market-based approaches to improving the resilience of small-scale fishing communities. In collaboration with the Ministry of Fisheries in Mozambique, NORAD and Iceland have conducted recent site visits to identify opportunities to improve gender equality and empower women within the fisheries and aquaculture food chains. NORAD has also provided seed funding to support Rare's launch in Mozambique to improve livelihoods and fisheries health.
- The World Bank, through its South Western Indian Ocean initiative (SWIO) is also supporting Rare and conducting livelihoods assessments on six pilot sites in connection with fishing communities.

Fishers and Communities

Fishing is a livelihood of last resort, and a combination of factors has diminished the health of nearshore fisheries in the region. Mozambique is the third-poorest country in the world. According to CARE-WWF Alliance, while only 30 percent of households fish, 66 percent of households rely on fish as their primary protein. The vast majority of the population still lives on less than $1.25 per day. About 288,000 people fish with scarce and unpredictable income, and roughly 130,000 of these fishers are coastal. The Mozambique government's overall national fisheries management goal is to ensure the preservation of fishery resources while maximizing economic income for the country, and the government is supportive of the SSF. Nearly 600 community fisheries councils operate in a community-government partnership to manage SSF operations and provide a conduit for engagement and communication.

Factors Favoring Work in Mozambique

Poverty levels single Mozambique out as a location where intervention would have a sizable impact. The recent ProPESCA effort to both map value chains and conduct stock assessments for the artisanal fishery represents a strong foundation for a potential market-based approach. Already, informal conversations with research staff indicate that stock assessments recently conducted for octopus are "impressive," and several other studies, such as the WWF rapid tuna survey in neighboring Tanzania and Kenya, suggest that this high-value species may be particularly significant for the artisanal sector in Northern Mozambique. And finally, the potential entry of Blue Ventures is an intriguing opportunity to engage with an NGO that has a track record of locally implementing supply-chain strategies at scale.

Constraints

Work in Mozambique may be affected by political volatility stemming from activities of the armed Mozambique National Resistance (RENAMO). The political will and uniformity of the artisanal sector is weak, and there is uncertainty around next year's election. In general, extreme poverty favors survival over long-term investments. The core challenge for the Foundation is that the market connection and management fundamentals are not strong. Shrimp is the obvious export commodity to address, but this sector is largely industrial and has been rapidly declining. Obviously, alternative livelihoods and development efforts are valuable, but difficult to tie to a market intervention. WWF, the strongest player in the region, has also experienced several setbacks, including continuing changes in its senior leadership structure and tension with the Mozambican government. The program is now in a rebuilding mode but is not as strong as it has been in the past, and, by some accounts, it has shrunk its footprint and engagement in the region.

Potential Interventions

1. Support potential **octopus workshops in the Western Indian Ocean** by supporting Blue Ventures to bring together fisheries scientists to explore what is and isn't working. The artisanal sector throughout the Western Indian Ocean catches 80 percent of octopus landings. MSC has also commissioned a market study of octopus in East Africa and may be a potential partner to identify niche markets.

2. Support alternative livelihood opportunities in Mozambique (improving upstream farming practices, supporting potential low-impact aquaculture) by supporting **CARE-WWF Alliance** and others. CARE-WWF is a driving force for much of the alternative livelihood work in coastal communities and has established successful models for redirecting efforts and microfinancing to support alternative livelihoods.

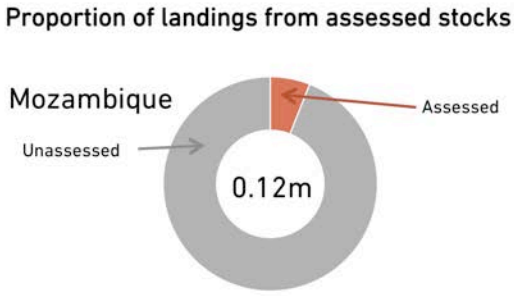
3. Support and/or fund the development of **pilot seaweed processing capacity** to support steady (though small) income for women and families to better access global markets and secure price premiums. Seaweed farming is an intriguing candidate, as seaweed can be gathered in the nearshore area without the use of any equipment, seaweed is primarily gathered by women, and such farming has low environmental impacts. However, because harvesters have no ability to process seaweed, they are typically at the whim of global markets and exist in a feast-and-famine loop. Supporting community processing plants in partnership with the Mozambique government may be a way to both satisfy the national focus on growing the aquaculture sector and create alternative livelihoods for women.

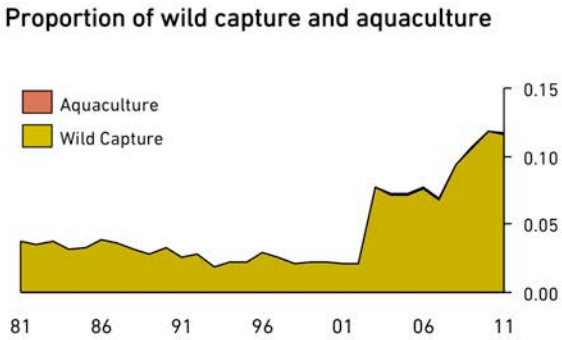
4. Support WWF and government efforts to develop a **sustainable national tuna fishery** given potential interest in engaging the artisanal fishery. Last year, the Mozambique government acquired 27 tuna boats and six patrol boats to the tune of $250 million. It also formed the state-backed Mozambique Tuna Company and has joined the Indian Ocean Tuna Commission to legitimize its rights to the resource. The government's plan prioritizes access for the artisanal fishing sector and alternative livelihoods. Risks and opportunities for this fishery still need to be assessed (for instance, shark bycatch), but given the high value of the resource this should be a priority for future research.

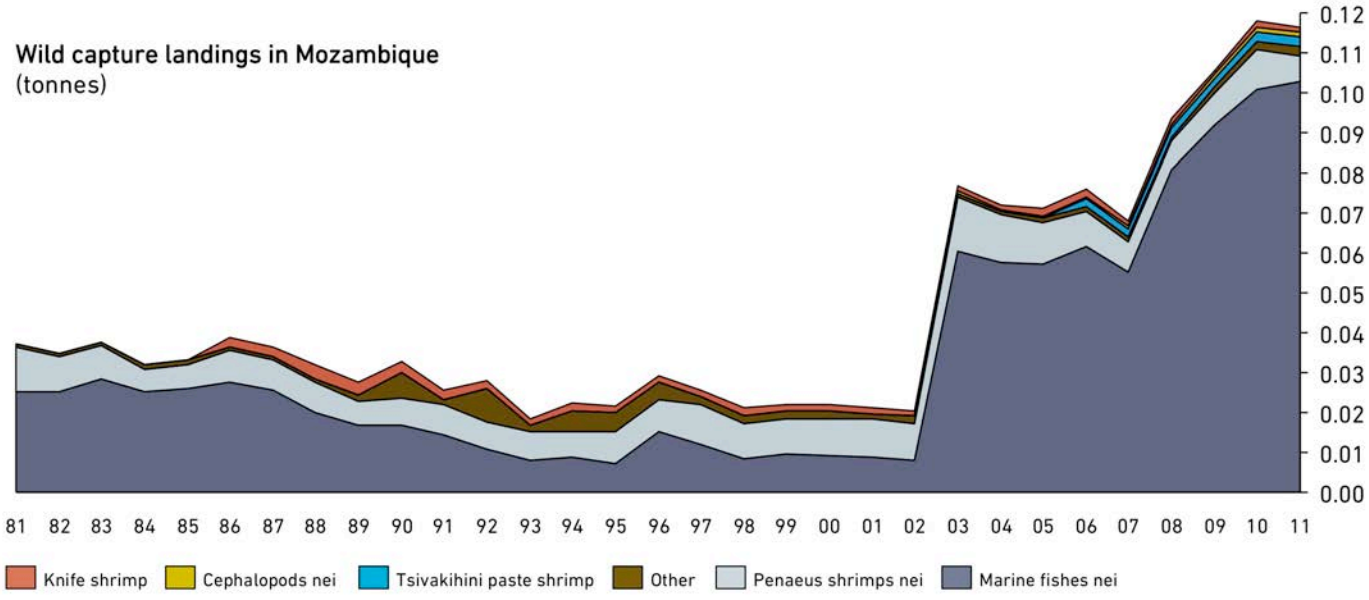
5. It may be possible to pursue a **payment for ecosystem services (PES) effort backed by the industrial shrimp fishery** to redirect artisanal effort from the shrimp fishery if an initial exploration by Blue Ventures proves successful. Such a project would also support WWF's deepwater shrimp FIP and reduce unsustainable fishing practices in nearshore communities in this fishery. Given the negative impacts of bycatch in the nearshore artisanal fishery, where mosquito nets are used to fish, this may be a viable alternative to promote income-generating opportunities for rural coastal communities.

Mozambique: Landings, Stock Status, and Trade-Related Data

Almost nothing is known about Mozambique's wild capture sector; over 85% of all landings are unidentified.





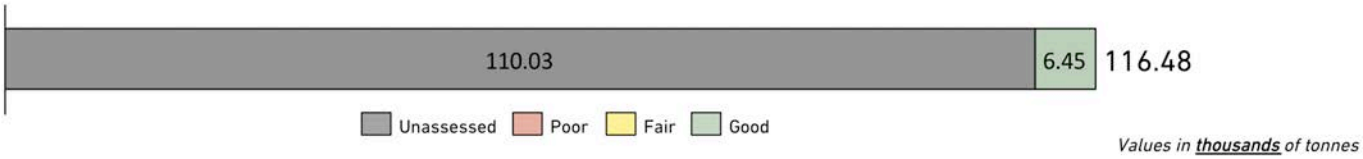


Landings data from FAO fishstat

Values in millions of tonnes

Warm water shrimp is the only stock that is assessed in Mozambique and there are no estimates for unassessed stocks.

Proportion of wild capture landings by stock status



*Values in **thousands** of tonnes*

Stock status of Mozambican stocks reported by Fish Source

Species	Biomass Status	TAC Compliance	Mortality Status	Overall Fishery Health Score	2011 Landings (tonnes)
Indian white prawn, red legged banana prawn	Above BMSY	High	F>Ftrp	A	6,445

Stock status of Mozambican stocks reported by FAO FIRMS database

Stock or species groups	State of Exploitation	Uncertainty	2011 Landings (tonnes)
Penaeus shrimps nei	Fully-exploited	High	6,445*

**Also assessed by Fish Source*

COUNTRY OPPORTUNITY SUMMARIES: SENEGAL AND THE GAMBIA

Overview

Senegal and The Gambia hug the coast of one of the most productive fishery regions in African waters. Marked by a seasonal upwelling that brings nutrient-rich cold waters into the Canary Current, the region is a crown jewel among Africa's fisheries for its productivity. Both Senegal and The Gambia are among the few countries in the world where fish is the most lucrative export. The region is home to a fairly well-organized and sizable artisanal fishing sector that has been expanded and strengthened by NGO efforts during the last decade. Senegalese fishers form the majority of those fishing in coastal regions of The Gambia, with many Senegalese fishing associations also operating in The Gambia. The two countries also share stocks, particularly pelagic stocks, and the NGO community has used The Gambia as a micro-laboratory. The small scale of The Gambia's fisheries—the country's Atlantic coastline is only 80 kilometers long—and the limited number of actors provide a relatively safe and small space to test new approaches with the Senegalese fishing industry, government agencies, and stakeholders, new approaches that could eventually be scaled up in Senegal's fisheries.

The core differences between the two countries are governance, scientific capacity, and size of fisheries. The Gambia is ruled by a dictator, and the country's human rights violations limit its access to international funds. (The World Bank, for instance, refuses to fund in The Gambia.) The Gambia's fisheries science and data collection are weak, while Senegal's fisheries science is fairly progressive and on par with many OECD countries. For example, information on the status of Gambian pelagic fish stocks is fairly dated (last collected in 2008), and its demersal fisheries were last assessed in 1986 by the Spanish Institute of Oceanography. The Gambia's fisheries landings are also far smaller than Senegal's due to the size of The Gambia's exclusive economic zone and because catches by Senegalese fishers are often reported in Senegalese ports. This practice, while legal, often underestimates the total landings of fish caught in Gambian waters.

Governance

Both Senegal and The Gambia are in various stages of supporting user rights and adaptive fisheries management. In 2008, the government of Senegal articulated a two-pronged approach to improving fisheries management in a Sectoral Letter of Policy. The Letter of Policy identified the importance of co-management and user rights. Specifically, the policy directed the

government to (1) implement systems of collaborative or co-management for the coastal fisheries to devolve more of the responsibility for managing these overfished resources to the users and support them in implementing needed reforms, and (2) more broadly at the national level and including the offshore fisheries, introduce a system of fishing access rights to fishers as a tool to offset the reduction of fishing capacity and the recovery of stocks. In 2007, The Gambia passed its own fisheries policy that includes rational use of fisheries resources, market development goals, and improvement of shared management given the overlaps between its coastal resources and Senegal's. More recently, the government has developed a Fisheries Strategic Action Plan (2012-2015) to direct resources to key gaps in knowledge and management capacity. Gambian law allows exclusive use zones to implement user rights.

Fishery management schemes in Senegal and The Gambia do use size limits, but they primarily use input controls. Output controls are a ways off, and no total allowable catch limits are in place. Some of Senegal's twelve major ports have daily collective landing quotas, but this is mainly a mechanism to control price. The government is currently developing community-based management committees (Conseils Locaux de Pêche Artisanale (CLPAs)) upon which to base co-management. These committees develop "local conventions" that determine governance and set regulations, creating a de facto decentralized management scheme. Prefects sign off on the conventions. Boundaries/jurisdictions of CLPAs and their decisions are yet to be tested in courts of law, and what CLPAs control via maritime mandate is extremely fuzzy. In total, 27 CLPAs form a system to implement co-management of fisheries at the community level. A criticism of the CLPA system is that it results in a chaotic patchwork of fisheries management that is not overseen at the stock level, a particularly acute problem for long-ranging, trans-boundary fisheries. The Gambia also uses local-level structures—Community Fishing Centers—that work closely with the government on fisheries management.

At a national level, Senegal is moving to address fisheries management through a National Committee on Pelagic Fisheries. (A similar committee has been formed in The Gambia.) This Committee was formed in recognition of the importance of pelagic species to food security, but also in acknowledgement that the range of these species and their susceptibility to environmental changes, particularly climate change, required an overarching plan.

Key Fisheries and Commodities

Both Senegal and The Gambia's annual fisheries landings are dominated by artisanal fisheries inputs. Fish from small pelagic fisheries represent the highest proportion of species landed by both Senegalese and Gambian fishers and are important for local food security as well as for the regional fisheries trade throughout the African market. The Gambia's artisanal sector catches roughly 93 percent of the national annual landings, for a total catch of 45,910 tonnes in 2010. However, only 3,563 tonnes of the 2010 landings were exported.

There is little industrial development but extensive foreign fishing in The Gambia; fish caught in Gambian waters are landed and processed elsewhere. Asian companies have established a presence in both Senegal and The Gambia to purchase octopus, squid, cuttlefish, and cymbium; they typically buy the product on the beach directly from small-scale fishers and then process it out of country, where much of its higher value is lost to African communities. Sole and

grouper/thiof are exported to Europe (Spain, the Netherlands, France, the UK, and Holland) and South Africa, while sardinella and bonga are traditionally eaten fresh or smoke-dried for other African markets.

In 2011, Senegal's artisanal landings accounted for almost 90 percent of domestic landings, totaling just shy of 400,000 tonnes. Surprisingly, the ten percent of industrial fisheries landings and farmed fish represent over three quarters of Senegal's seafood exports. However, the 24 percent of seafood exports derived from SSFs is one of the highest percentages in Africa, and indeed, on a global level. Most Senegalese exports have traditionally been exported to the EU or Japan, and NGOs have invested significant effort in the last decade to shape EU fishing agreements to gain more sustainable terms for Senegal's exploited fisheries. Major fisheries targeted by artisanal fishers and their value are included in table 1 below.

Table 1: Value of commonly targeted artisanal fisheries in Senegal[50]

Species	Estimated Value in USD
Bonga shad	2,563,442
Sardinella *(round, flat)*	32,090,186
Sole	13,250,261
Shrimp *(all)*	6,712,120
Lobster *(spiny, slipper)*	1,166,437
Octopus	29,069,192
Tuna *(bluefin, bonito, skipjack, albacore)*	4,176,115

Both The Gambia and Senegal face considerable obstacles to accessing the fisheries export market. In January 2014, an EU assessment found gaping holes in Senegal's handling and sanitation practices. The Gambia has also been prohibited from exporting fish for the same reasons. Currently, many high-value products are processed abroad due to lack of infrastructure in Senegal and The Gambia. The EU's January 2014 report prompted the Senegalese government to issue a decree to mount a campaign to address health and sanitation issues that are particularly prevalent in the artisanal sector. The restriction of fish exports represents a huge loss to the African market.

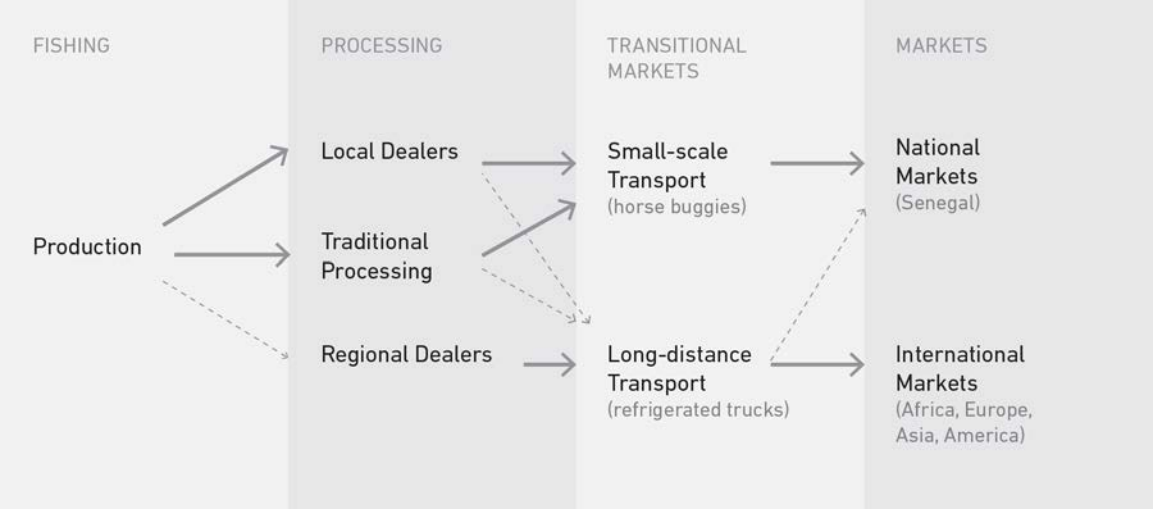
Markets and Supply Chains

In Senegal, fish are distributed using two different forms of transportation. Modern refrigerated trucks with ice transport high value species bound for export (groupers, shrimp, octopus, squid,

[50] Resultats Generaux des Peches Maritimes, 2011.

tuna, sparids), while large horse buggies called "charettes" transport fresh small pelagic fish (sardinella) caught by artisanal fishers to local consumers and to processors. The "charettes" carry open containers without ice or isolating material to preserve the quality of the fish in Africa's hot climate. This inefficient form of transport remains the main means of fish distribution. Modernizing this artisanal industry would provide an opportunity to increase fish quality and value, and improve human well-being across the distribution and processing sector within the country.

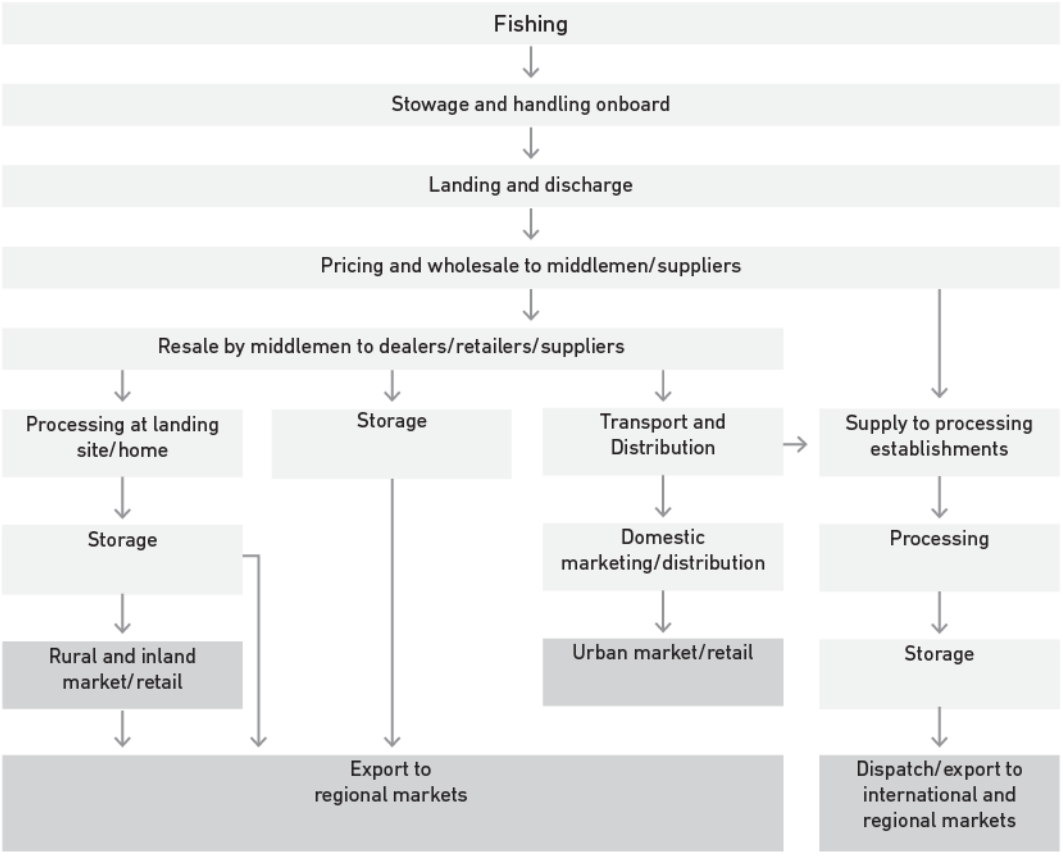
Figure 2: Senegal's Supply Chains[51]



Note: Bolded lines signify dominant pathways within the supply chain, dotted lines indicate weaker links.

[51] Personal communication with URI, 2014.

Figure 3: Gambian Supply Chains[52]



The central fish markets in Dakar and Kaolack play a key role in the collection, storage, and distribution of fish, and have revamped fish trade. But fish trade remains undeveloped in certain areas, especially the areas in Southern Senegal, which lack roads and infrastructure (ice producing plants, storage facilities, good roads, refrigerated trucks, etc.) to maintain the cold chain and preserve the quality of products until they reach their intended destination. Two types of players sell fish: wholesalers and small traders. The activity is changing in many ways with other players coming into the sector from the sub-region.

Fish processing is an important source of employment and economic security, especially for women, and sardinella and bonga are most commonly fished and processed by the artisanal supply chain.

In the region, keccax (a fish product prepared by braising) is the most highly exported and economically important product derived from locally-processed small pelagic species. According to the University of Rhode Island's Coastal Resource Center (CRC), four times more

[52] UNCTAD, 2014.

keccax was exported (in terms of value) than the second most exported product, salé seché (salted dried).

Production of smoked sardinella is also expanding as demand in Senegal and neighboring countries increases. The top importers for this product are in the West African sub-region, and the main destination markets are Burkina Faso, Guinea-Conakry, and Mali. This type of processing has traditionally been dominated by women, but technological innovations such as the introduction of costly smoking ovens ("fours parpaing") are shifting this dynamic. These technologies are driving the development of large-scale operations backed by businessmen with access to more sophisticated financing and capital.[53]

Within this supply chain dynamic, the Senegalese government and the NGO community have experimented with a range of market-based initiatives to increase the value artisanal fishers, and women it particular, receive from the value chain. Such interventions include micro-finance, and eco-labeling MSC pre-assessments, and an industry-backed FIP in The Gambia. Fisheries most promising for a Rockefeller Foundation approach include lobster, octopus, sole, sardinella, and bonga. Several of these fisheries have been pre-assessed or are targeted for eco-labeling because they either produce high-value seafood export products for international markets (octopus, lobster, sole) or because they are domestically valuable for livelihood, culture, and food security (sardinella and bonga). So far, it appears that fishers, exporters, and traders in the region support these efforts and are actively involved. However, the need for data collection, a lack of unity among fishers, and gaps in co-management have stalled these initiatives and represent significant hurdles. Under a World Bank initiative in partnership with WWF, territorial use rights in fisheries (TURF) management involving octopus stocks has proven successful in a very limited capacity in terms of generating improved management and price premiums. However, Senegal lacks a consumer push mechanism: domestic awareness of and sensitivity to seafood labeling and certification is low, and three quarters of artisanal landings are sold domestically. Eco-labeling for domestic species may improve handling and reduce waste in the supply chain, but it is uncertain if it will deliver price premiums that will improve livelihoods in the artisanal sector.

The most active and promising FIP in the region is the sole FIP initiated in The Gambia with a strong market draw. This project is described in greater detail below as it is the farthest along of any FIP in West Africa.

The Ba'Nafaa Project: Through the USAID/Ba'Nafaa project, the Banjul community worked together with MSC, WWF, the Peace Corps, and the Coastal Resource Center (CRC) to conduct an MSC assessment for the sole gill net fishery. The assessment, funded by the community, identified several barriers to MSC certification, including an overfished status and high levels of catfish bycatch. These results led the community to experiment with seasonal closures to address overfishing and also to conduct a full assessment of the catfish fishery. The effort has been supported by key members of the industry including two sole processors, Dutch-owned and locally based Atlantic Seafood Company and International Pelican Seafood, and a major

[53] Mbengue 2013. See also Ndoye, Moity-Maïzi, & Broutin 2002.

retail buyer from Germany, Kaufland, representing 1,000 grocery stores. Last year Kaufland contributed €100,000 to the effort. The Gambia's sole FIP project is one of the few African efforts in an SSF that has attracted both market funding and active buyer engagement. During interviews, many criticized SSF FIP efforts elsewhere in Africa for having been designed with NGO agendas, rather than end markets, in mind; these FIPs consequently lack the market pull to incentivize shifts. The sole FIP in The Gambia is being closely watched by the Senegalese government and fishers and could serve as the first MSC-certified fishery in all of West Africa.

The sole fishery still requires additional work to complete the assessment and gain certification. As a result of assessment findings, The Gambia has taken active adaptive management steps and is pursuing a joint management plan with Senegal on its trans-boundary fisheries. With USAID funding now ended for the Ba'Nafaa project, several interviewees suggested that there is an opportunity to push this project to the finish line and provide proof of concept that user rights through co-management can be valuable. However, the project has yet to deliver any price premiums to fishers. It is also too soon to say if there have been improvements to the health of the stock. With no real changes in income over the duration of the project, it is difficult to see how this might be the best test case for investment given Rockefeller's approach. It is also possible that the lull in funding may cause a loss of momentum on the project. (For extensive information about the sole FIP, please see the CRC proposal submitted separately to the Rockefeller Foundation.)

Fishers and Communities

According to the CRC, approximately 25,000 to 30,000 people directly and indirectly participate in The Gambia's SSFs. As of 2006, 6,100 active fishers were participating in the fleet, many of them Senegalese. There are eleven landing sites in the country where the active canoe, or pirogue, fleets are primarily owned by Gambians but crewed by Senegalese men. Senegalese fishers typically spend six to eight months a year in The Gambia and are part of the community, participating in local fishing associations and management decisions.

In Senegal, the last survey of the artisanal sector in 2011 identified 58,000 active artisanal fishers operating in the coastal area. Roughly half of the active pirogue fleet is concentrated in the coastal region of Thies, with critical trading centers in Dakar and Kaolack. It is estimated that the fishing sector supports 600,000 direct and indirect jobs. In addition, the number of people who benefit from the sector is even higher: extrapolations from census data show that each employed Senegalese worker feeds at least five people. The CRC estimates that three million people, 25 percent of Senegal's total population, depend directly on fishing for their livelihoods.

The Gambia, a very poor country, is recognized by the United Nations as a Least Developed Country. The 2010 Integrated Household Survey conducted by the Gambian government found 48.4 percent of Gambian households living below the US poverty line of $1.25/day; households who earn their income from agriculture and fishing are poorer than their counterparts in other sectors. In Senegal, about half the population (46.7 percent) lives under the national poverty line, and fifteen percent of the population is employed in the fishery sector. The fishery sector is

so important that it is prioritized as one of five key sectors under Senegal's Accelerated Growth Strategy.

Women predominantly participate in nearshore harvesting activities (oysters, cockles, and mussels) but also figure prominently in the processing and trading activities of the value chain of both Senegal and The Gambia.

Factors Favoring Work in Senegal and The Gambia

Several factors favor working in Senegal and The Gambia. The Senegalese government has taken active and unusual steps to counter illegal fishing, a primary impediment to effective and sustainable SSF reform in the developing world. Additionally, the Senegalese and Gambian governments are motivated to tackle fisheries sustainability issues due to the domestic value of fisheries—both with respect to export values and because the artisanal sector is fully responsible for meeting the region's high demand for fish. The artisanal sector plays a dominant role in the supply chain, wields political power, and has already begun to take initial steps toward several of the interventions identified by the Foundation.

Constraints

Despite factors favoring work in the region, Rockefeller's envisioned approach will face serious constraints in Senegal. The first of these is the government's potential unwillingness to address overfishing by the artisanal fishing fleet. The Senegalese fishing sector is a politically powerful constituency. It successfully encouraged President Macky Sall to evict foreign fishing fleets in 2012 and tackle illegal fishing head on. The Sea Around Us project estimates that Senegal loses more than $3 million in exports annually due to illegal fishing. The administration, under the president's mandate, continues to take a hard line on protecting its artisanal fishery fleet. Interviewees have presented conflicting views, with several insisting that the president and his activist Minister of Fisheries and Maritime Affairs, Haïdar El Ali, are deeply wedded to the sustainability of the artisanal fleet. On the other hand, we have also been informed that it is highly questionable whether the administration's stance on illegal fishing will extend to the difficult job of curtailing and reducing the capacity of the artisanal fleet—the very sector which propelled the president's successful election campaign. Without addressing capacity in the artisanal sector, overfishing will likely continue. The pirogue fleet is estimated to be three times larger than what fisheries stocks can support. A jointly authored French-Senegalese report found that the Senegalese pirogue fleet directly contributed to overfishing of thiof, an economically valuable species of grouper that is iconic to the region and culturally important. To date, the administration has frozen new entrants but it has not demonstrated any further movement in addressing overcapacity.

The primary constraint is that management is simply not that strong, and it requires better access controls. Of the 27 local fisheries governance bodies, only two have sufficient funding to operate sustainably and only eight have been formally established. Interviewees suggested that government bureaucracy presents significant barriers to funding the CLPAs and additional sources of support are necessary. The World Bank, WWF, and the Collaborative Management for a Sustainable Fisheries Future (COM-FISH) project have been focused on establishing effective

management, but several interviewees criticized the management systems in place as wholly dependent on the NGO sector. Without local control, there is an absence of community outreach and input, monitoring and surveillance, and infrastructure development. Seafood trade in the southern part of the country is poorly developed due to its isolation and the lack of infrastructure needed to maintain the cold chain and deliver a good quality product to its destination. Similarly, micro-traders (primarily women) are not well organized and lack bargaining power in the value chain. And, finally, Senegalese fishers are professional fishers; they travel, in some cases all over Africa, spending up to six months away from their families. Past attempts to pilot alternative livelihood projects with fishers have proven unsuccessful.

A key consideration for Rockefeller is how to address food security concerns in the region. Artisanal fisheries form the bedrock of the domestic and regional seafood supply chain that supports the high per capita seafood consumption in Senegal—one of the highest in Africa. Sardinella and bonga, two of the country's biggest fisheries, play a prominent role in supplying cheap, nutritious fish to Senegal and other African markets. Several interviewees expressed concern that a market-based approach focused on valuable export species could encourage Senegalese fishing fleets to follow the money and largely abandon pelagic species. Markets have already driven exploitation and the development of new high-value fisheries for export. An example of this phenomenon is the dramatic development and exploitation of the ribbon fish fishery, which is driven by strong demand from Korean markets. The power of the global market to negatively affect food security has been a consistent concern, with most in-country experts favoring an approach in Senegal that promotes food security by prioritizing pelagic fisheries and African markets. A regional management approach would be necessary to make this work across many countries.

In terms of partners and activity, there is substantial aid funding in Senegal but far less philanthropic funding for conservation NGO activity. The country has not been a priority for MSC, Sustainable Fisheries Partnership (SFP), or Fairtrade International. In addition, none of the major marine foundations have focused on West Africa, though MAVA Foundation in Europe has a West Africa portfolio. While MAVA has developed guidelines to accept proposals exploring new market-based approaches, it has received no submissions from West Africa. Most of the NGO activity (e.g., Greenpeace, Environmental Justice Foundation) has focused on excluding the foreign fishing fleet.

The CRC, REPAO (the West African Fisheries Policy Network), and WWF are the dominant NGO players in light of their work on sustainable fisheries management with a focus on market-based interventions. As a result of the success of several efforts in Senegal, microfinancing and seafood alliances that were seeded in Senegal are now being pursued in The Gambia. Microfinance projects funded by WWF are up and running in twelve villages. There are also highly acclaimed interventions within the oyster fishery, particularly through the TRY Oyster Women's Association, which is receiving international funding from the Global Environment Facility (GEF), Spain, and several small NGOs. WWF has established the Alliance for Sustainable Fisheries to provide an independent platform for the seafood community to organize around improvements.

Potential Interventions

1. Support **The Gambia's sole FIP** and encourage co-management of shared sole stocks with Senegal via support of WWF, the CRC, and COM-FISH. The CRC has submitted a separate proposal describing the full nature of the investment needed to bring this project to its conclusion.

2. Support the expansion of **microfinance and financing** in coastal communities in Senegal and The Gambia per WWF's model. (Note: to date, this has proved successful in generating income opportunities for women but not for fishermen.) There have been many successful examples of microfinance programs in Senegal's fisheries sector, but more needs to be done to structure loan programs that link sustainability criteria with financing to minimize overcapacity and develop other income-generating opportunities.

3. Improve management capacity by supporting the efforts of WWF and COM-FISH to establish, incorporate, and develop **sustainable CLPAs**. The Partnership for African Fisheries envisions a parallel development fund that would accompany the Fisheries Investment Fund, a private equity investment fund. This development fund could be used to train and generate local-level management, business, and monitoring capacity to support community-based legal entities in more effectively managing the resource. We heard in interviews that government funding of CLPAs was a huge challenge due to bureaucratic delays and potential corruption and that, consequently, independent funding was essential.

4. Drive **octopus improvement efforts** to a successful conclusion and support local TURF management in Senegal in collaboration with WWF, REPAO, and the World Bank. The World Bank has conducted four different pilot projects on TURF management connected with the octopus fishery but requires added support from wholesalers. Linking up with WWF's Responsible Seafood Alliance is a potential mechanism to support the long-term adoption of this approach and show the long-term sustainability benefits of local co-management.

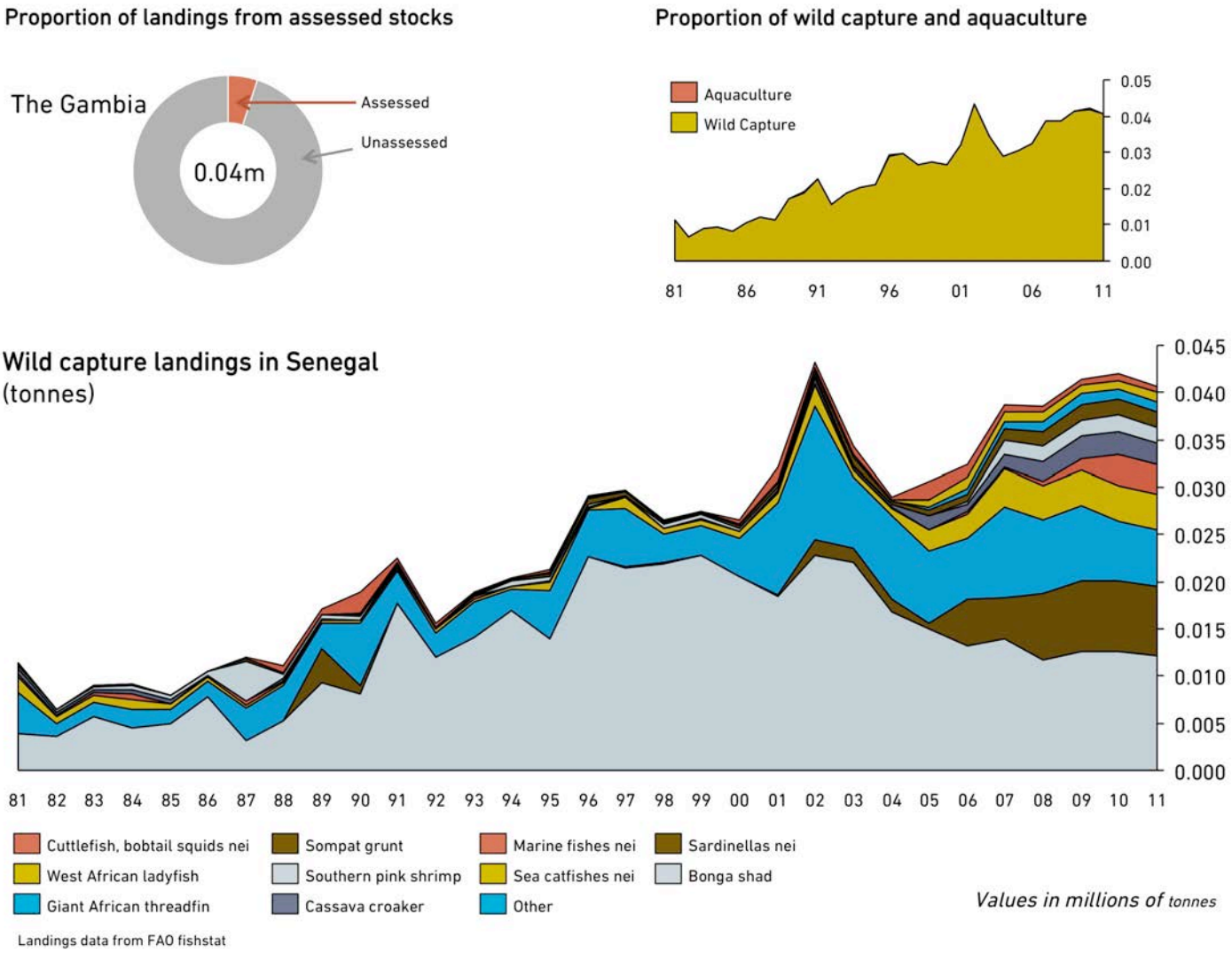
5. Support COM-FISH **local labeling efforts** connected with species important to food security to incentivize reduced food waste, trans-boundary management, and better handling in Senegal (sardinella/bonga) and improve regional distribution to African markets. This strategy could support and bolster trade between developing countries and incentivize improvements in the cold chain to channel more resources more effectively to inland distribution. Studies conducted in Morocco suggest that boosting inland distribution of highly nutritious fish could dramatically reduce infant mortality for rural communities.

6. Conduct **market analysis** of food security species in key regions to determine regional market dynamics and opportunities to extend the inland distribution network through improvements in value-added activities on sardinella in partnership with WWF, SFP, MSC, or other potential partners. Trade among developing countries is increasing and will continue to increase as Africa's middle class grows, but the information on the flow of products and these value chains is weak.

7. Support COM-FISH **improvements in hygiene and health practices** to meet EU standards and gain access to the Western market, and generate improved price premiums for women who process fish. Through local-level education, particularly in the Cayar port, where the majority of all seafood is landed, COM-FISH has shown 400 percent increases in price premiums as a result of very simple but effective best management practices.

The Gambia: Landings, Stock Status, and Trade-Related Data

The Gambia's landings have been steadily rising, but only lands 40,000 tonnes a year; small pelagics comprise roughly half of national landings.



Almost nothing is known about Gambian stock health and what little is known is negative.

Proportion of wild capture landings by stock status

Stock status of Gambian stocks reported by FAO FIRMS database

Stock or species groups	State of Exploitation	Uncertainty	2011 Landings (tonnes)
Bobo croaker	Over-exploited	Low	480
False scad	Fully- to overly-exploited	Medium	290
Southern pink shrimp	Over-exploited	Low	1,350

Estimates of unassessed stock health provide a bleak outlook for the state of Gambian fisheries' wellbeing.

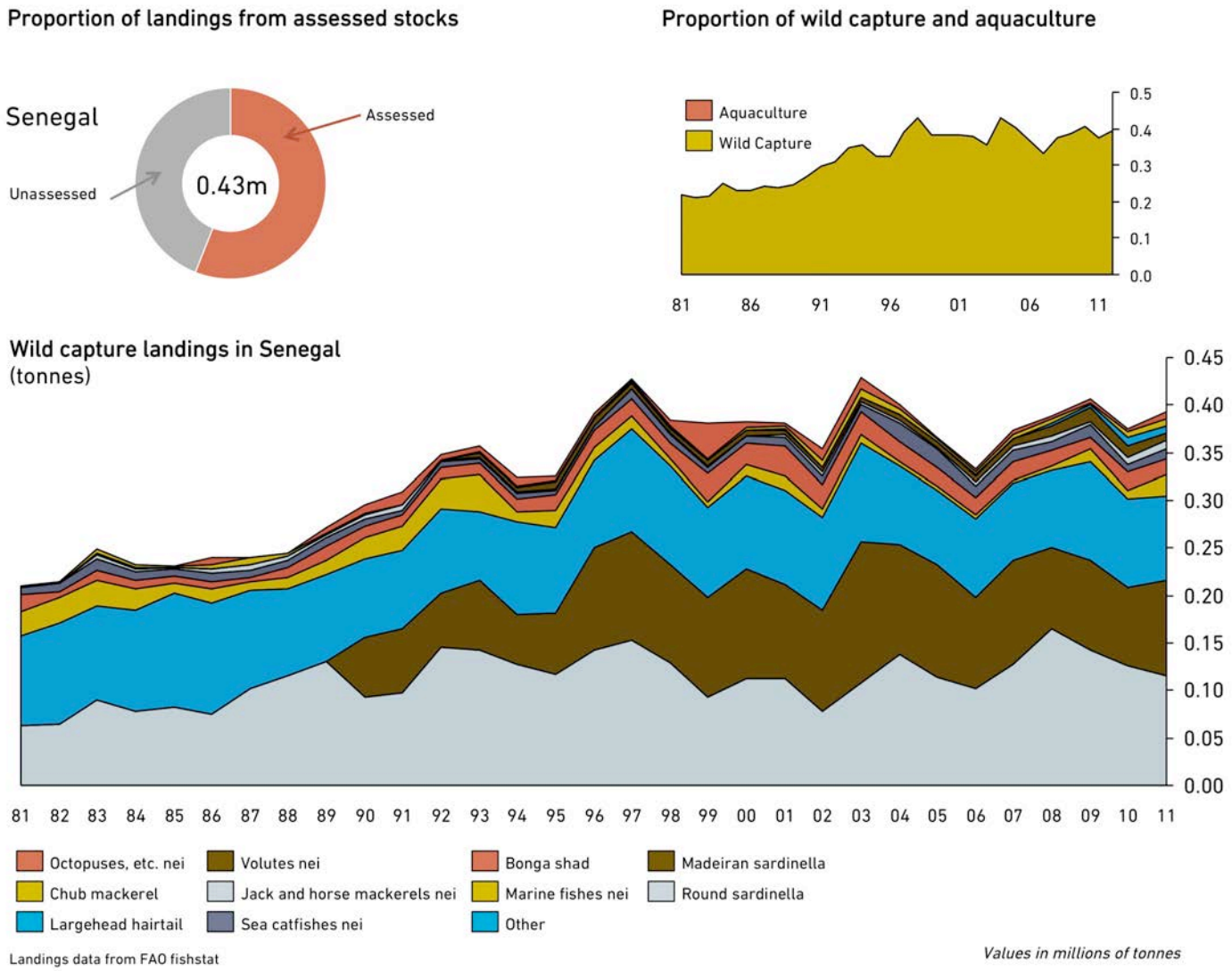
Proportion of wild capture landings by stock status

Costello et al. stock B/Bmsy estimates

Common Name	Estimated B/Bmsy	Confidence Intervals		2011 Landings (Tonnes)	Total Landings (Tonnes)
		Lower	Upper		
Meagre	0.10	0.01	0.59	33	18,223
Rubberlip grunt	0.28	0.04	2.49	160	
African sicklefish	0.53	0.08	4.32	240	
Giant African threadfin	0.53	0.07	3.86	900	
Lesser African threadfin	0.56	0.07	4.60	380	
Tonguefishes	0.58	0.08	4.00	360	
Bonga shad	0.83	0.10	6.39	12,650	
Cassava croaker	0.94	0.21	4.38	1,900	
Sompat grunt	0.95	0.23	4.38	1,600	

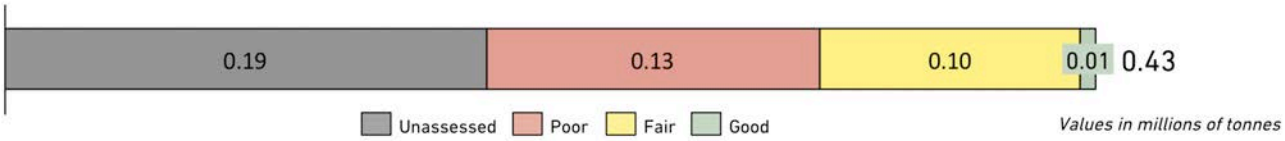
Senegal: Landings, Stock Status, and Trade-Related Data

Senegalese landings have remained roughly constant for 20 years; small pelagics account for half of total landings.



Roughly half of Senegalese landings' stocks are assessed; only 1% of landings' stocks are in good health, 25% are fair, and 25% are poor.

Proportion of wild capture landings by stock status



Stock status of Senegalese stocks reported by Fish Source

Species	Biomass Status	TAC Compliance	Mortality Status	Overall Fishery Health Score	2011 Landings (tonnes)
Skipjack tuna	Above BMSY	Medium	F<Ftrp	A	4,823
Yellowfin tuna	Not Overfished But at or Below BMSY	Medium	Unknown	B	1,049
European pilchard, European sardine	Overfished	Medium	F<Ftrp	D	0

Stock status of Senegalese stocks reported by FAO FIRMS database

Stock or species groups	State of Exploitation	Uncertainty	2011 Landings (tonnes)
Senegalese hake	Fully-exploited	Low	86
Madeiran sardinella	Fully-exploited	Low	99,569
Round sardinella	Over-exploited	Low	116,065
Barracudas nei	Fully-exploited	Medium	2,412
Deep-water rose shrimp	Fully-exploited	Low	23
Southern pink shrimp	Over-exploited	Low	2,634
Cuttlefish, bobtail squids nei	Over-exploited	Low	3,963
Octopuses, etc. nei	Over-exploited	Low	7,502

**Also assessed by Fish Source*

Estimates of unassessed stock health covers 10% of Senegalese landings; three quarters of these estimates are in poor condition.

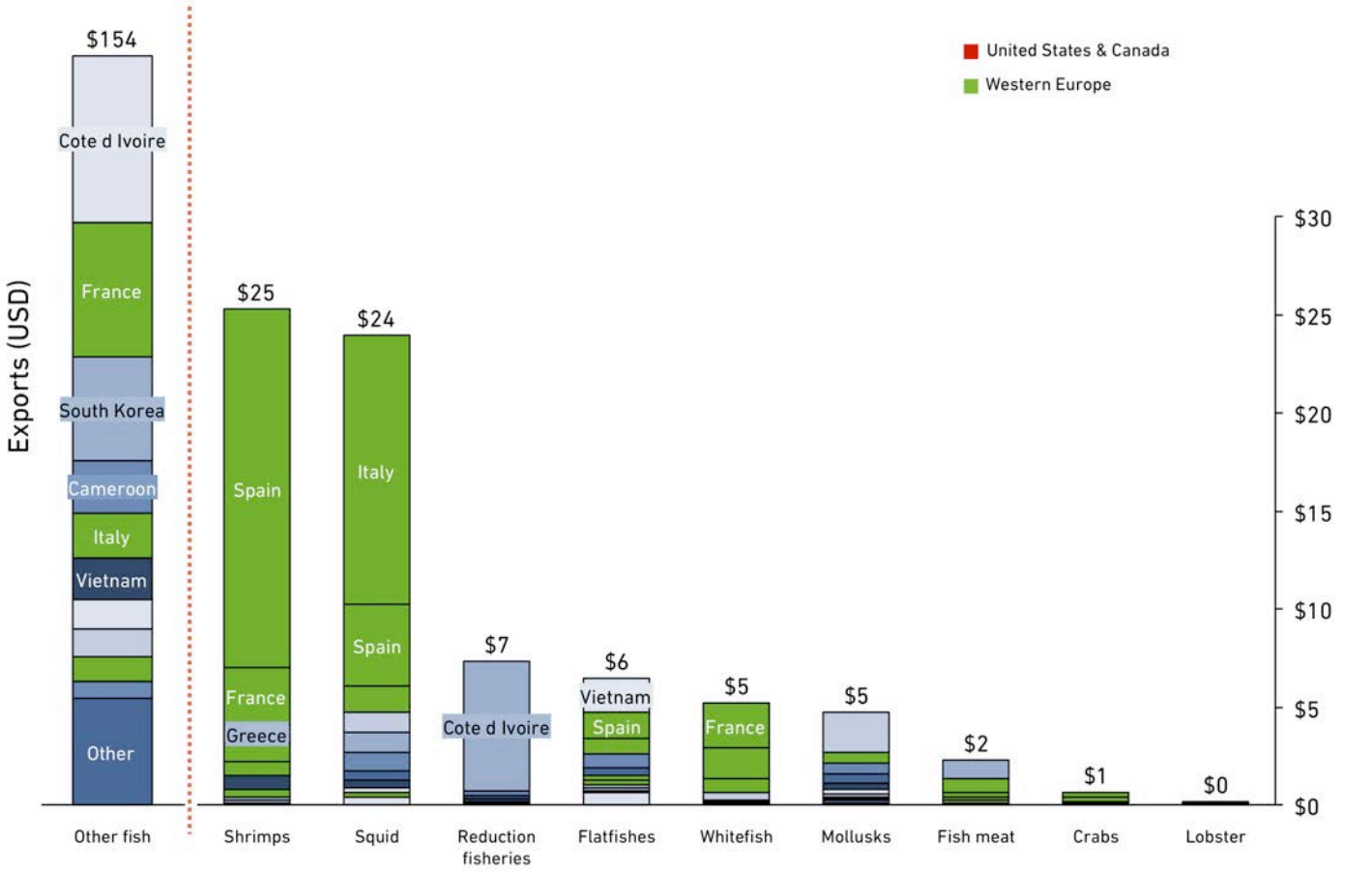
Proportion of wild capture landings by stock status

Values in millions of tonnes

Costello et al. stock B/Bmsy estimates

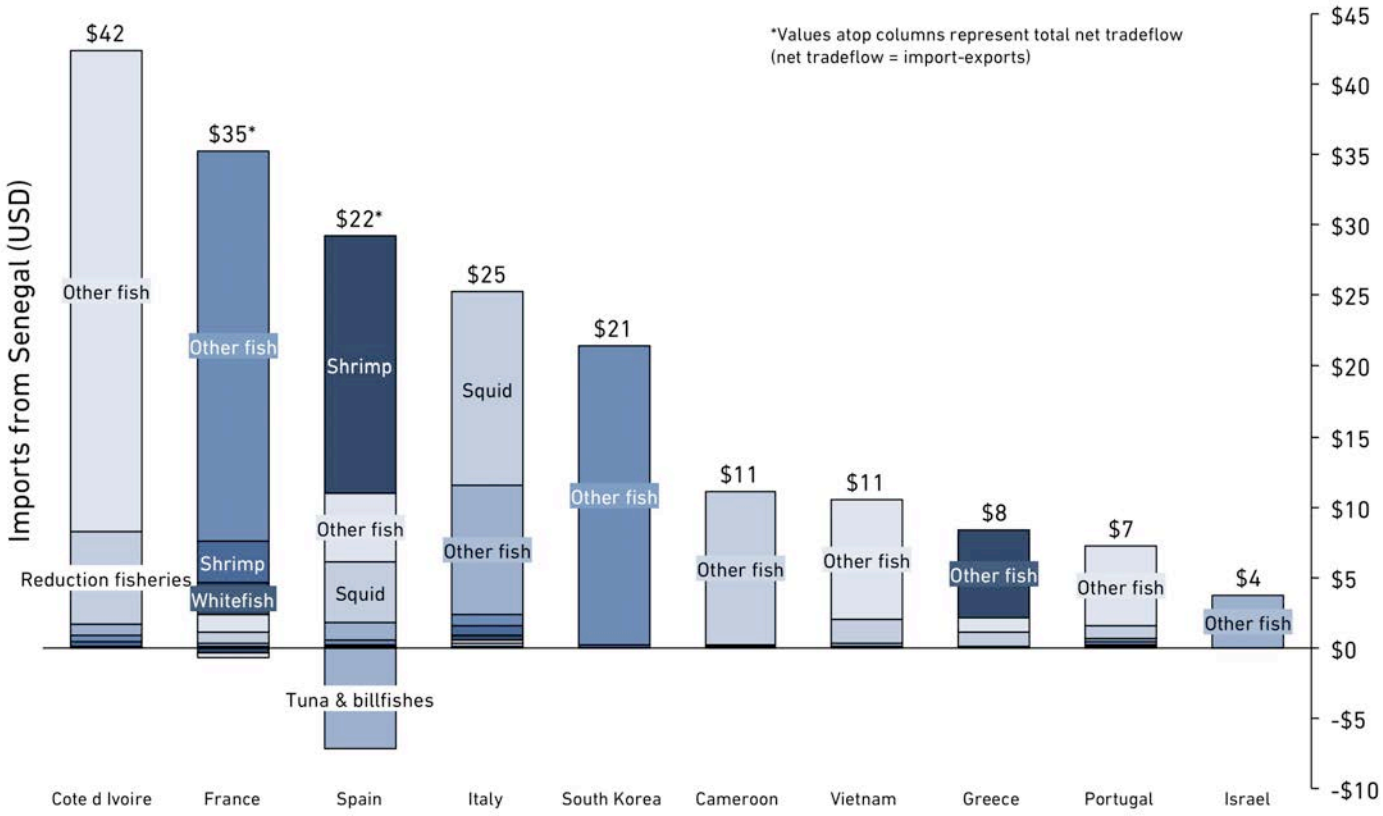
Common Name	Estimated B/Bmsy	Confidence Intervals		2011 Landings (Tonnes)	Total Landings (Tonnes)
		Lower	Upper		
Spotted seabass	0.17	0.02	1.06	102	28,828
Sand steenbras	0.20	0.03	1.34	29	
Morays	0.29	0.04	1.89	134	
Boe drum	0.30	0.05	1.78	1,158	
West African goatfish	0.32	0.04	2.08	87	
African sicklefish	0.40	0.05	3.23	893	
Bigeye grunt	0.42	0.05	3.12	1,139	
Lesser African threadfin	0.44	0.05	3.39	2,749	
Cassava croaker	0.60	0.10	3.66	2,479	
Bobo croaker	0.61	0.08	4.63	290	
Black seabream	0.62	0.09	3.94	2,202	
Bonga shad	0.73	0.11	5.46	17,133	
John dory	0.74	0.11	4.89	289	
Bogue	0.77	0.11	5.02	144	
Red pandora	1.08	0.31	3.62	2,649	12,353
Large-eye dentex	1.36	0.34	4.69	844	
Bearded brotula	1.65	0.40	6.22	1,074	
Largehead hairtail	2.91	0.76	11.03	7,786	

The majority of Senegalese exports are unidentified fish; shrimp and squid are the only known exports of significance exported to the West.



Values in millions of USD

Only Spain and Italy are significant importers of Senegalese shrimp and squid, while all other countries primarily import unidentified fish.



COUNTRY OPPORTUNITY SUMMARIES: LATIN AMERICA

Regional Overview

Opportunities to support work on small-scale fisheries in Latin America are infinite and, depending on the objective, focus and timeframe of effort, offer a long list of potential approaches that range from community capacity building to experimental market mechanisms. Factors favoring work in the region clearly outweigh constraints, especially when considering a regional approach that leverages similarities in culture and language in order to replicate and scale promising models that have emerged in each country. These include territorial user rights fisheries (TURF) systems in Chile, gastronomic movements in Peru, "fisher universities" in Mexico and communitarian banks in Brazil, to name but a few. In addition, common challenges can be jointly addressed such as mechanisms to decrease the information asymmetry between fishers and direct buyers.

Despite regional commonalities, each country must also be regarded individually, with its respective political, socio-economic and ecological contexts and associated challenges. While Chile and Peru face strong (semi-) industrial fisheries that are undermining sustainability of the small-scale sector, the strong demand of Asian buyers is overriding fisheries sustainability efforts in Mexico. Brazil suffers from a bureaucratic and often corrupt political system, and small-scale fisheries occupy a low priority on the national agenda.

Two overarching themes have emerged during this scoping effort. One refers to the trade-off between feasibility and scalability. Only a handful of exceptional communities have developed successful models of management and commercialization. However, external communities benchmark their objectives based on these leaders, in the hope of replicating and scaling those successful models. While replication is possible in selected areas which also feature key enabling conditions for the uptake of promising models (e.g., culturally and ecologically), scalability requires much time and effort, or may not always be possible.

The second theme relates to the observation that market-based mechanisms can have positive impact on fishing communities and associated ecosystems when communities are prepared for extra value coming their way. On the contrary, increasing the price paid to fishers without previously ensuring that fishing effort does not increase as a result, will almost certainly have a negative impact on both fishing communities and fish stocks.

Outlined below are select characteristics of each country to inform considerations on the desirability and feasibility for the Rockefeller Foundation to work in each country.

Chile is a fascinating country with respect to fisheries. Despite strong institutions, a stable political environment and a top-down economically rationalized fisheries legislation, all major stocks have collapsed or are near collapse. However, the 2012 revision of the first (1991) fisheries law provides promising interventions for FIPs, coupled with opportunities around improved commercialization. In addition, the often praised Chilean TURF reserves (and associated *caletas*) are interesting units that can serve as incubators for route-to-market interventions such as traceability projects, home delivery or even biodiversity credits. All of these approaches would benefit from a very strong academic community in Chile.

Peru - *Anchoveta* has long become a synonym for Peruvian fisheries. Due to the enormously productive upwelling system off the country's coast, this oily small pelagic fish makes for the largest single species fishery in the world. Along with the giant squid, anchoveta is also the most important species for the artisanal sector. Although these high-volume species offer important and promising opportunities for market-based interventions such as FIP efforts and value-chain development, they statistically hide several economically relevant segments of small-scale fisheries. Most prominently this includes the mixed finfish fishery that is mainly earmarked for a booming ceviche market. This could become an important example of a gastronomic movement triggering traceability programs and decreasing the distance between catch and consumption. Due to very little previous philanthropic engagement in Peru, Rockefeller work in this country could contribute to a first and important step to improve a largely unmanaged small-scale sector. Although many indicators seem to promise a decent degree of feasibility, the lack of experience of this kind of work in the country also means that it would involve some risk.

Mexico is the only country in the Americas that has received long-lasting and significant amounts of philanthropic funding in marine conservation and fisheries management issues, especially in the northwest region. This is partly a result of a geographic proximity to the United States but also reflects the high biodiversity in the region, notably of charismatic marine animals such as whales and turtles. While the need for support is greatest in the Southwest Pacific region (due to isolation and poverty) and Gulf of Mexico (biodiversity and overfishing), market-based mechanisms are probably most feasible in the northwest, given previous efforts in the region. The proximity with the US market, the rising middle class and a booming tourism sector are promising indicators for a multitude of approaches, but there is also a certain degree of oversaturation concerning external support on all levels (especially in the Northwest).

In many ways, **Brazil** is an exception to the mix of countries examined herein. It is as large as a continent, its landings are only a fraction of other countries' landings, and artisanal fisheries represent around 70 percent of total catch. In addition, corruption, bureaucracy and poverty are more prominent than elsewhere. Past philanthropic commitment in the country has been scarce but over the past year, Oceana, Rare and EKO Asset Management Partners all set out to understand opportunities to work in Brazil and identified, each individually, a set of approaches that could be complementary to potential Rockefeller initiatives. Paired with a very dedicated and well-organized local civil society movement, this new interest would clearly help future work in Brazil. Geographic distance, costs and a politically unstable environment would be constraints.

COUNTRY OPPORTUNITY SUMMARIES: CHILE

Overview

As the longest country in the world, Chile has more than 4,200 miles of coast distributed over fifteen regions, with highly heterogeneous ecological, socio-economic and political backgrounds. It is therefore difficult to ascribe any generality wholesale without at least examining the issue from a regional perspective. This section on Chile thus attempts to generalize where possible and differentiate where necessary.

Chile stands out as one of the most politically stable and economically prosperous countries in Latin America and is characterized by strong institutions and rule of law. Public revenues, however, are highly dependent on natural resource extraction, and resource management has fallen victim to short-term rent maximization, often catering to the aspirations of industrial interests.

The country's fisheries sector, traditionally one of the most productive in the world, has not been an exception. Over past decades, a politicized Total Allowable Catch (TAC)-setting system has allowed for a systematic overexploitation of all major stocks (i.e., anchoveta, sardine, jack mackerel, chub mackerel, and recently also Humboldt squid), that are targeted by both industrial and artisanal vessels.

A new fisheries law (yet to be implemented) has largely eliminated politicized TAC-setting practices, which created biological inefficiencies. This change has also gradually shifted the "fisheries debate" in the country from a focus on ecosystem exploitation toward questions of socio-economics, including the economic exploitation of fishers and more concern with inequality and the equitable distribution of value along the supply chain.

Due to a long history of market-based mechanisms in Chile and obligatory management plans for all major stocks resulting from recent changes in legislation, opportunities exist to implement different FIP-type approaches as well as financing models to decrease dependency on middlemen.

Governance

The first fisheries law in Chile came into force in 1991 and replaced an open access regime with a comprehensive national management plan including zoning, quotas, licenses, seasons, fishing gears and several other modern mechanisms. For the artisanal fleet (vessels smaller than eighteen meters in length) this included exclusive rights to the first five nautical miles in the center and north of the country (macro-TURF) and exclusive user rights allocated to locally organized communities for the extraction of benthic resources (micro-TURF).

While this was a significant improvement to the previous system of open access, legal loopholes allowed industrial lobby groups to set total allowable quotas far above scientific recommendations, ultimately leading to the collapse or overfishing of almost all major stocks. The first revision of the 1991 law came into force in 2012. This new legislation nearly eliminated politicized TAC-setting and made management or recovery plans compulsory for all fully exploited or overfished stocks. It also banned all fishing vessels greater than twelve meters from the first nautical mile. However, it created much controversy about the allocation and design of transferable quotas. First, vessels less than twelve meters in length (representing 90 percent of fishers) were allocated less than ten percent of quotas. Second, while artisanal quotas were previously not tradable, the 2012 law introduced the possibility for artisanal fishers to sell their quotas and allowed them to use quotas as collateral when taking credit at a bank.

Compared to other Latin American countries, the implementation, control and enforcement of existing policies in Chile all work relatively well. Although illegal fishing exists and remains concerning especially in the Patagonian South, it is not perceived as a major problem, partly because institutions associated with fisheries research, administration, and management are large and relatively well-financed governmental bodies that are represented in every region of the country.

One of the most striking characteristics of Chilean fisheries might be the degree of transparency and quality of data available, which covers statistics on catch, trade, and socio-economic aspects across each region. This greatly facilitates prioritizing regions and fisheries for potential intervention programs.

Key Fisheries and Commodities

Over 80 percent of the approximately 1.5 million tons of artisanal catch in Chile is comprised of sardines (43 percent), anchoveta (22 percent), Jack mackerel and Chub mackerel (10 percent) and the Humboldt (giant) squid (5 percent) and other small pelagics (5 percent). Except for the Humboldt squid, these are medium to small pelagic species mainly earmarked for fish meal and fish oil production. These artisanal landings are almost entirely fished by a fleet of boats twelve to eighteen meters in length, employing ten percent of the artisanal fishers.

The remaining fifteen percent of artisanal fisheries are mainly fished by vessels smaller than twelve meters in length and can be roughly divided into two camps. The first is a fishery dedicated to demersal, coastal and white fish species, including the Southern hake and Southern Pacific hake. The second includes benthic species fished in nearshore TURF areas.

The latter only represents three percent of artisanal catch by volume but is an important source of income due to the very high value of bivalves such as the Chilean mussel (loco) and the Taca clam.

Beyond these fisheries, algae and seaweed are increasingly important sources of employment and income (with annual landing volumes of 350,000 tons). Products derived from algae and seaweed sell at high prices, mainly into Asian markets.

Markets and Supply Chains

The most comprehensive study on artisanal fisheries in Chile (an EU-financed analysis carried out by Exequiel González Poblete and others in 2013), suggests categorizing artisanal fisheries into pelagic species (small and medium as one category and large as another), demersal species, coastal and white fish, and benthic species.

In almost all of the 455 *caletas*, small-scale fishers directly sell their catch to some kind of intermediary buyer, at minimum hygiene standards, without ice, and lacking traceability. A major portion of the income generated at this "punto de primera venta" is based on fresh and frozen products that have not been manipulated to add any value. Most of this catch stays in the country (the percentage that stays in-country is shown in parentheses as follows): demersals (89 percent), white coastal fish (67 percent), large pelagics (65 percent), mollusks (39 percent) and crustaceans (12 percent).

The mollusks that are exported are mainly shipped to Asia (70 percent), EU (12 percent) and US (4 percent). Lobsters are exported almost exclusively to Asia (>90 percent); crabs to Asia (72 percent), USA (20 percent) and Australia (4 percent). (Note that industrial and artisanal catches are pooled in export data. These statistics suggest a very slight influence of core MSC-type consumer markets on major artisanal commodities.)

For the national market, a large number of *caletas* and a small number of middlemen—who coordinate prices among each other—has led to a monopsony where fishers become price-takers with very low negotiating powers. The individualistic nature of fishers makes things even more difficult for this atomized sector.

Fishers and Communities

There are only about 80,000 fishers in Chile, out of the country's total population of 17.6 million. Around 90 percent of these belong to the smallest segment of the sector, including collectors and fishers using vessels greater than twelve meters in length, representing the economically most marginalized and vulnerable subsector of fishers in Chile. Monthly income depends on main target species, meaning it is most lucrative for fishers who target finfish and crustaceans and least lucrative for those who focus on mollusks and algae. Although almost all artisanal fishers live at or above the national poverty line, the seasonal variability of incomes makes personal economic development extremely difficult.

All artisanal fishers must be registered in only one of fifteen regions in Chile, preventing fishers from migrating between areas. Between 20,000-25,000 artisanal fishers are furthermore associated to one of 405 *caletas* (vaguely translates to 'production units of fishing communities') along the coast, granting them access to benthic management areas (micro-TURF). These management areas represent only one percent of national landings but are an important source of income, mainly because of the Chilean abalone, also called "locos." The below table lists the number of fishers per region.

Table 1: Artisanal fishers registered per region in Chile

Region	Registered fishers
X	30,663
VIII	24,934
IV	8,204
XII	7,201
V	6,734
III	5,405
XI	4,626
II	4,398
IX	4,247
I	2,863
VII	2,797
XIV	2,590
XV	1,670
VI	1,337

It is interesting to note that country experts consistently highlight the individualistic nature of fishers in Chile. Although a large amount of the country's artisanal fishers are associated with a *caleta*, this association is often a means to the end of receiving fishing permits and there is little cooperative spirit observed.

Factors Favoring Work in Chile

Perhaps the most important factor favoring work in Chile is the country's longstanding and valuable experience with market-based mechanisms over the past twenty years, including transferable quota systems for the industrial sector and TURF-systems in coastal regions. These developments are generally seen as going in the right direction. Additional favorable factors include: a strong rule of law; compulsory management or recovery plans for fully or over-exploited stocks, respectively; solid and well-financed institutions; and a very respected and well-established academic community and a new wave of talent entering the country. (Chile has spent millions on scholarship programs over past years, and 2014/2015 will welcome the first wave of students coming back to the country with international masters and PhD titles.)

Constraints

The main drawback in Chile might be the atomized small-scale sector and the power of middlemen and processing plants that have "direct phone lines to SUBPESCA" (Subsecretariat of Fisheries). Additional unfavorable factors include:

- The individualistic nature of fishers; a certain "resistance" against change and against capacity building work as observed in the past;
- A significant decrease in resource abundance.

Potential Interventions

1. **Increase negotiating power of fishers**
   As mentioned, fishers in Chile have no power whatsoever to increase the price of the fish they sell. Middlemen dictate this price and add, in many cases, up to 80 percent of "value" between the fisherman and the processing plant. The high degree of atomization in the sector (450 vending points, plus individualist fishers) and financial dependence (pre-financed by middlemen or processing plants) makes it very difficult for fishers to obtain a higher price.

   An opportunity could include creating a comprehensive, integrated action plan, consisting of: i) a financing body granting cheap capital to fishers in return for compliance with clearly defining sustainability indicators (conditioning the interest rate of the loan to changes on the water), ii) increasing lateral communication and coordination between regional *caletas* (or *caletas* providing the same or substitutable products such as white/coastal fish), and iii) providing technical assistance and basic education on business and marketing. This could be linked to the now compulsory management and recovery groups for all major fish stocks in Chile that, for the first time, unite producers of shared stocks/species together to develop plans in a participatory manner, moderated by universities across Chile. This and other efforts requiring capital or technical assistance to artisanal fishers could leverage public funds that are planned to be allocated by the new legislation, which will establish a development institute of artisanal fisheries.

2. **Expand current TURF system to cover additional species**
   The driving factor behind the existence of the TURF system is the requirement for all *loco* sold to originate from a TURF with an approved management plan. One could substantially strengthen the economic rationale for TURFs by simply increasing the number of species that can only be harvested in an area with an approved local management plan. That could include algae or other benthic species, and could potentially involve a modification of the TURF unit to be larger scale or involve a collaboration of multiple caletas.

3. **Support local "farmers market initiatives"**
   Fishing communities have initiated several attempts to process and deliver their catch without paying a middleman. An opportunity would consist of supporting fishing communities in their efforts to "shorten" the supply chain through home delivery programs. TNC is working with a community in the XIVth region that successfully developed a processing and distribution center (*pesca en linea*). This type of community-based "farmers market" is an aspiration shared throughout Latin America but is probably most feasible in Chile due to the enabling political and bureaucratic conditions.

4. **Scale up traceability efforts**
   Export articles require a high degree of traceability (including verifiable quality and sustainability criteria), especially for Western markets such as the EU and the United States. Common supply chains cannot provide this degree of certainty in Chile. Shellcatch (a catch verification technology company in San Francisco) has started to provide this kind of traceability for three small-scale fisheries, reaching 300-400 fishers. One opportunity would consist of scaling up their efforts by co-funding outreach programs to potential communities and/or supporting Shellcatch or other emerging groups directly. This is a model that seems to be emerging in other countries in Latin America in the moment and has great momentum. In Chile, this approach is especially promising as the new legislation

will (if properly implemented) likely rebuild overfished stocks, playing into the cards of such traceability programs.

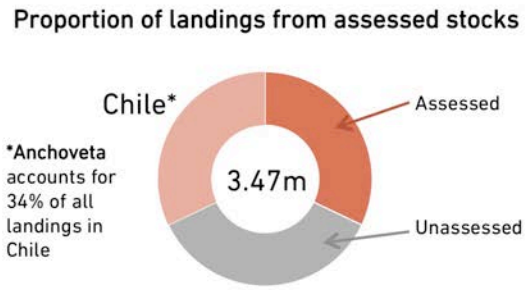
5. **Fund regional FIPs for Loco and Kelp and create "biodiversity credits"**
Chilean TURF-systems are the often-cited textbook examples of artisanal catch-share models that provide exclusive access to specific communities and require strict compliance with management plans that have been established in a participatory manner between communities, consulting biologists and the Servicio Nacional de Pesca (SERNAPESCA). TURFs in Chile were mainly established to control the *loco* fishery, which are the most economically important benthic species. Over past five years, however, the collection of kelp has grown considerably, due to rising export prices for derived products. As kelp is the main habitat for *loco* populations, this creates conflicts for the two highly valued export products. An opportunity exists in financing integrated kelp/*loco* FIPs. Single species FIPs are often criticized as short-sighted for not taking ecosystem dynamics into consideration. The kelp-*loco* example could be an attractive attempt to do this. Due to the recent increase in commercial interest in kelp, ecological interdependencies are only now being analyzed. Areas III, IV and X would be particularly interesting starting points, as both kelp and *loco* landings in these regions are very high.

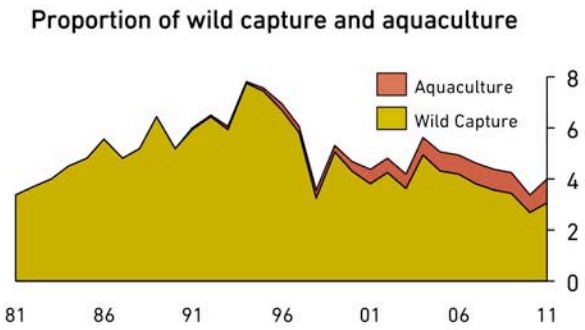
   Although not all TURFs are operative, they provide important biodiversity services in that they are de-facto no-take zones for non-target species. Increasing the economic gain from TURF systems would help this model to persist in the future. One option for implementing this approach includes biodiversity credits, which are currently being explored by Advanced Conservation Strategies (ACS), the Pontifica Universidad de Chile and Shellcatch. The basic premise of the credits is that *caletas* enter into contract with a certified broker who video monitors designated no-take areas and measures the relationship between no-take zones and biodiversity. Ideally, this should be commoditized into "credits" and generate demand. Potential buyers include industries with high environmental impacts (i.e., forestry, energy, oil/gas) that seek to voluntarily offset collateral damage, as well as consumers who are willing to pay a price premium for associated TURF-products.

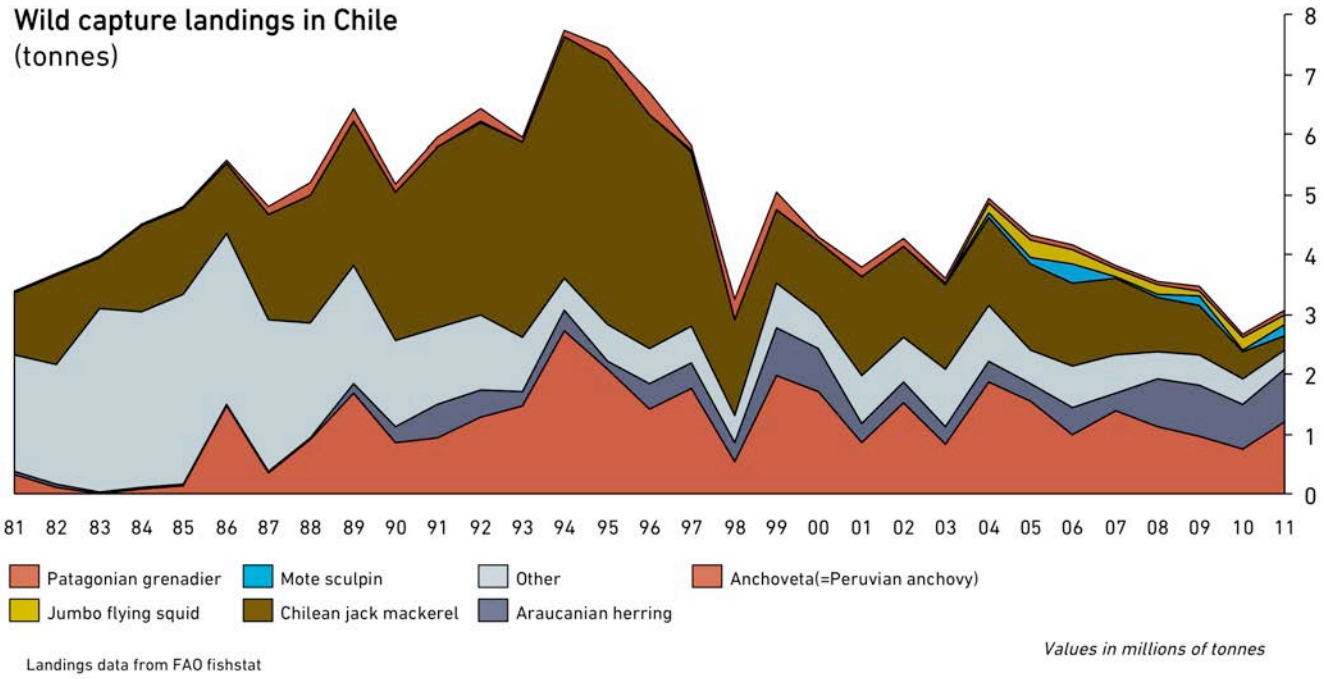
6. **Additional FIPs Artisanal/industrial**
Given the recently compulsory management and recovery plans in Chile, FIPs are generally a promising opportunity for important artisanal species. Except for benthic resources, however, almost all artisanal target species are shared stocks with the semi-industrial and industrial fleet, thereby requiring a coordinated approach with all fleets involved. Opportunities include the inshore (southern) hake fisheries, the idiosyncratic Jack mackerel fishery and the Humboldt squid fisheries. Beyond these, WWF will continue to focus on small pelagic species through the organization's Southern Cone Initiative.

Chile: Landings, Stock Status, and Trade-Related Data

Chilean landings have suffered from the collapse of the jack mackerel fishery; aquaculture has grown to a quarter of total seafood production.



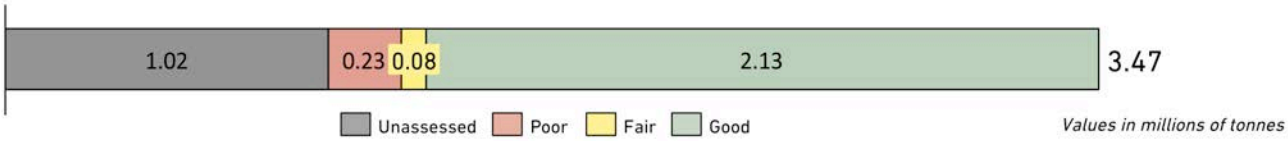




Landings data from FAO fishstat

Roughly two thirds of all Chilean stocks are in good condition; less than a third of total landings are attributed to unassessed stocks.

Proportion of wild capture landings by stock status

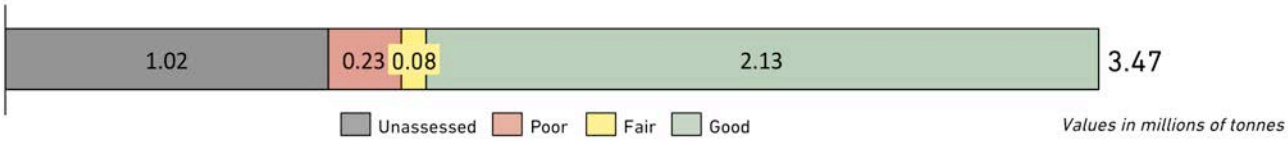


Stock status of Chilean stocks reported by Fish Source

Species	Biomass Status	TAC Compliance	Mortality Status	Overall Fishery Health Score	2011 Landings (tonnes)
Anchoveta (Chile/Peru stock)	Not Overfished But at or Below BMSY	High	F<Ftrp	A	989,000
Anchoveta (Chile regions III, IV)	Not Overfished But at or Below BMSY	High	F<Ftrp	A	55,000
Anchoveta (Chile regions V-X)	Overfished	High	F>Ftrp	D	63,230
Araucanian herring	Above BMSY	High	F<Ftrp	A	690,070
Blue squat lobster, Langostino amarillo	Above BMSY	High	Unknown	B	
Chilean jack mackerel	Above BMSY	High	F<Ftrp	A	223,390
Hoki, Patagonian grenadier	Overfished	High	F>Ftrp	D	48,030
Juan Fernandez rock lobster	Unknown	Unknown	Unknown	D	
Patagonian toothfish - South American	Overfished	High	F>Ftrp	D	2,280
South Pacific hake - Chilean	Overfished	High	F<Ftrp	C	34,250
Southern blue whiting - Chilean	Not Overfished But at or Below BMSY	High	F<Ftrp	A	9,420
Southern hake - Pacific Patagonian	Not Overfished But at or Below BMSY	Medium	F>Ftrp	C	20,410

Roughly two thirds of all Chilean stocks are in good condition; less than a third of total landings are attributed to unassessed stocks (cont.)

Proportion of wild capture landings by stock status



Stock status of Chilean stocks reported by FAO FIRMS database

Stock or species groups	State of Exploitation	Uncertainty	2011 Landings (tonnes)
Patagonian grenadier	Over-exploited	High	70,137
South Pacific hake	Over-exploited	Low	45,332*
Southern hake	Fully-exploited	High	20,909*
Patagonian toothfish (Pacific)	Fully-exploited	High	4,786*
Patagonian toothfish (Atlantic)	Fully-exploited	Medium	4,786*
Anchoveta(=Peruvian anchovy)	Fully-exploited	Low	1,191,376*
Araucanian herring	Fully-exploited	Medium	887,272*
Chilean jack mackerel	Over-exploited	Medium	247,295*
Chub mackerel	Fully-exploited	High	26,056*
Jumbo flying squid	Underexploited	High	163,495

**Also assessed by Fish Source*

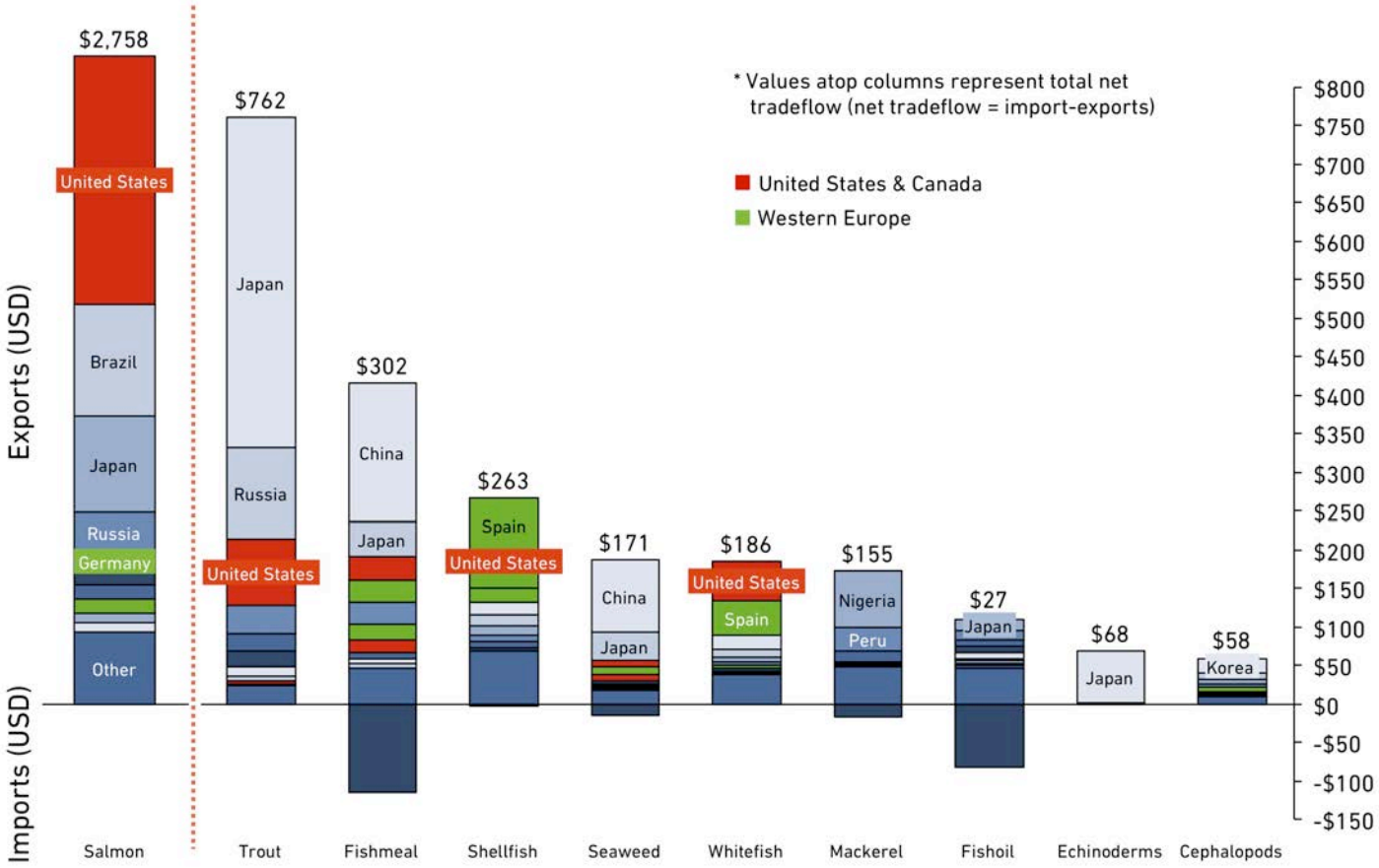
Academic estimates of unassessed stock health covers less that 1% of total Chilean landings.

Proportion of wild capture landings by stock status, including Costello et al. stock estimates

Costello et al. stock B/Bmsy estimates

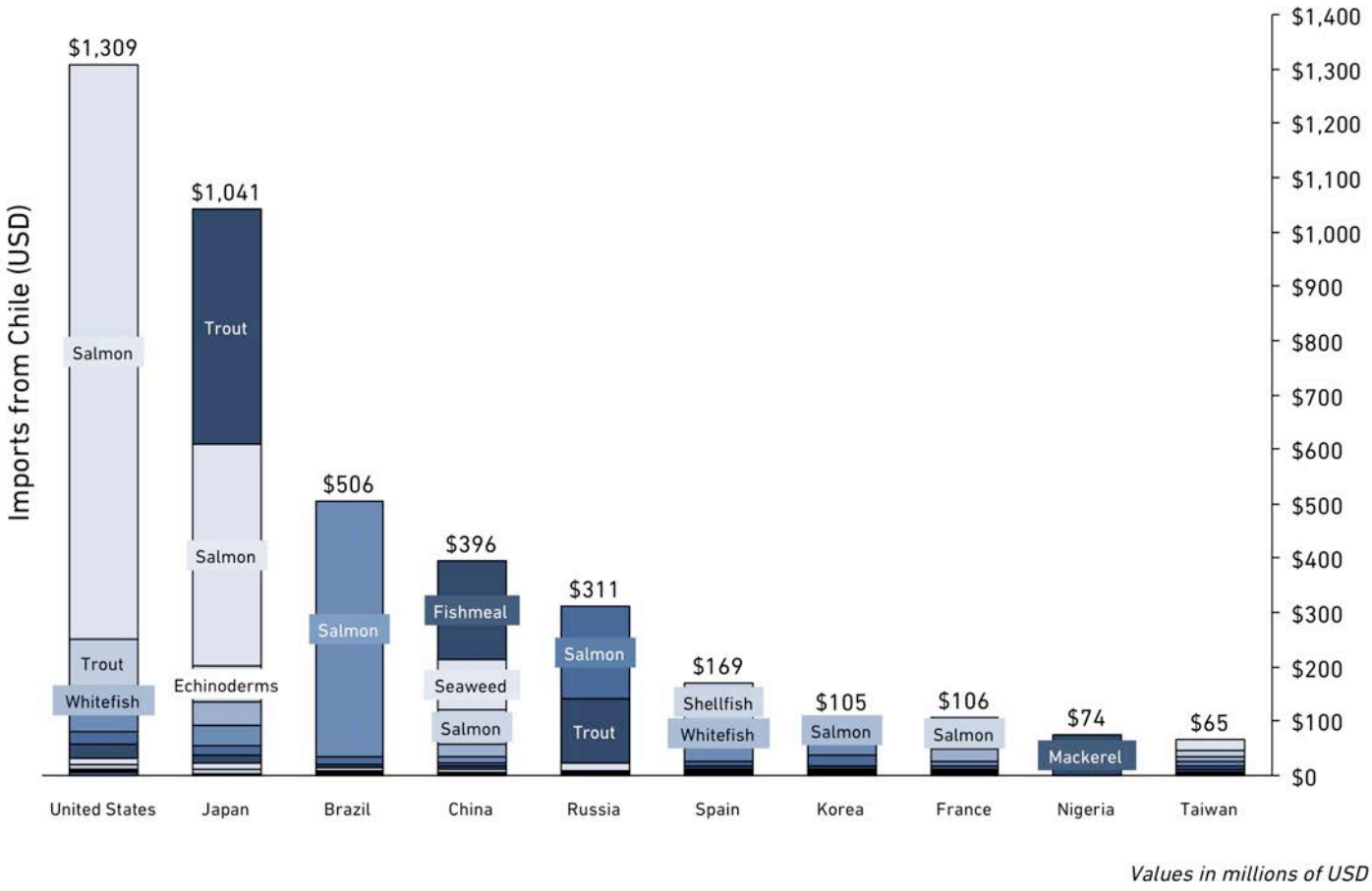
Common Name	Estimated B/ Bmsy	Confidence Interval		2011 Landings (Tonnes)	Totals (Tonnes)
		Lower	Upper		
Shortfin mako	0.14	0.02	1.06	334	9,254
Peruvian weakfish	0.17	0.02	1.40	4	
Blue shark	0.19	0.03	1.28	209	
Patagonian blennie	0.25	0.03	1.74	230	
South American pilchard	0.29	0.04	2.18	72	
Cabinza grunt	0.29	0.04	2.10	110	
Corvina drum	0.31	0.05	1.94	863	
Pacific sandperch	0.34	0.05	2.26	46	
Hapuku wreckfish	0.44	0.06	2.94	0	
Snoek	0.51	0.07	3.57	2,764	
Pink cusk-eel	0.69	0.10	4.40	2,863	
Red cusk-eel	0.72	0.11	4.86	855	
Black cusk-eel	0.75	0.11	4.68	323	
Plownose chimaera	0.78	0.11	5.47	581	
Pacific menhaden	1.84	0.46	9.10	10,437	10,535
Peruvian morwong	2.30	0.56	11.69	98	

Farmed salmon and trout are Chile's most exported commodities; fishmeal, whitefish, and mackerel are important wild capture exports.



Values in millions of USD

Salmon and trout are the top commodities imported by Chile's biggest trade partners; China is a major importer of Chilean fishmeal.



COUNTRY OPPORTUNITY SUMMARIES: PERU

Overview

The upwelling system off Peru's coast provides for the most productive marine ecosystem in the world. As in most cases of high nutrient availability, this productivity is bundled into few, extremely abundant small pelagic species: in this case, the Peruvian anchoveta. This species is the most valuable resource in Peruvian waters, representing the largest single stock fishery globally and comprising over 90 percent of Peru's annual landings. As a result, virtually all fisheries-related work by the government, multilaterals, and NGOs in recent decades have focused on the promotion, efficiency, and control of this fishery.

Though dwarfed by the sheer volume of the mainly industrial anchoveta fishery, Peru's small-scale sector is as diverse and captivating as the small-scale fisheries in any other Latin American country, featuring almost 200 species distributed along the entire length of the Peruvian coast. While Peru has an astonishingly comprehensive legislation for small-scale fisheries, implementation of laws and decrees is virtually nonexistent.

Despite a large variety of possible target species, only a few seafood commodities dominate the relevant national supply chains. Further, export volumes of products earmarked for human consumption remain relatively small, mainly as a result of supply inconsistency and hygiene standards.

Rockefeller work in Peru has the potential to make a proportionally high impact, almost irrespective of its particular focus. Part of the reason is that philanthropic work has been extremely scarce in the country and has mainly focused on the industrial anchoveta fishery. This has left small-scale fisheries as low-hanging fruit and a "hidden treasure" in terms of engagement opportunities, although several interesting possibilities (such as clearly assigned landing sites) seem to promise a decent degree of feasibility for FIP-type work and traceability efforts. Another reason is that the current government understands challenges and opportunities around small-scale fisheries, is aligned with Rockefeller objectives, and is receptive to collaboration. In addition, a relatively low coastal population density and pronounced market channels would favor work in Peru. Main constraints include the lack of an overarching philanthropic precedent, in that no similar efforts exist (current and previous) to gauge the ease of working in the country, and the lack of comprehensive small-scale fisheries legislation.

Governance

Fisheries in Peru fall under the mandate of PRODUCE, the ministry for production. Although fisheries regulation is comparatively resistant to industrial influence in terms of quota-setting, the ministry has a tradition of promoting the productivity of its subsectors, rather than focusing on environmental concerns. As a result, the main focus of the Vice Ministry of Fisheries in the past decade has been directed towards infrastructure improvements to ease extractive processes and less towards ecosystem-based management of marine resources.

Sustainable harvest hence is a relatively recent vocabulary in the ministry. In fact, only a dozen fisheries are managed under so-called *reglamentos de ordenamiento pesquero* (fisheries management plans- ROPs) that regulate stock exploitation via effort restrictions, TACs (Total allowable catch), permissible gears, fishing seasons, fishing areas, and/or minimum catch size. Of these ROPs, only a few are relevant for the small-scale sector. For remaining species, fishing seasons or minimum catch size are the main instruments of management.

Where regulations exist on paper, they have been neither implemented nor enforced. This is due partly to the high costs of implementation and partly to political calculations, as regional governments are tasked with enforcement and fear voters' discontent. In sum, there is not one small-scale fishery in Peru that could be called properly managed. Adding to this, apart from recently established zoning regimes for the anchoveta fishery, fishers are allowed to migrate and fish along the entire coast, making sustainability efforts difficult, especially when they include exclusive access.

Notwithstanding, noticeable steps have been taken in the recent past to confront this seemingly unfavorable situation. Most significantly, six specialized general directorates were established in 2012 as part of the Vice Ministry of Fisheries that underline the importance of control and enforcement, and emphasize the political dedication of taking environmental concerns into consideration. Also, decentralized institutions such as the marine institute IMARPE (Instituto del Mar Peru), the fisheries sanitary service SANIPES (Servicio Nacional de Sanidad Pesquera), and the national fisheries development fund FONDEPES (Fondo Nacional de Desarollo Pesquero) work closely with the Vice Ministry to better combine the aspirations of fisheries development with environmental and hygiene standards and to advance the commercial potential of coastal fisheries. Finally, in our conversations with the minister of PRODUCE and his team, it became evident that their objectives are very much in line with the general objectives of the Rockefeller Foundation and that work in Peru would, if coordinated with the current ministry, benefit from relevant political patronage.

Key Fisheries and Commodities

In terms of volume, anchoveta, and hake (semi-industrial) and squid (artisanal) contribute 70 percent of Peruvian small-scale landings; this figure does not include the significant portion of illegally caught anchoveta. Beyond these three species, however, local communities highly depend on a number of other species including bivalves (especially "concha abanica"), finfish for fresh consumption, and crustaceans. In addition, macroalgae have become increasingly important in the southern part of the country (as is the case in Northern Chile).

Markets and Supply Chains

Over 70 percent of artisanal catches in Peru are landed in one of 48 so-called *DPAs ("landing sites")*, mostly consisting of robust landing sites and concrete-rich infrastructure where products are washed and loaded into refrigerated trucks. These DPAs are the heart of onshore artisanal fisheries operations. Fisher syndicates have their offices here, middlemen convene there to buy their fish, and governmental inspectors occasionally show up at these locations to sample minimum sizes of catch. (A twenty percent below minimum size is usually accepted.)

Departing from DPAs on a daily basis, trucks either supply processing plants (as in the case of the giant squid *Pota* and the anchoveta) or deliver their product to fresh fish markets across the country for consumption. Fresh fish markets exist across the country but most of the catch goes to two major markets in Lima and the big fish markets in the northern part of the country, where fish consumption is highest. This means that the great majority of fisheries landings in terms of both species involved and fishers employed follow the same supply channel across the country: landed in DPAs, loaded on trucks, sold at open markets. Although a few supermarkets and restaurants are directly supplied, the great majority of all fish and seafood is bought on these markets.

This distribution model puts a considerable amount of bargaining power into the hands of middlemen. Not only do they pre-finance most small-scale operations, thereby binding fishers to them at low ex-vessel prices. The middlemen's far greater knowledge of market prices and the high volatility of those prices, as well as the social capital of the middlemen's networks with buyers, further increase their basis for negotiation with fishers. Adding to this, middlemen often take on socially important roles, providing healthcare to fishers if needed, as well as other benefits.

The domestic market is very unselective for quality, fish size, or any other sustainability indicator. Although demand for high-quality products and traceability is growing in Peru, so is demand for low-cost, low-quality products.

Fishers and Communities

Factors such as the target commodity, the scale of operation, role in the fishing process, access to markets, and main fishing area, among others, have a significant influence on the economic profile and decision-making power of Peruvian "small-scale" fishers. [54]

Most importantly, perhaps, is the role that a fisherman plays in the process. The *armadores* (vessel owners) are at the top of the food chain. They sometimes own various vessels, which more often than not stay on shore (especially in the case of the very dominant semi-artisanal fleet), decide about target species and gears used, and take care of the business side of the fishing operation. Below them comes the fishing crew (two or three in small vessels, six to ten

[54] Although women play no or a very marginal role in the actual fishing operations, they do take on important roles in commercialization and post-harvest operations.

in larger vessels). These individuals have no official contracts, are relatively substitutable and receive "parts" of the landed value, incentivizing them to fish as much as possible. When the fish is landed, stevedores unload vessels and bring the product into the DPA structures where it is washed, eviscerated, and loaded onto trucks.

Depending on the fishery, operations can include four to five steps before the fish is even loaded into refrigerated trucks. In terms of influence on fishing operations on the water, however, the most important actors are the vessel owners.

Factors Favoring Work in Peru

The landscape of actors in Peru is relatively small and interconnected, making initiatives around small-scale fisheries reform practical. After a ten-day site visit including interviews with 30-40 groups, we felt confident we understood the challenges and opportunities in Peru fairly well. Furthermore, several important factors support a potential engagement in the country:

- The government is aligned with Rockefeller's objectives and open to collaboration with philanthropy.
- The coastal population is not desperately poor, nor is the coast overpopulated.
- Fisheries science in Peru is unaffected by political influence.
- Countrywide, 48 very similar DPAs (landing sites) bundle 70 percent of small-scale landings and can be used as units to scale up efforts.
- Last, but not least, very few foundations have set foot in Peru, thus providing an opportunity for Rockefeller to make a distinctive impact.

Constraints

As a country with relatively little history of philanthropic engagement in the field of small-scale fisheries, it is difficult to estimate the likelihood for success (or the risk) of a program in Peru. In addition, several other factors might work against a program in the country:

- Despite recent changes in the Vice Ministry, there is no comprehensive legislation in place for the small-scale sector, let alone an implementation of existing policies.
- A large part of the artisanal fleet remains informal, which could complicate the implementation of market-based approaches.
- IMARPE has traditionally spent most resources on anchoveta and very little scientific information actually exists on most target species.
- Lastly, little leverage can be expected from other philanthropic funders.

Potential Interventions

1. **Anchoveta for human consumption**
   The artisanal part of the anchoveta fishery is earmarked for human consumption only and is largely unrestricted in terms of catch volumes. However, human consumption markets for anchoveta are very limited, whereas rising fishmeal and fish oil prices make it increasingly tempting for small-scale fishers to sell anchoveta illegally to reduction plants.

   A promising initiative would be to support Compania Americana de Conservas in their efforts to create markets for human consumption of anchoveta and develop alternative uses for residues of canned fish. Pablo Echevarria, general manager of this Spanish canning company, is a charismatic and visionary leader who has connected actors along the entire value chain to scale up this model. While designed as a business model, Rockefeller could support this effort through technical assistance. The Centre for Environmental Sustainability (CSA) at Cayetano Heredia University in Peru would be one logical partner.

2. **Gastronomic boom**
   Lima is considered the Paris of Latin America in terms of culinary sophistication and its gastronomic boom is based almost entirely on fisheries products. There are 11,000 ceviche restaurants in Lima alone and Peruvians are enormously proud of their cuisine. Famous chefs like Gaston Acurio are highly respected and one interviewee said that if this chef ran for president, people would probably vote for him. The elite of the culinary community have for several years now been promoting sustainability and traceability. Several promising initiatives are conceivable:

   - Support APEGA (Peruvian gastronomic association) to develop and finance a media awareness program. It is feasible to leverage the media's high interest in featuring representatives of the gastronomic community, which means a collaboration with APEGA may require relatively little financial support.

   - The lack of traceability is a significant and persistent problem for fisheries markets in Peru, and few have tried to do anything about it. Allin Kausay (lead by Jessica Pino) and Pro Delphinus are two groups that have started to advocate for traceability. Supporting these efforts could increase traceability and thereby encourage fisher cooperatives to comply with quality and sustainability criteria.

3. **Exclusive access to benthic resources**
   As stock health is worsening, fishing communities are increasingly interested in complementing incomes with aquaculture projects. Under the name of "restocking," this is legally possible and might be a development path that the government cannot and does not want to oppose. However, it bears considerable environmental risks.

   One opportunity might be to drive a development similar to the AMERB-structures in Chile, whereby exclusive access to coastal areas is granted to nearby fishing communities while fishing communities are required to sustainably manage their (benthic) resources. TNC would be a logical partner, as would ESCAES, a local NGO closely working with pilot projects in Sechura Bay.

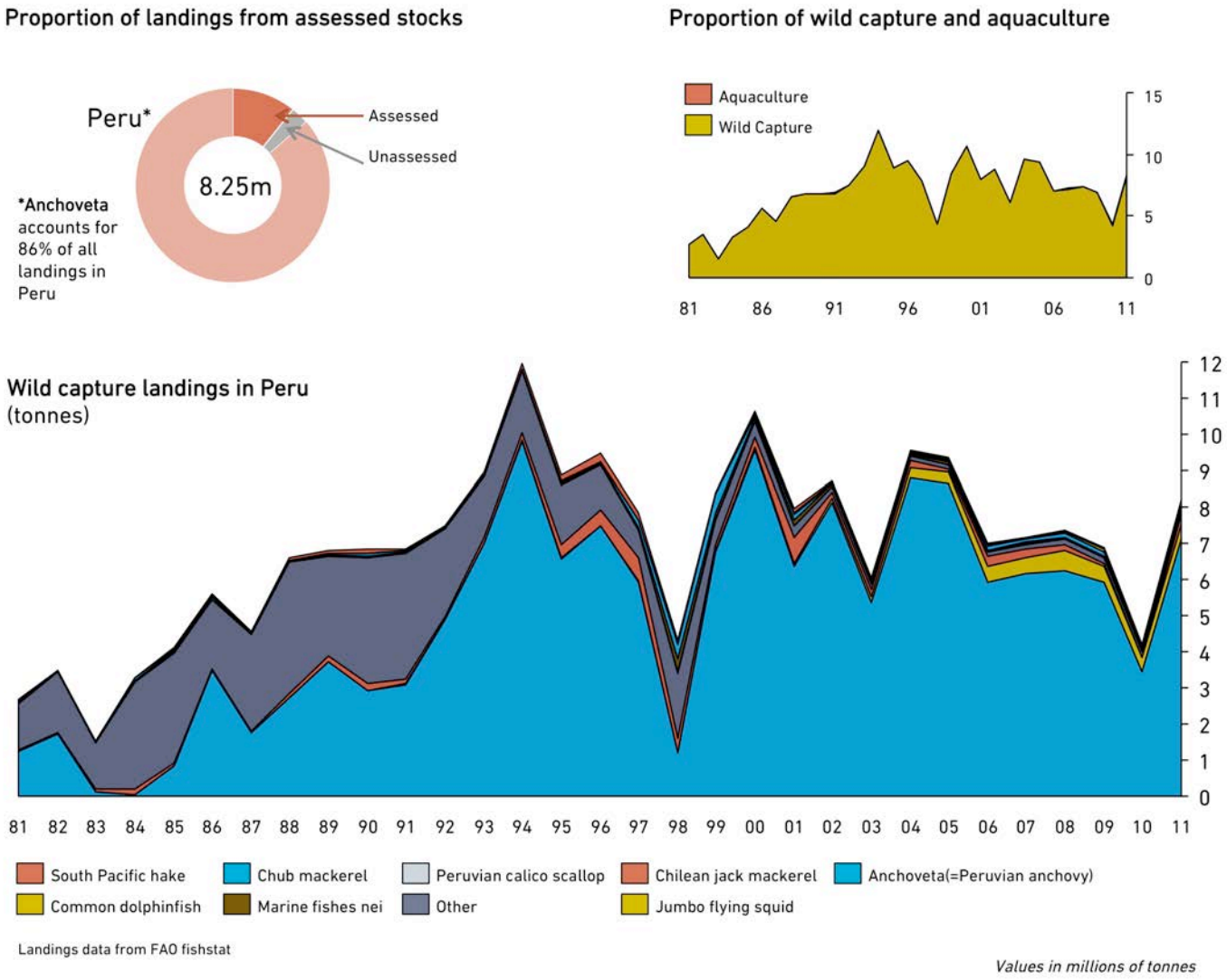
4. **FIP projects and product quality enhancement**
   Several stocks offer promising opportunities for FIP-like models. These include the mahi mahi fishery in Pucusana (already under a WWF FIP), the pota (giant squid) fishery in the north (currently explored by CeDePesca, though there is limited information about their work), and the hand line merluza fishery in El Ñuro. Two of the main challenges for export-oriented initiatives in Peru continue to be: (a) the informal nature of most fishers (making legal commercialization difficult), and (b) more importantly, their inability to meet the sanitary and phytosanitary standards required by importers. Only two of the 48 DPAs currently conform to importers' hygiene standards.

5. **Improving asymmetric relationship between fishers and middlemen**
   One of the recurring themes in our conversations with fishers or groups advocating for them was the ostensible exploitation of fishers by middlemen. It is very difficult to verify to what extent fishers are exploited by middlemen, and, more importantly, it seems very difficult to change this business model. Clearly, middlemen possess a completely different set of experiences, skills, and capital (both working capital and social capital) than fishers, which means that efforts to replace them with fishers themselves would certainly lead to a loss in the overall efficiency of the supply chain and probably to a loss of profit for the fishers. Although the current model is efficient, it may not be the fairest. This is largely the case because of: (a) the asymmetry of information held by each party, (b) the dependence of fishers on being pre-financed by middlemen, and (c) the imperfect competition between middlemen. Opportunities exist to address these issues:

   - Fixing the market failure of asymmetric information and imperfect competition by increasing transparency around prices, while educating fishers and granting access to financial assistance could decrease their dependence on middlemen. All three steps have been attempted by individual groups but have never been scaled up. (PRODUCE provides information on prices per kilogram on a daily basis, but access to prices is of limited use if dependence remains.)

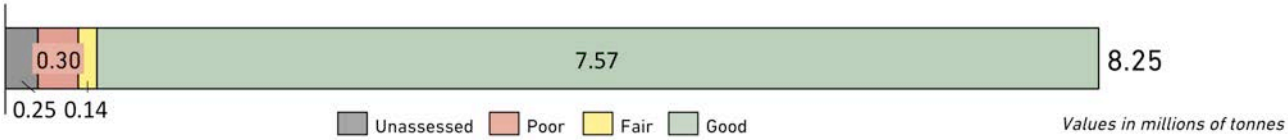
Peru: Landings, Stock Status, and Trade-Related Data

86% of Peruvian landings are anchoveta, with squid, jack mackerel, and hake comprising most of remaining landings.



97% of Peruvian landings' stocks have been assessed, mostly due to anchoveta, which can fluctuate between good and poor health yearly.

Proportion of wild capture landings by stock status



Stock status of Peruvian stocks reported by Fish Source

Species	Biomass Status	TAC Compliance	Mortality Status	Overall Fishery Health Score	2011 Landings (tonnes)
Anchoveta (Chile/Peru)	Not Overfished But at or Below BMSY	High	F<Ftrp	A	7,125,244
Anchoveta (N. Peru)	Above BMSY	High	F=Ftrp	A	
Peruvian hake	Not Overfished But at or Below BMSY	Medium	F>Ftrp	B	37,645
Jumbo flying squid	Above BMSY	High	Unknown	A	404,730
Peruvian calico scallop, Chilean-Peruvian Scallop	Unknown	Medium	Unknown	C	93,050
Mahi-mahi, common dolphinfish	Not Overfished But at or Below BMSY	Low	Unknown	D	43,688

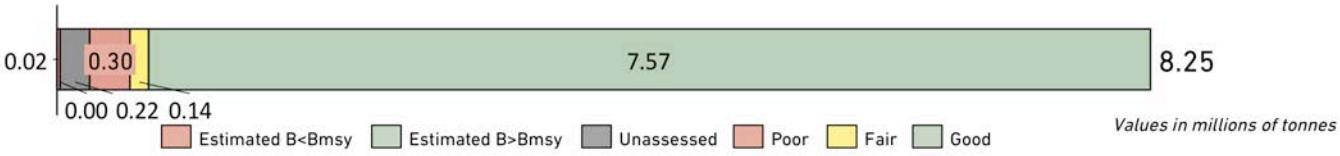
Stock status of Peruvian stocks reported by FAO FIRMS database

Stock or species groups	State of Exploitation	Uncertainty	2011 Landings (tonnes)
South Pacific hake	Over-exploited	Low	37,645*
Anchoveta(=Peruvian anchovy)	Fully-exploited	Low	7,125,244*
Chilean jack mackerel	Over-exploited	Medium	257,240
Chub mackerel	Fully-exploited	High	46,946
Jumbo flying squid	Underexploited	High	404,730*

**Also assessed by Fish Source*

Academic estimates of unassessed stock health covers less that 1% of total Peruvian landings.

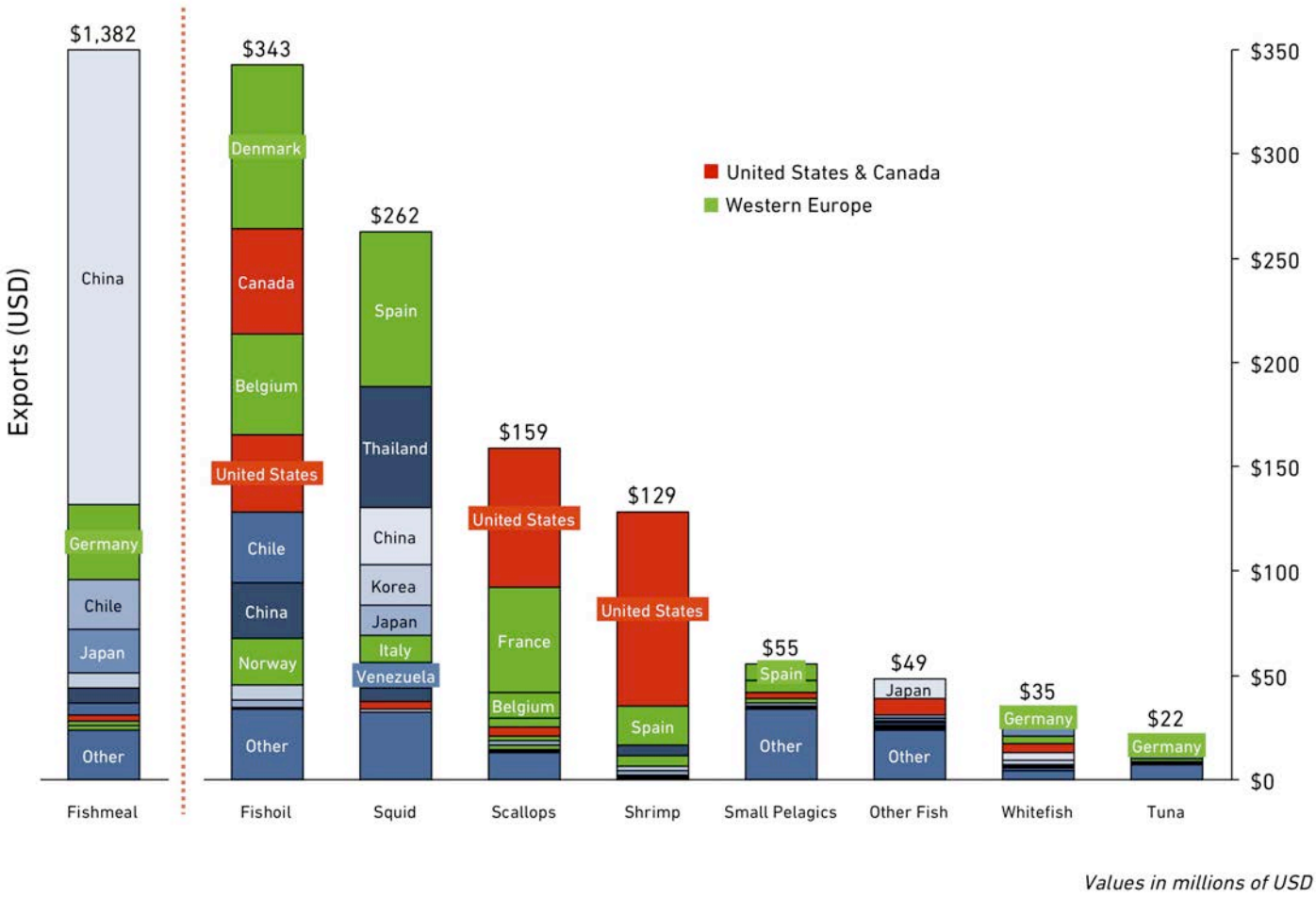
Proportion of wild capture landings by stock status



Costello et al. stock B/Bmsy estimates

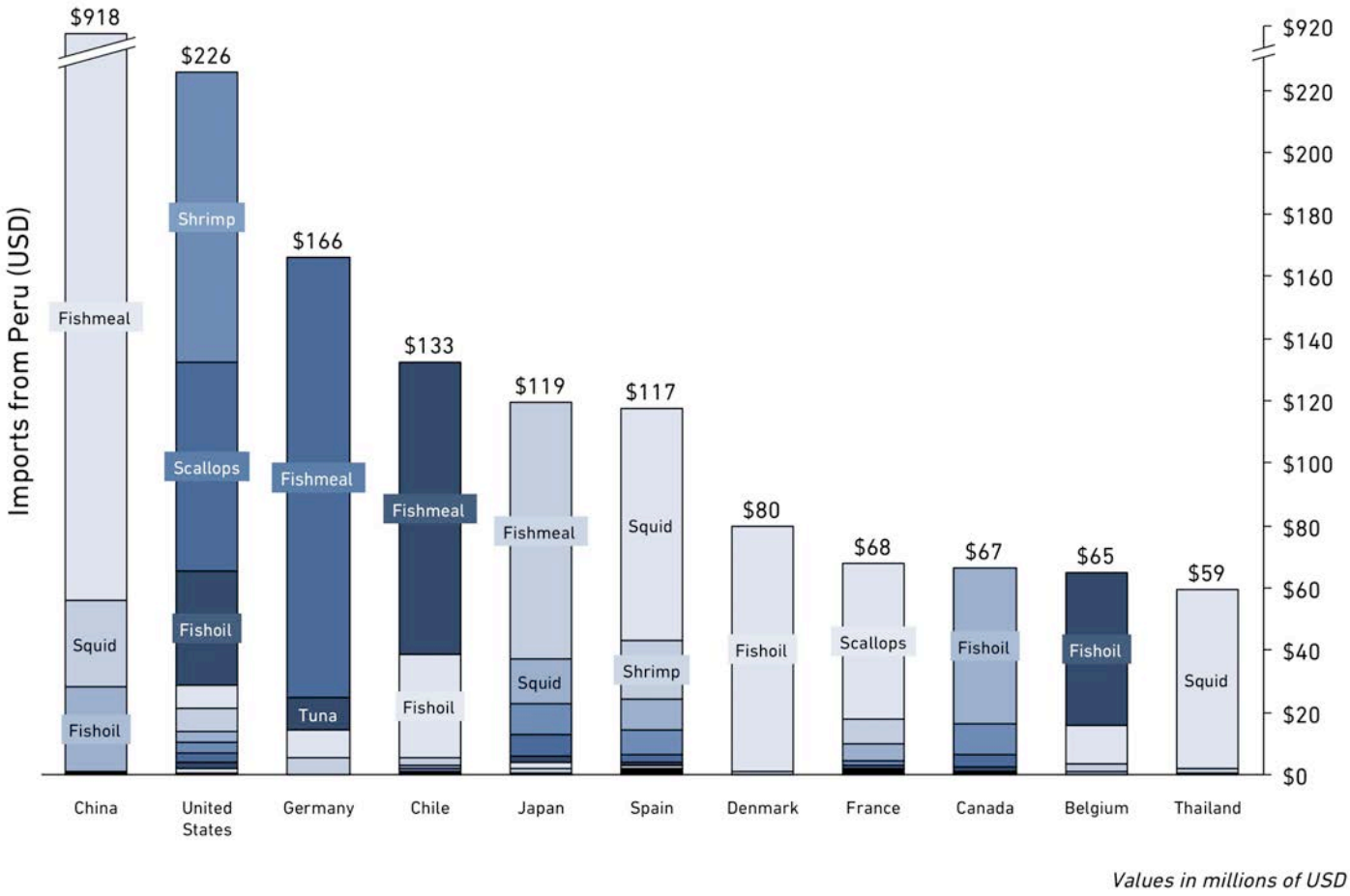
Common Name	Estimated B/ Bmsy	Confidence Interval		2011 Landings (Tonnes)	Total Landings (Tonnes)
		Lower	Upper		
Peruvian weakfish	0.25	0.03	1.85	4,323	21,233
Peruvian banded croaker	0.26	0.04	1.61	1,207	
South American pilchard	0.31	0.05	2.34	63	
Peruvian rock seabass	0.35	0.05	2.26	1,047	
Pacific angelshark	0.38	0.05	2.42	23	
Corvina drum	0.40	0.06	2.82	9,049	
Pacific guitarfish	0.63	0.10	4.65	85	
Cabinza grunt	0.63	0.11	4.47	3,657	
Pacific menhaden	0.70	0.11	4.36	1,779	
Peruvian morwong	2.16	0.51	9.97	251	251

Squid, scallop, and shrimp are Peru's most significant export commodities, outside of fishmeal and fish oil.



Values in millions of USD

China, U.S. and Spain are Peru's biggest markets, but France and Thailand's imports are concentrated on a single commodity.



COUNTRY OPPORTUNITY SUMMARIES: BRAZIL

Overview

Brazilian waters are simply not very productive. Although some pelagic species thrive in the south and southeast of the country, and well offshore, most of the landings are low volume coastal fisheries, unattractive for industrial-type fisheries. As a result, around 70 percent of national fisheries landings are made up of an extremely heterogeneous artisanal fleet, with a large majority of fishers punting through lagoons on wooden canoes, sailing along windy coasts setting lobster traps or wading through knee deep mangrove mud to catch crabs with their bare hands.

Possibly because of this low productivity (only about half a million tons of annual marine artisanal catch) and the consequential artisanal nature of fisheries, the number of fisheries in Brazil is considerable as compared to other Latin American countries. An estimated 500,000 to one million fishers roam the 8,500 kilometer long coast, and almost as many are dedicated to inland freshwater fisheries. This is more than twice the number of artisanal fishers found in Chile, Peru and Mexico combined, and in part represents fishers of extreme poverty.

While some emblematic crustaceans are of significant importance as seasonal sources of income (lobsters, mangrove crabs, shrimps), a long list of finfish species represent the most important source of income to most fishers.

A growing domestic market and export commodities fit for high-end international consumer markets make FIP-type projects an interesting opportunity. While 22 marine extractive reserves (RESEX) would serve as ideal units to scale up such efforts, many of them are poorly functional and lack the political dedication, especially on a federal level. Beyond FIPs, several very interesting opportunities exist to unlock and leverage public and private capital for improvements in fisheries management and associated value chains.

In many respects, Brazil would be an ideal country for Rockefeller's objectives. This relates to a high number of fishers, a competent local civil society community and a general sense of crisis in the country's fisheries, an element seen as an important ingredient for change in Brazil. Furthermore, Rockefeller work in Brazil could complement the recent and very important efforts and intentions of Rare (community-work) and Oceana (policy work). Distances, costs, corruption, bureaucracy and a culture of not finishing projects to completion are serious constraints.

Governance

Brazilian fisheries have been plagued, for many years, by an institutional dichotomy between the environmental ministry (IBAMA) and changing versions of ministries interested mainly in the development of the fishing sector. Today, IBAMA shares responsibilities with the ministry of fisheries and aquaculture (MPA). The political struggle between these two ministries has resulted in a significant impairment of the government capacity to manage the sector.

This struggle is emblematic for a highly bureaucratized political landscape. Brazil features over 40 ministries that have often emerged as a sign of gratitude from "above" to groups supporting the cause of the current government. By the account of various observers, the ministry of fisheries was given to the Evangelical Christians. On a federal level, their ability to drive a well overdue reform remains so mediocre that one interviewee said that the fisheries crisis would be solved by scrapping this ministry altogether. On a state- and municipal level, few examples of "good governance" can be observed; such efforts however, are made difficult by administrative and political conflicts between the different levels of responsibility. One of the seemingly unsolvable issues in this context also includes the high turnover rate in the ministry on both federal and state levels that makes long-lasting projects impossible and has generated an astounding amount of well-intended but half-finished and badly thought-through projects that have swallowed millions and left observers shaking their head in frustration.

IBAMA, the enforcement arm of the fishing law, has smartly appointed offices, is well-equipped and is theoretically suited to enforce policies and laws. However, the mere length of the Brazilian coast line and the dispersion of landing sites (everywhere on the beach) make enforcement virtually impossible. Within protected areas, including extractive reserves, the Instituto Chico Mendes de Conservação da Biodiversidade (ICMBIU) is responsible for surveillance and control but even there fails to properly enforce management policies.

Given this context, it is easier to understand the almost complete lack of fisheries legislation and management for the artisanal sector. Beyond a handful of poorly enforced seasonal bans, coastal fisheries in Brazil, at least outside of well-functioning RESEX areas, are de-facto open access regimes. This is made even more difficult with the entire dismantling of the Brazilian fisheries statistics program in recent years, without which no management initiative can be properly undertaken.

Despite the very low priority of fisheries in the agenda of relevant decision makers, the Brazilian state features socially interesting programs that are of high relevance to the fishing population. These include a program allowing fishers to sell fish at competitive prices to the state (for school lunches and charity) and a policy of minimum prices per agricultural product. Both are very difficult to profit from, due mainly to bureaucratic hindrances, and will be mentioned again in the opportunities section.

Key Fisheries and Commodities

Stripping those species from the equation that are mainly targeted by the industrial sector (sardine, corvina, bonito, pesca amarela and few others), Brazilian fisheries are based on approximately 100 finfish species (none of which is really dominant in the catch), a dozen crustaceans (mainly shrimp, crabs and lobsters) and a dozen mollusk species, the latter mainly sourced from mariculture. While crustacean species are targeted individually, finfish are mostly landed in multi-species fisheries where different gears can be used during a single fishing trip. As ecological settings vary greatly along the seemingly endless coast of Brazil, fisheries techniques vary as well. As a general rule one can say that semi-industrial and industrial fisheries dominate in the more developed south while fisheries become more and more artisanal towards the north.

Markets and Supply Chains

The only artisanal export commodity to speak of, in terms of value, is the rock lobster. This valuable species represents trade flows worth $60 million per year and is shipped mainly to the US (80 percent). Export licenses of rock lobsters are restricted to a few dozen processing plants. Although lobster fishing takes place along the entire coast of Brazil (not so much in south and southeast), most export is processed in the state of Cearà. Processing/exporting plants in Cearà therefore represent an important bottle neck for any fishing improvement of this species.

The great majority of artisanal catch, however, is landed at small ports with poor infrastructure or along the thousands of miles of uncontrollable beaches. Neither fishing vessels nor landing sites live up to basic hygiene standards and products mostly end up in local and national markets. Due to scattered landing sites, low catch volumes and long distances to main consumer markets, it is not a rarity for four or five middlemen to handle a fish before it reaches the end consumer.

Although seafood imports and aquaculture production for domestic consumption are on the rise, their combined supply does not keep up with the vacuum created by a quickly rising domestic demand for fisheries products (growing by around five percent per year). This creates more pressure on already stressed ecosystems but can also be regarded as an opportunity for the development of sustainable domestic markets. Importantly, however, as opposed to all other Latin American countries in this review, coastal families often depend on their catches as an important source of protein and are likely to be negatively affected by increased commodity prices.

Fishers and Communities

The official definition states that industrial fishing is based on catch quotas and artisanal fishing is not. By this definition, over half a million registered Brazilian fishers fall into the artisanal category. They are extremely diverse, ranging from semi-industrial sardine fleets in the south to subsistence mangrove crab collectors in the north of the country. Across the country, fishers are organized into fishing “colonies,” a historic remnant of extended surveillance units for the

Navy. These colonies are instrumental for the distribution of benefits from the government (especially the no-season compensation fees *dafeso*) but have, in many occasions turned into powerful, politicized and corrupt organizations that do not represent fishers at all. As a result, alternative movements have emerged over past years, to counter colonies and to coordinate fishers' interests. These movements are on the rise, are well-organized, and have in some cases succeeded in being accepted as legally comparable to colonies. Important distinctions in comparison to other Latin American countries include that women are of paramount importance in all segments of the supply chain (especially in the labor-intense crab fishery) and that a large part of fisher folks depend on their catch for subsistence.

Factors Favoring Work in Brazil

One main factor favoring work in Brazil is the high number of fishers that could be affected by scaling up relatively simple models such as the RESEX model. Fishers are highly dependent on their catch as a source of both protein and income, making it a good fit as a focus country, given Rockefeller's focus. In addition, several important factors apply:

- Large public and private funds that could be leveraged
- Recent attention by Rare and Oceana on Brazil (surrounding communities and policy-oriented work, respectively)
- A well-connected and engaged civil society across the country: this includes the RESEX movement that can be used as an ideal platform to scale up simple models, a strong group of academics and governmental groups (Instituto Chico Mendes, IBAMA, Joaquim Nabuco Foundation and others), as well as NGOs
- A strong and recently developed sense of crisis in the country's fisheries

Constraints

Some of the factors favoring work in Brazil also are a source of concern, like the fact that Brazil is enormous. The number of fishers landing their catch at any point along the beach makes management exceedingly difficult. Even if local efforts are feasible, scaling them up will always be a challenge. Other constraints include:

- A highly corrupt and bureaucratic policy environment
- A culture of starting big projects but rarely following them through to the end
- Long distances and bad infrastructure, especially in the north and northeast, making NGO-type work very expensive
- Apart from crustaceans, no fisheries-specific interventions that would affect a significant amount of fishers

Potential interventions

1. **Access compensation payments of ecologically harmful industries**
   All Brazilian industries whose operations are potentially harmful to the environment must make compensation payments worth four percent of their investment in order to get licensed. These include the oil industry, mining and logging companies, shrimp farms and several others. By law, these compensation payments must benefit the management of protected areas, both marine and terrestrial. Although this money (hundreds of millions of dollars), is available in theory, there is currently no good mechanism to access and distribute it due to ineffective bureaucracy. The reasons are that these funds cannot be used to pay allocation schemes and that the government does not consider it a high enough priority to fund these schemes. One opportunity would consist of funding a solid mechanism, trusted by all stakeholders, to access and allocate these funds. One option would be to support the ongoing efforts of Conservation International (CI), National Fund for Biodiversity (FUNBIO) and ICMBIU to create such a mechanism.

2. **Unlock the "PAA" government funds securing high prices of fish to fishers**
   Every artisanal fisherman in the country (except for those who target high-value species like lobster) is allowed to sell $7,500 thousand worth of catch per year to governmental programs (earmarked for charity and school lunches). Government pays two to three times the price paid by middlemen. Problem: Requires sanitary licenses and a lot of paper work. Only one freshwater fishery has managed to access this money until now. One opportunity would consist of supporting fishing communities to access this money by assisting with technical advice (bureaucracy) and infrastructure (sanitary licenses). This is a model that is perfectly suited to be scaled up and would unlock an additional revenue (beyond what fishers would get selling to middlemen) of around $4,000 per fisherman. A good starting point would be well-working marine RESEXs such as Canavieiras in Southern Bahia and Araruama and Saquarema Lagoons in the State of Rio.

3. **Implement minimum price/commodity policy for fisheries products**
   Federal policies exist to regulate minimum prices of agricultural and fisheries products. This has been implemented for several agriculture products but has never been used in fisheries products. One opportunity could consist of implementing this policy for specific fisheries products that are associated to vulnerable producers, such as mangrove crabs. This could have enormous value to fishers.

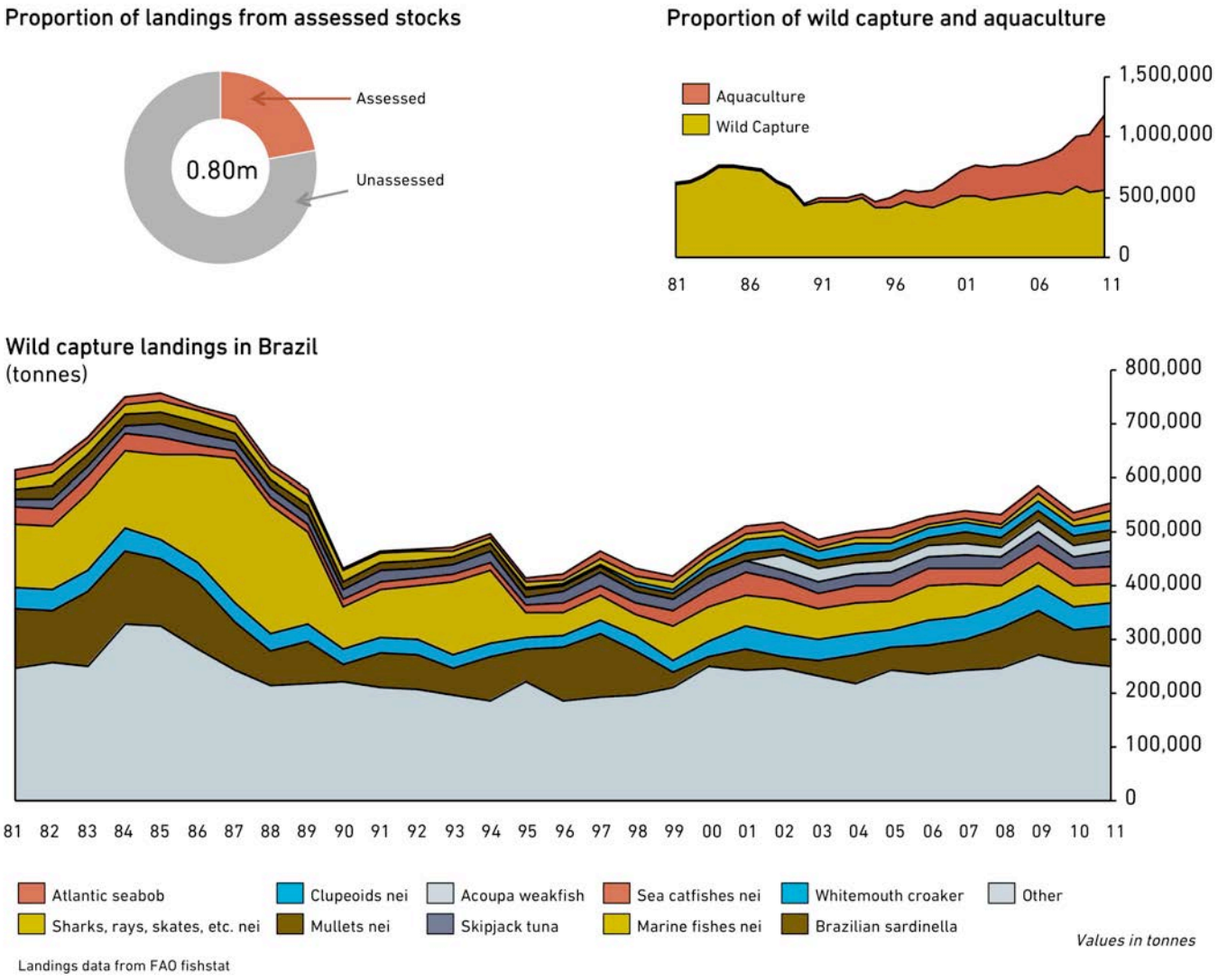
4. **RESEX interventions**
   RESEX areas are not particularly important as conservation units but relevant as units to oppose real estate speculation and industry development in nearshore areas. Beyond 22 existing extractive reserves, 154 communities have applied for new RESEXs but the current government (will change in October 2014) has not granted a single RESEX area. Beyond their function as buffers against speculation, RESEX areas are ideal units for FIP++ type interventions as they often arise from organized and often committed communities. One opportunity would be to support ongoing FIP engagements and/or MSC pre-assessments and certification processes, in addition to value chain interventions such as quality enhancement and traceability programs. Examples include the five fisheries that have been selected for the RIO2016 Olympic Games and a handful of other marine and freshwater fisheries related to well-managed RESEXs. Although these fisheries would directly benefit only a relatively small number of fisher families, the RESEXs are the most promising unit for fisheries management in Brazil and can be linked to route-to-market interventions.

5. **Support (components of) the ongoing Lobster FIP in Cearà**

   Lobster is by far the most important fisheries export commodity of Brazil ($60 million/year) and is exclusively fished by the artisanal fleet. While traps are the only permissible fishing gear, an estimated 80 percent is fished illegally (gillnets, hookah, off-season, under-sized etc.). Since 2012, a UNEP-initiated FIP run by CeDePesca attempts to have importers and exporters commit to traceability programs that secure legally fished lobster. One opportunity could consist of supporting this FIP. It is not risk-free, however. First, government commitment is zero and enforcement is virtually impossible. Second, it seems illusionary to achieve voluntary commitment at scale from exporters to only trade legal products, due to the very low amount of legally available lobster. Third, despite an important export market to the US (almost 80 percent of total catch), the remaining twenty percent (and maybe more in the future) represents an important leakage that will not be solved unless management is improved. Another opportunity could consist of supporting environmental attorneys such as RENAP to pressure the ministry to follow its enforcement mandates. During site visits in Cearà, the ministry of fisheries conceded to the ruling of a federal attorney and consequently must revise all fishing permits. This creates an enormous pressure on the illegal fishery, which survives on governmental off-season payments. This program (Dafeso) is available only to those who have permits, which were easily accessible in the past.

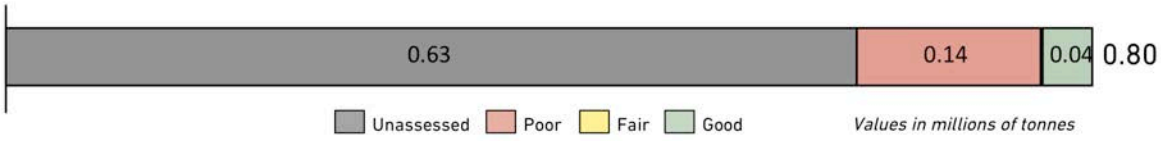
Brazil: Landings, Stock Status, and Trade-Related Data

Brazilian landings have remained constant for 20 years, while aquaculture has grown to provide the majority of Brazilian seafood.



Little is known about the stock health for most of Brazil's landings; most assessed stocks are in poor condition.

Proportion of wild capture landings by stock status



Stock status of Brazilian stocks reported by Fish Source

Species	Biomass Status	TAC Compliance	Mortality Status	Overall Fishery Health Score	2011 Landings (tonnes)
Caribbean spiny lobster	Overfished	Low	Unknown	D	6,907
Swordfish	Not Overfished But at or Below BMSY	High	F<Ftrp	A	3,067
Yellowfin tuna	Above BMSY	Medium	F<Ftrp	A	3,538
Skipjack tuna	Above BMSY	Medium	F<Ftrp	A	30,908

Stock status of Brazilian stocks reported by FAO FIRMS database

Stock or species groups	State of Exploitation	Uncertainty	2011 Landings (tonnes)
Argentine croaker	Fully to over-exploited	Medium	12,125
Whitemouth croaker	Fully to over-exploited	Low	43,229
Brazilian sardinella	Over-exploited	Low	75,971
Skipjack tuna	West: N, East: N	Low	30,908

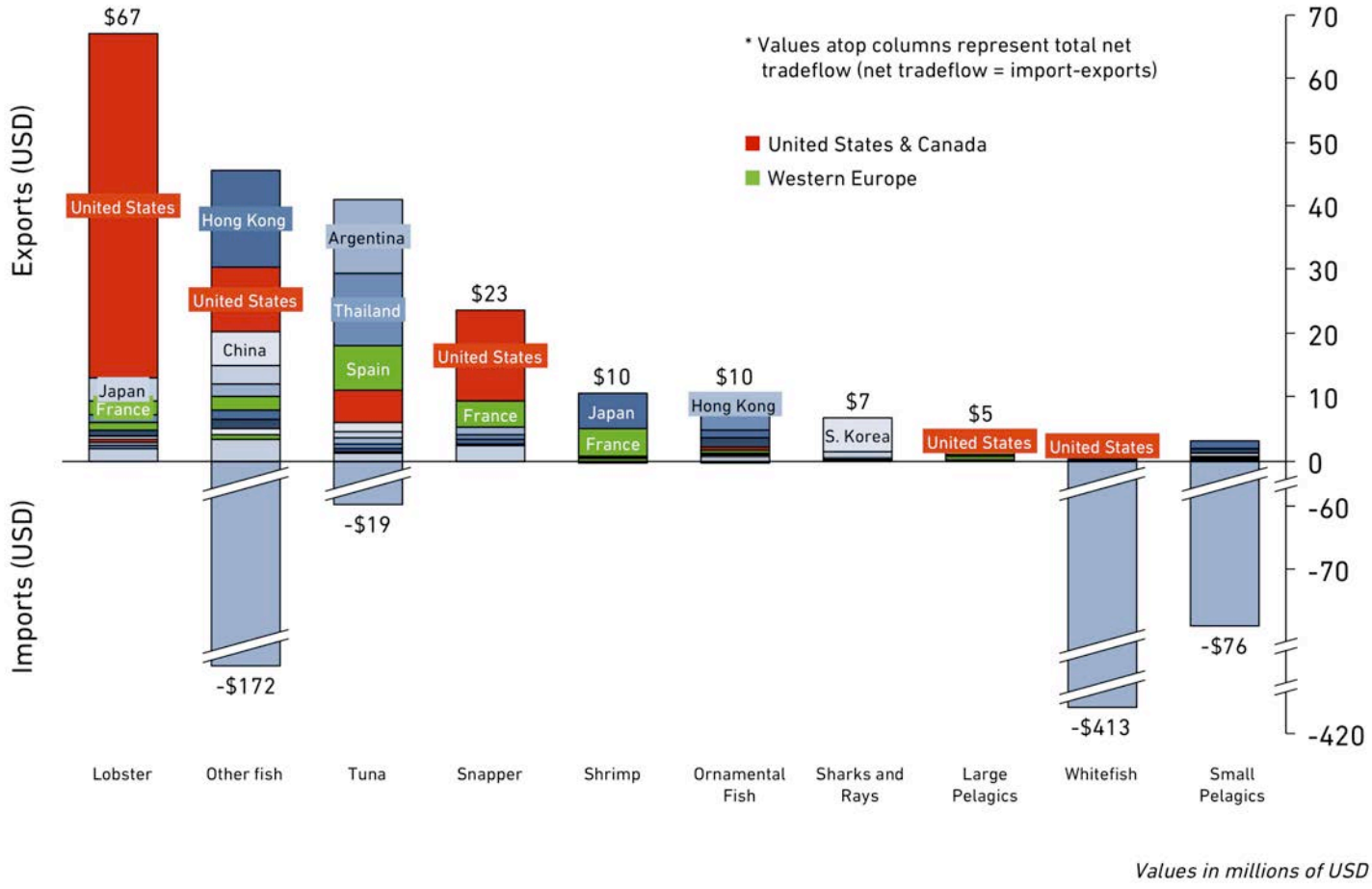
Little is known about the stock health for most of Brazil's landings; most assessed stocks are in poor condition.

Proportion of wild capture landings by stock status, including Costello et al. stock estimates

Costello et al. stock B/Bmsy estimates

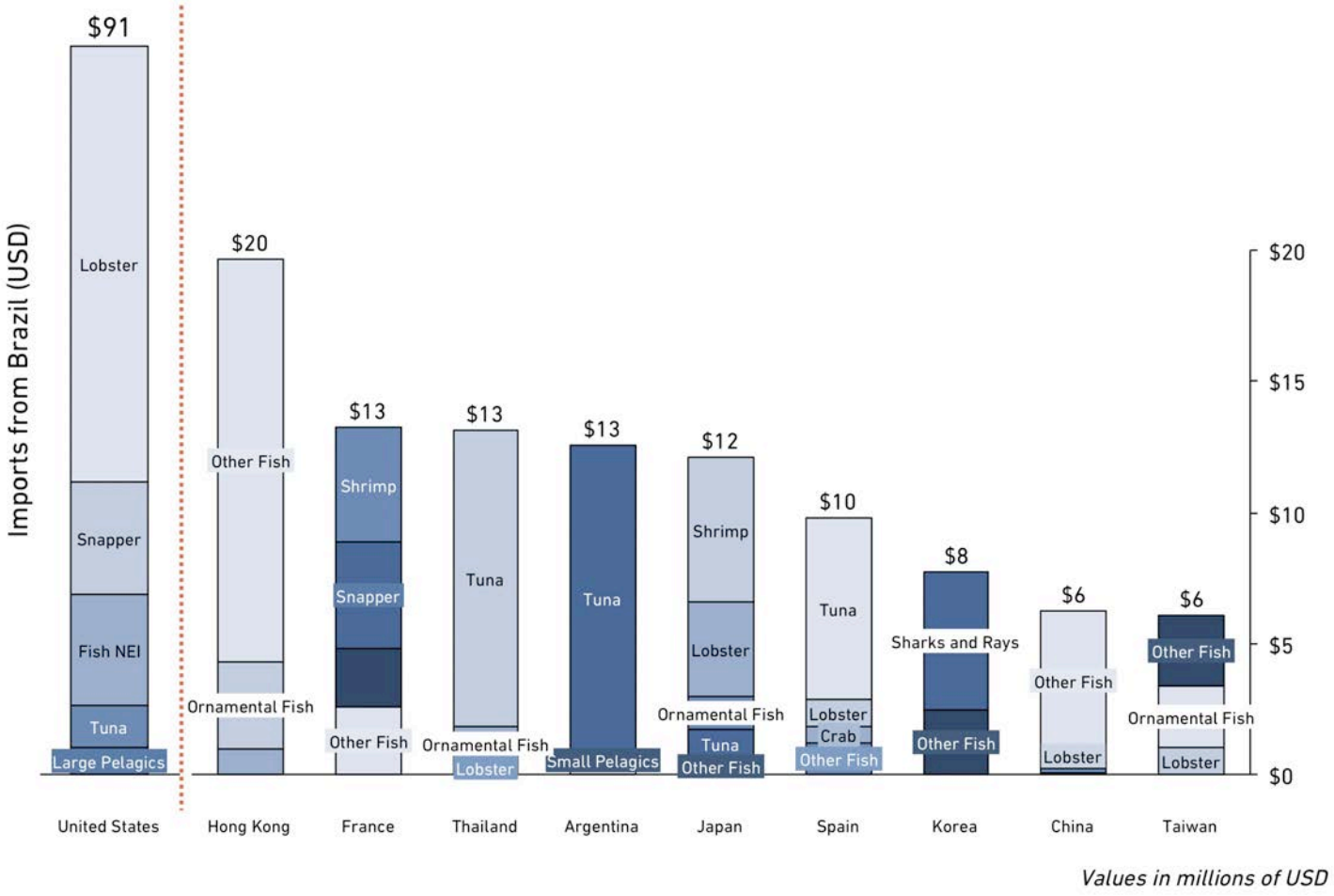
Common Name	Estimated B/ Bmsy	Confidence Interval		2011 Landings (Tonnes)	Totals (Tonnes)
		Lower	Upper		
Black drum	0.08	0.01	1.12	0	
Shortfin mako	0.14	0.02	0.94	0	
Scalloped hammerhead	0.17	0.03	1.24	0	
Bigeye thresher	0.19	0.02	1.47	0	
Southern red snapper	0.22	0.03	1.70	6,227	
Tarpon	0.24	0.03	1.71	580	
Barred grunt	0.26	0.04	1.86	155	
Chola guitarfish	0.36	0.03	4.87	0	16,772
Red grouper	0.43	0.06	3.35	1,113	
Brazilian flathead	0.57	0.08	3.25	778	
Ladyfish	0.59	0.04	9.21	0	
Brazilian menhaden	0.64	0.09	4.19	863	
Sawfishes	0.66	0.04	8.56	0	
Argentine conger	0.84	0.14	6.39	35	
King weakfish	0.90	0.20	4.17	7,021	
Atlantic thread herring	1.02	0.29	3.46	8,782	
Blackfin goosefish	1.12	0.28	4.88	2,608	
Red porgy	1.13	0.31	3.81	2,242	
Lane snapper	1.39	0.38	4.47	1,945	28,598
Yellowtail snapper	1.46	0.45	4.94	4,972	
Atlantic searobins	1.65	0.41	6.61	5,527	
Largehead hairtail	2.17	0.64	8.75	2,522	

Lobster exports to the United States dominate Brazil's net exports, by value.



Values in millions of USD

The United States is by far the largest single importer of Brazilian fish, importing more than the next 7 countries combined.



COUNTRY OPPORTUNITY SUMMARIES: MEXICO

Overview

Due to the cultural and ecological diversity along the thousands of kilometers of Mexican coast, any broad generalization about small-scale fisheries would be misleading. Apart from being subject to the same federal legal framework, few aspects of Mexico's fisheries are comparable between the two gulfs or between the Pacific and Caribbean. This analysis focused on Northwest Mexico (where most previous fisheries-related work has been done) and only tangentially on the other areas. It should be mentioned however that, while general aspects on policy and markets apply to all regions in a similar fashion, cultural and ecological differences are significant.

The Northwest is blessed with highly productive fisheries filled with highly valued seafood commodities including lobsters, bivalves, shrimps and swimming crabs. Despite robust legislation, enforcement is too weak to quell over-exploitation in these fisheries, which is driven by demand from Asian buyers. As a result, illegal fishing is thriving and an increasing number of target species stocks have collapsed in recent years.

Critical observers in the region attest that the Northwest of Mexico has been spoiled in three different ways. First, ocean productivity is a blessing but also a double-edged sword; no matter how bad you treat the ocean "it keeps giving. It keeps coming back at you. It keeps forgiving you." Second, fishing communities have access to a seemingly infinite amount of public funding for such things as infrastructure, vessels, gasoline subsidies, and ice factories. As a result, fishers have started to take it for granted that the government provides help if the ocean stops providing sufficient income. Third, the NGO community in Northwest Mexico has been the by far most significant sink of US philanthropic funding in marine conservation in the whole of Latin America in recent decades. This has attracted a lot of very talented people and created an impressive body of knowledge and expertise about ecological, social, political and economic dynamics, about challenges and about opportunities. But it has also created a somewhat oversaturated space in which relations between governments and NGOs are tense and often counterproductive.

Despite the relatively large amount of "NGO attention" in the area, Rockefeller work in Northwest Mexico would be well-poised to make a positive impact. While an export-oriented initiative seems unlikely to be successful at scale for the artisanal fleet (with no hygiene standards and a strong demand from Asian

countries being major drawbacks), interesting opportunities exist to work through communities and recreate a model of "cooperativism" in which communities are empowered to better manage and commercialize their products. Current work by leading Mexican and international NGOs, as well as inspiring community efforts, could be used as a good basis for further work. FIP-type efforts aiming for certification are promising only for select examples, as most of the high-value catch is earmarked for Asian markets that have not yet signaled interest in paying price premiums for sustainability associated with trade products.

Governance

Fisheries legislation in Mexico, including legislation for small-scale fisheries, is very advanced compared to most other Latin American countries. As an example, there are 55 comprehensive, official management standards and 350 species (or stocks) are included in the national fisheries chart, which provides guidelines on sustainable fisheries management. These guidelines include quotas, fishing seasons, input controls through permits, permissible fishing gear, and designated fishing areas, tailored to each target resource.

While the National fisheries institute (INAPESCA) provides technical assistance, CONAPESCA, Mexico's fisheries administrative office, is in charge of implementing legislation. Due to a drastic underfinancing of their regional offices, they lack the required budgetary resources to effectively implement the laws and control standards and norms. While illegal fishing is now considered a criminal act and both extraction and commercialization without proper licenses can have serious consequences, the lack of enforcement still allows for considerable levels of illegal fishing.

The success of NGO-type interventions in Mexico is also a function of the government's support. Market-based mechanisms are received skeptically, especially concerning small-scale fisheries. One of the reasons is that past certification programs have not yet resulted in economic benefits for fishing communities. Also, there are several factors influencing the level of government support granted, including: the superintendent of CONAPESCA in each state, his/her personal experience with NGOs and connections to the industry, buyers or small-scale fishers. Judging by the conversations with superintendents of Baja California Sur and Sonora, for example, the political context would favor work in the latter state.

Key Fisheries and Commodities

In Northwest Mexico the main commodities for the artisanal sector are bivalves, lobsters, shrimp, crabs, "escama" (i.e., finfish), and jellyfish; the Southwest and Central Pacific depends on large pelagic species such as sailfish, tuna and Mahi Mahi (the latter only for sport fishers); important artisanal commodities in the Gulf of Mexico and Caribbean include the (blue) swimming crab, a relatively large snapper and grouper fishery, and an octopus fishery.

Markets and Supply Chains

The Asian market absorbs a very significant portion of all commodities from this area; the other two important markets are a growing domestic market that is not concerned with the origin and sustainability of the resource, and a US export market. While the US market drives demand in the region for high-quality products and sustainability, this demand is smaller than the Asian market that pays well and does not ask any questions. In the domestic market, finfish species are divided into three categories of descending desirability, with snapper-like white meat fillets on the upper end of desirability and darkish-colored herbivores or omnivores such as sea bass on the lower end.

Most catch in Mexico is consolidated by middlemen and trucked to Mexico City, the world's second largest seafood market. From there it is redistributed for both export and domestic consumption. Middlemen have an unusually strong bargaining power in both directions (as sellers and buyers) and in conversations are often demonized (e.g., "middlemen hold fishermen as slaves"). However, maybe paradoxically so, it is also the middlemen who are most likely to drive change: fishers usually do not cooperate well enough to overcome the dependence towards middlemen and it will be difficult to make them the agents of change in many cases. The middlemen on the other hand, also have long-term interests in the access to and sustainability of the resource. Aligning their interests with RF objectives (constancy of supply, high quality, traceability) might be a very promising way forward.

Fishers and Communities

With the exception of the unattached fishers who work as employees for permit holders, all legal fishers are organized into cooperatives. While cooperatives were formerly a political means for empowering communities (leading to relatively strong fishing communities), this system was undermined by political changes in the 1980s. Today, as few as five people can form a cooperative, leading to an atomization of small-scale fisheries and making coordination and cooperation for management and commercialization a difficult task.

Small-scale fishers, no matter what species they are targeting (which is based on skill more than on anything else) belong to the poorer part of the population, rarely owning houses or cars. Although in the northwest only a few communities show real signs of structural poverty, fishers usually do not have the means to send their children to schools and universities and are not financially prepared for health calamities in the family.

A recurring theme in our conversations was that fishing communities are "spoiled" by their government as large amounts of financial assistance have been granted to fishing communities (in the form of vessels, engines, ice factories, etc.) with little or no accountability for their intended social, ecological, or economic effects. This has "spoiled" communities to some extent and has left the impression that continued failure will be buffered by governmental support. Despite this, the degree to which individual leaders within the community have taken action to improve the situation is outstanding and very inspiring.

Factors Favoring Work in Mexico

Mexico has very strong legislation and small-scale fisheries policies, and its government and associated institutions have demonstrated a willingness to manage their fisheries. INAPESCA, the technical arm of CONAPESCA, has very close ties with many communities and its work goes much further than pure scientific work on the water. Additional positive factors include a very strong and competent NGO community, generally well-working cooperatives, and high biodiversity.

Constraints

There are several limiting factors for philanthropic work in Mexico. First, the relationship between government and NGOs is difficult on both sides, and includes allegations of "sabotage" (NGO perception) and "espionage" (government perception). There are many exceptions but the collaboration between NGOs that have valuable knowledge in the area, and government institutions that are committed to their mandate despite being chronically underfinanced, has not always been harmonious. In addition, there are other difficulties:

- A strong market pull from Asia ("the Asian mafia"), which is perceived as willing to buy everything, undermines conservation efforts.
- Illegal fishing is rampant.
- Fishing communities have become reliant on government support.
- The looming implications of climate change have limited people's belief in their ability to make significant positive changes to the ecosystem.

Potential Interventions

1. **Support community projects, visionary middlemen**
   The Bahia de Magdalena on the west coast of southern Baja California is considered one of the most productive fishing areas in Mexico, as the warm northern equatorial current meets the nutrient-rich California Current in an area where an island group protects the large bay from oceanic influences. At the same time, this is an area that sees a lot of drug trafficking. With stricter border controls by the US, drugs have started to pile up in Mexico and have become a serious social concern in coastal villages.

   One opportunity would be to support MARSEL, the major Mexican buyer of bivalves and lobsters in the region and a regionally well-respected group, in their efforts to create holistically sustainable communities. Its program (still in the early stages) includes anti-addiction work, aquaculture for restocking of natural banks, and no-take zones. The group includes very knowledgeable people who sincerely want to "give back to the ocean what they got out of it."

2. **Fund selected bivalve mariculture projects**
   Along large stretches of southern Baja California and Sonora, natural banks of high-value bivalves have supplied fishers with a solid source of income for decades. With increasing prices and little enforcement, natural banks of permissible species have been almost depleted, and some stocks completely collapsed for the first time in history this year (almeja catarina). Mariculture is an easy way out but has the risk of growing too fast. At the same time, bivalve mariculture can be an ecologically neutral way of removing the pressure from natural banks, and even restocking them.

   Opportunities exist to finance small-scale, cooperative-based mariculture systems in controlled settings. Noroeste Sustentable (NOS) would be a logical partner in southern Baja California as it has participated in pilot models financed by the World Bank (in Bahia Magdalena) that are praised by many as exemplary.

3. **Fund and scale up the Puerto Libertad model**
   Puerto Libertad is an isolated town in western Sonora with only 200 fishers. These fishers control highly productive fish and bivalve banks. As in many other places, numerous cooperatives exist. Puerto Libertad, however, stands out as a fishing community that collectively makes decisions about management and, through a fisheries committee, collectively attempts to get legal backing for voluntarily created restocking areas.

   Although only a few directly benefit, this is a model that many communities aspire to and few achieve. The opportunity consists of supporting this model, including aspirations for collective commercialization, and making it a more replicable model. This could be linked to an alternative livelihood approach designed by former bivalve divers in Sonora that have turned into scientific divers. As COBI ("Community and biodiversity", a local NGO) has worked with both groups, that would be a logical group with which to partner.

4. **Support the Seri tribe in Sonora**
   The Seri is an indigenous tribe that has fished in Sonora for centuries and was almost wiped out in the late 1900s. The tribe lives in poverty but has maintained a cultural heritage that is passed on from generation to generation. (Among themselves, they all speak their original, Apache-like language.)

The opportunity would lie in supporting the tribe (2,000 people) in their aspiration to protect their exclusive fishing area and achieve higher prices at local markets by increasing financial literacy and getting access to proper permits. This can be linked to a fascinating project by CRIP (regional research center under the national fisheries institute INAPESCA) that empowers young members of the community to do transect dives and catch/recapture analyses.

5. **Fund a "university of fishers"**
   One of the most critical missing links in achieving sustainable fisheries at scale in Mexico is the empowerment and sensitization of fishing communities with regard to community-based management and commercialization. Widespread passivity (i.e., an attitude of "government will fix it") and financial illiteracy hinders communities from making use of their entrepreneurial ingenuity and enthusiasm to "do the right thing."

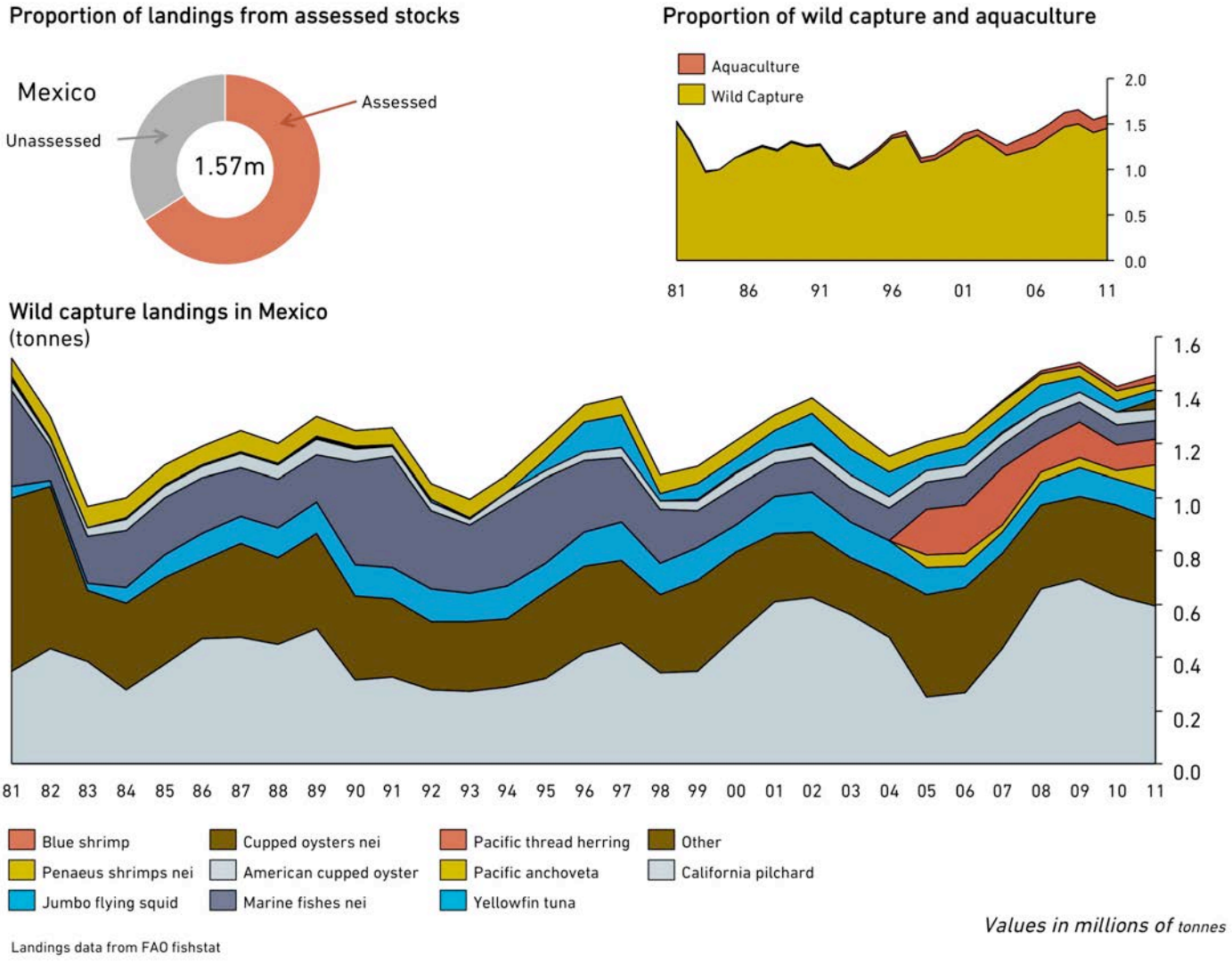
   A real opportunity would be to scale up the "university for fishermen" that COBI designed and has been testing for the past couple of years, in which fishers learn about fisheries biology, management, and commercialization and are given the tools for community-based management. COBI and Niparaja would both be good partners. Both are very talented and well-respected groups that work closely with communities. NOS would be another good partner.

6. **Scale up the "inverse alchemy" model**
   Over the past couple of years, SmartFish (mainly through the work of Hoyt Peckham) has successfully transformed a sea bass (third-grade) fishery in the upper Gulf of California into a first-grade product and created markets (mainly hotels and restaurants) that are willing to pay a premium for a fish that is otherwise used mainly for fish tacos. The system is based on low-quantity catch with Japanese bleeding techniques, thereby increasing the meat quality.

   Opportunities exist to support this model (which is being tried in different ways elsewhere in Latin America) and to help connect small-scale fishing communities directly to high grade restaurants, which allows these communities to gain a higher price for their products and to fish less.

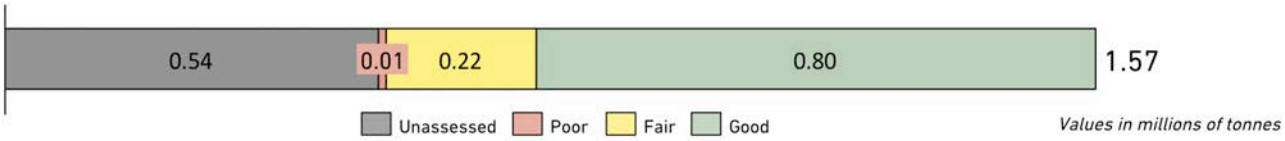
Mexico: Landings, Stock Status, and Trade-Related Data

Mexican landings have fluctuated, but stayed roughly constant for 30 years; small pelagics and yellowfin tuna comprise the majority of landings.



More than half of Mexican landings' stocks are in good condition, due to the state of pilchard; roughly a third of landings' stocks are unassessed.

Proportion of wild capture landings by stock status

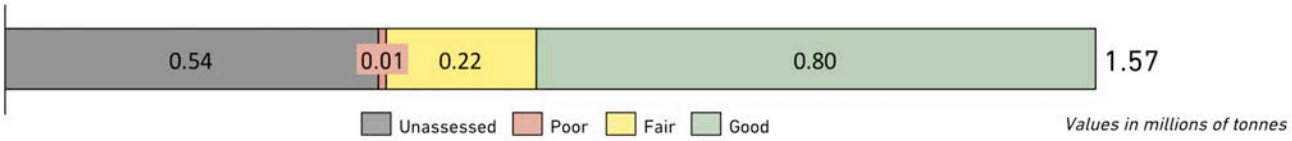


Stock status of Mexican stocks reported by Fish Source

Species	Biomass Status	TAC Compliance	Mortality Status	Overall Fishery Health Score	2011 Landings (tonnes)
Blue crab, Jaiba azul	Not Overfished But at or Below BMSY	Medium	F<Ftrp	B	9,505
Blue shark	Not Overfished But at or Below BMSY	Medium	Unknown	B	3,776
Caribbean spiny lobster	Not Overfished But at or Below BMSY	Medium	Unknown	B	238
Silky shark	Overfished	Medium	Unknown	D	0
Skipjack tuna	Above BMSY	Medium	F<Ftrp	A	7,927
South American pilchard - Gulf of California	Not Overfished But at or Below BMSY	Medium	Unknown	B	592,862
South American pilchard - Northern stock	Not Overfished But at or Below BMSY	Medium	F=Ftrp	B	
South American pilchard - Pacific Baja California	Not Overfished But at or Below BMSY	Low	Unknown	C	
Yellowfin tuna	Not Overfished But at or Below BMSY	Medium	F<Ftrp	B	105,880
Yellowleg shrimp - Bahía Magdalena Western Baja	Not Overfished But at or Below BMSY	Low	Unknown	C	11,041
Yellowleg shrimp - Sinaloa-Nayarit	Not Overfished But at or Below BMSY	Low	Unknown	C	
Yellowleg shrimp - Sonora	Not Overfished But at or Below BMSY	Low	Unknown	C	
Yellowleg shrimp - Upper Gulf of California	Not Overfished But at or Below BMSY	Low	Unknown	C	

More than half of Mexican landings' stocks are in good condition, due to the state of pilchard; roughly a third of landings' stocks are unassessed.

Proportion of wild capture landings by stock status



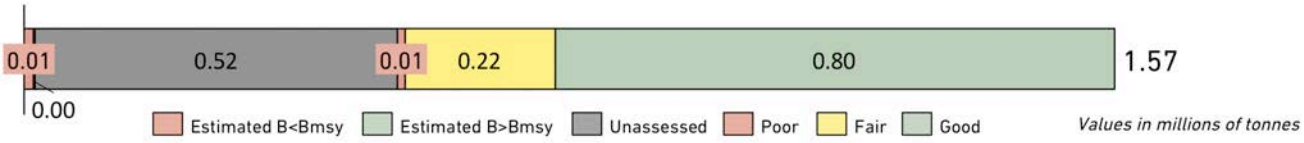
Stock status of Mexican stocks reported by FAO FIRMS database

Stock or species groups	State of Exploitation	Uncertainty	2011 Landings (tonnes)
Yellowfin tuna	East: F; West: N	Low	102,441*
Atlantic seabob	Fully-exploited	Low	1,868
California pilchard	Fully-exploited	Low	592,862*
Californian anchovy	Fully-exploited	Low	4,938
Northern brown shrimp	Fully-exploited	Low	6,452
Pacific anchoveta	Fully-exploited	Medium	98,647
Pacific thread herring	Fully-exploited	High	93,222
Flathead grey mullet	Fully- to over-exploited	Medium	3,194
Grunts	Fully- to over-exploited	Medium	-
Sciaenides	Fully- to over-exploited	Medium	-
Groupers	Over-exploited	Medium	-
Northern pink shrimp	Over-exploited	Medium	2,389
Pacific bluefin tuna	Over-exploited	Low	2,731
Snappers	Over-exploited	Medium	-
King mackerel	Over-exploited	High	4,202
Chub mackerel	Underexploited	Low	6,925
Jumbo flying squid	Underexploited	Medium	34,844
Opalescent inshore squid	Underexploited	Medium	11
American cupped oyster	U, F	High	42,881

**Also assessed by Fish Source*

Academic estimates of unassessed stock health covers less than 1% of total Mexican landings.

Proportion of wild capture landings by stock status



Costello et al. stock B/Bmsy estimates

Common Name	Estimated B/Bmsy	Confidence Intervals		2011 Landings (Tonnes)	Total Landings (Tonnes)
		Lower	Upper		
Black drum	0.14	0.02	0.95	93	13,145
Bobo mullet (W Central Atlantic)	0.20	0.03	1.25	273	
Bobo mullet (E Central Pacific)	0.25	0.03	1.39		
Common snook	0.26	0.04	1.90	36	
Gulf kingcroaker	0.27	0.04	1.79	106	
Lane snapper	0.38	0.05	2.94	242	
Milkfish (W Central Atlantic)	0.27	0.02	3.28	10,146	
Milkfish (E Central Pacific)	0.43	0.06	2.96		
Northern red snapper (W C Atlantic)	0.03	0.00	0.66	1,109	
Northern red snapper (E Central Pacific)	0.23	0.03	1.75		
Porgies	0.26	0.04	2.02	57	
Spotted weakfish	0.22	0.03	1.63	189	
Yellow snapper	0.16	0.02	1.33	75	
Yellowtail snapper	0.76	0.11	5.01	819	
Ocean whitefish	2.04	0.48	8.51	2,186	2,186