Exploring Opportunities in Working with Small-Scale Fisheries Cooperatives and Producer Associations

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COVER PHOTO: Fishing boats in Thailand

PHOTO CREDIT: James Tobey, CRC

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What are cooperatives and producer associations?

Cooperatives and producer associations are voluntary membership organizations that are formed to realize mutual social, economic, and/or environmental benefits. Members join voluntarily to access those benefits. In some instances people also join cooperatives because they have an interest in addressing a community concern. In small-scale fisheries, two types of cooperatives are common:

1. **Producer cooperatives/associations.** In these cooperatives fishermen, vessel owners, or quota owners collaborate to share resources, set joint rules, and establish enforcement mechanisms. By working together members share risk, reduce competition, and obtain access to information, capacity building, better gear and credit. Some cooperatives are have tenure rights.
2. **Marketing cooperatives/associations:** Members of marketing associations often pool their products attract buyers, to obtain a better price, reduce competition, reach new markets, or jointly purchase equipment for processing raw materials (e.g. fish smokers).

Opportunities for working with cooperatives and associations

Working with fisheries cooperatives is attractive to governments and NGOs, because the groups are based on values such as self-help, equality, and solidarity. It is also much easier to reach, influence, and offer services to a group than unorganized fishermen. From a production and marketing perspective joining forces through an association/cooperative offers many opportunities for fishermen:

1. Increased production efficiency and economies of scale
2. Pooling product, to ensure steady supply and larger quantities of product
3. Increased traceability (allowing buyers and consumes to know where the product came from)
4. Development of brands that stand for a certain quality standard
5. Increased food safety (by building joint processing centers, developing association processing standards, etc.)

Links between cooperatives and sustainable fisheries

Some fisheries cooperatives have biodiversity and fish stock conservation goals—basically grounded in a joint interest in maintaining the stocks and hence, revenue streams. Cooperatives and associations that are formed around fisheries where there are tenure rights are most likely to have strong biodiversity goals, simply because they have a self-interest in maintaining the stocks. There are other examples where associations work towards fisheries sustainability. In some cases these fisheries are characterized by some sort of limited entry (e.g. though licensing or quotas). A third—and increasingly common—category of fisheries associations with environmental goals are producer/marketing cooperatives that adopt biodiversity goals not only to protect the environment, but as a way to mark themselves as sustainable, and thereby obtain a price

premium, gain or maintain market share for their products on the international market. This is sometimes part of a larger effort to reach Marine Stewardship Council (MSC) certification.

Examples of fisheries measures created by cooperatives:

1. Impose or lengthen closed seasons
2. Use gear that will reduce by-catch
3. Establish size limits
4. Set total allowable catches for target species

Characteristics of successful fisheries cooperatives

Successful cooperatives within fisheries and other sectors share certain characteristics. They are often groups where the members are homogeneous and working towards clear goals. The groups usually have strong, transparent, and capable leaders. The capacity among association members also matters as does long term thinking and willingness to share risk in undertaking fisheries conservation measures.

Marketing cooperatives that succeed in adopting sustainability and equity goals often have good market access. The market cannot be too competitive. Having many buyers create windows for cheating (e.g. selling under sized fish or shell fish). With too many sellers, it becomes difficult for the producers to influence the price, because the buyers will likely buy from the fishermen who offer the lowest price. Having just a few buyers (oligopsony[1]) can be good if those buyers are committed to sustainability and are willing to provide a price premium to purchase, for example, fish above a certain size limit. However, buyer oligopsonies that are not committed to sustainability and dictate the price leave little or no room for fisheries cooperatives to negotiate better conditions. As a general rule, cooperatives work better when they are dealing with a high value fisheries (e.g. crab and lobster) than a low value product.

Barriers to change

There is a multitude of failed fisheries cooperatives in South East Asia, Africa, and Latin America. Some cooperatives failed because fishermen were facilitated to form a cooperative that in essence would take over the middle men's role—but turning fishermen into marketers proved difficult as they lacked the capacity and interest to engage in marketing and sales. Other examples of failures are cooperatives that are formed and supported by the government or local NGOs. However, if the driving force is not among the fishermen themselves, the cooperatives are likely to fail when the outside support runs out.

Control of power is a major barrier to change. In many fisheries the control over fisheries effort, who to sell to, etc., is not with fishermen, but with vessel captains, boat owners and financiers. Removed from the local community and interests, these players may be more driven by financial

[1]Oligopsony is a market form in which the number of buyers is small while the number of sellers in theory could be large.

than sustainability interests (at least if they have the ability to switch to a new location if the fisheries collapses).

There are many social contracts and relationships that influence who fishermen sell to. Fish buyers, financiers, and other intermediaries often provide social services, such as loans and support for special life needs (e.g. burial costs, weddings, school fees). Being dependent on the intermediaries, it is difficult for individual fishers or crew members to organize themselves to control harvest, product quality, and price. On the marketing side, a barrier is when the buyers are too small in scale, unorganized, and lack the capacity to influence the market.

Summary of positive and negative factors influencing success of producer and marketing cooperatives

The following table summarizes the characteristics that influence to what extent a producer and/or marketing cooperative is likely to succeed. Many can be seen as leverage points where a fisheries improvement program can provide support to move an organization from a "worst case" to a "best case" situation.

BEST CASE	WORST CASE
Organization	
Homogeneity among members	Heterogeneity among members
Clear goals	Lack of or conflicting goals
Risk sharing	Uncertainty and risk
Transparency	Lack of transparency
Strong leadership	Poor leadership/corruption
long term thinking	Short term thinking
High capacity (to gather information, rally members, perform services)	Low capacity
Fisheries characteristics	
Tenure by fishers	Open access fishery
Value of product (high price)	Low value product (low price)
Market characteristics	
Market access (nearby)	Market access (distant)
Policies that limit # of producers and/or entry into fisheries	Highly competitive/open entry
Fishers can influence price	Fishers lack control of price setting
Limited # of buyers (limits cheating)	Many buyers
Provision of services	
Access to new gear	No services
Access to training/information/capacity	No services
Access to credit	No services

BEST CASE	WORST CASE
Fisheries and processing characteristics	
Economies of scale (reduced input cost per unit)	No economy of scale
Steady supply of product	Supply/catch varies
Traceability	No traceability
Branding/quality of product	Varying product quality
Food safety standards	No food safety standards
Production efficiency	Inefficient production

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Examples of fisheries management oriented fisheries and processor organizations

Case 1: Mexico Lobster Cooperatives in the Gulf of California (Single Species)

Fishermen's cooperatives which manage and harvest Mexican Red Rock Lobster (spp. *Panulirus interruptus*) provide a compelling example of an intermediary function used to achieve and receive recognition for their sustainable fishing practices along with market benefits.

Background

Fishing cooperatives in Mexico are characterized by their co-management style and community-based structure. Defined as historic social organizations since the 1930s, cooperatives have been granted exclusive use rights through area-based fishing permits known as "concessions" by the Mexican government extending for periods up to 20 years (Pérez-Ramírez et al., 2012, McCay et al., 2014). In accordance with the national fisheries law, concessions are renewable based on responsible environmental management, socio-economic impact and continued productivity as defined in Article 47, General Law of Sustainable Fishing and Aquaculture (Pérez-Ramírez et al., 2012). Cooperatives also provide improved social and economic benefits to its members. Government funding is directed towards social programs and infrastructure projects in recognition for their continued stewardship. Select benefits increase with tenure and include a pension system (McCay et al., 2014). In return, members are expected to adhere to stringent rules, attend meetings and achieve optimal levels of production for their continued participation (Pérez-Ramírez et al., 2012). As a result, concessions have been regarded as a means of advancing co-management capacity and fisheries development in Mexico.

The Regional Federation of Cooperative Societies

Nine of the 26 lobster cooperatives fishing in Mexico have formed the Regional Federation of Cooperative Societies of Baja California (FEDECOOP). FEDECOOP is comprised of 1200 fishermen and captures 80% of the lobster in their region. Lobsters are caught in assigned marine areas near shore using simple metal traps on open, outboard motored *pangas* (skiffs) averaging seven meters in length. In addition to serving as a marketing arm for collective bargaining, FEDECOOP provides technical expertise to assist and record information relating to their fishery. FEDECOOP is a key liaison with government agencies, helping to promote and shape national regulatory standards. The FEDECOOP cooperative maintains fishing effort at below what is authorized by government agencies and other cooperatives (Phillips et al., 2008).

The cooperatives belonging to FEDECOOP operate along the Pacific coast of the central Baja California Peninsula in Mexico. Despite large-scale climate fluctuations caused by El Niño, the lobster catch has remained stable over the past decades, largely attributed to the well-managed fishermen's cooperatives and benefitting from the rich upwelling caused by the California Current Large Marine Ecosystem (Pérez-Ramírez et al., 2012). As opposed to migratory or far-

ranging species, the sedentary nature of lobsters facilitates resource management, stock monitoring and enforcement by small-scale cooperatives. For local communities isolated on the Baja peninsula with few alternatives forms of livelihood, the health of this fishery is critical for employment, income and trade relationships given the high export value and return of this resource. Approximately 90% of the lobsters harvested are sold live and destined for foreign markets. Exporting live product requires careful and skilled handling, minimizes storage and processing costs and provides quick financial liquidity (Pérez-Ramírez et al, 2012).

Key features of the lobster fisheries and the FEDECOP in Baja California

- Exclusive access and area-based fishing rights, which are limited to co-op members.
- High degree of coordination and co-management among regulatory entities.
- Community-based regulatory measures implemented. This includes determining fishing effort and allocation (of traps and fishing areas) within the concession.
- The cooperatives invest in fixed and social capital. Examples include: investing in fishing equipment/technology, enforcement, marketing or community-related investments such as education, roads and electricity.
- Facilitating adaptive management practices given the limited mobility of the target species within the fishery and its proximity to shore.
- Supports regional development through income generation, employment and social expenditures of the FEDECOOP.

MSC Certification

Recognized for their strong organizational structure and strict management practices, FEDECOOP achieved MSC certification for the Red Rock Lobster fishery in 2004. MSC's certification and ecolabel program is based on a scientifically robust standard for assessing whether wild-capture fisheries are ecologically sustainable and well-managed. To become certified, current catches should be at levels that ensure fish populations and the ecosystems on which they depend remain healthy and productive for today's and future generations' needs. The certification has been maintained for the past ten years. FEDECOOP was the first community-based organization to receive MSC certification in a developing country. To date, Mexico remains one of few developing countries with a small-scale fishery certified by the MSC. The benefits and barriers are further detailed in the text box below.

MSC Certification: The benefits and barriers to fishing cooperatives of SSF in Mexico

Benefits of MSC certification to fishing cooperatives:

1. International recognition and national prestige of its administration and government's fishery policy.
2. Increased the cooperative's power to negotiate government/international support.
3. Additional financial support for community-related projects.
4. Funding for continued fishery research, improvements in processing plants and fishing equipment.
5. Ensures likelihood of the renewal of concessions.

Barriers and limitations of MSC certification to fishing cooperatives:

1. Discontinuous flow of information/understanding from FEDECOOP managers to the field (fishermen) regarding the certification process and its maintenance.
2. Lessening of recognition as more fisheries are certified (diluted effect).

The conditions under which the Mexican lobster fishery exists are clearly unique, however not isolated; the Philippines and Chile provide similar models. Identifying fisheries that possess or demonstrate the ability to cultivate these characteristics might prove of interest.

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Case 2: Senegal Processors/buyers band together to improve sustainability (Single Species)

Background

Senegal is centrally located within the zone of the Canary Current Large Marine Ecosystem upwelling, one of the most productive, diverse and economically important fishing zones in the world. Major river/estuary/delta/mangrove wetlands complexes also contribute to productivity. Small pelagics constitute the bulk of all fish landings in this upwelling system, especially sardinella. Small pelagics are critical in the marine food chain as forage fish for high value species such as tuna.

The regional catch of the Northwest Africa sardinella population is 667,000 tons (2007-2011 average). Senegal artisanal average annual catch is 260,000 tons, with a high of 375,000 tons in 2009, almost all from the small-scale fisheries sector. This marine species accounts for 70% of fish landings in Senegal, represents 70-75% of fish consumed in Senegal, and provides over three-quarters of the population's animal protein.

Despite the productive ecosystem, sardinella is considered over-exploited. Total catch tonnage remains steady, but the level of effort (number of fishing boats, gear, and ability to catch sardinella) has grown rapidly masking unsustainable levels of catch. In addition, the level of Illegal, Unreported and Unregulated (IUU) fishing, especially from large, foreign, industrial ships has been estimated to equal the entire registered, legal catch. This large unaccounted volume of catch puts the catch of the legal, artisanal fleet under further pressure. Evidence of over-exploitation is represented by the distance the Senegal artisanal fleet now travels to maintain catch volumes. Currently, Senegal is catching over half its landings of sardinella outside its Economic Exclusive Zone (EEZ), especially in Mauritanian waters (its neighbor to the North). There is no regional or Senegalese fishing management plan for sardinella, but there is now a process under way to formulate and approve both a regional plan, and a Senegal plan.

Sardinella Processing in Cayar

Most of the landed sardinella in Senegal (about 80 percent) is destined for local artisanal processing, predominantly by women processing groups. They manually process the fish into different products such as the fermented and dried fish known as *gej*, the salted and dried fish known as *sali*, and the roasted and dried fish known as *keccax*. About 12% of sardinella (predominantly processed, but also fresh) is transported to other African countries (32,000 tons/year to Mali, Mauritania, Cameroon, Congo, Cote d'Ivoire, Gabon, Ghana, Guinea, Nigeria, Togo, Benin, and DRC).

Sardinella is thus critical for employment, fisheries income and trade, nutrition, and empowerment of women in fisheries. Because of the large proportion of all sardinella landed that are locally processed, women processors can play a potential influential role in the fishery if they are well organized and empowered. If they band together and agree to not buy small, juvenile

sardinella (juveniles are small fish that are not yet able to reproduce) from fishing boats, this can have an important effect on fishing practice and stock abundance. An example is the coastal city of Cayar in Senegal where a group of women processors have agreed to a "Code of Conduct" which includes not buying and processing juvenile sardinella (see Text Box below).

In Cayar, the local processing takes place near the beach. There are a number of ways by which the women processing group obtains sardinella fish. They often have arrangements with specific boats to buy directly from them. In some cases, they own the boat or equipment on the boat (e.g. nets, engine) and have arrangements that the catch is sold to them at an agreed to price. In other locations, such as in the large landing site of Joal, the processing is done a half-mile to a mile inland. The women buy through fish buyers and the fish are transported to the processing site with horse and buggy.

Fishermen and fishing stakeholders know that it is not a good practice to fish for juvenile sardinella. Keeping juveniles in the sea until they are able to reproduce increases total fish abundance and the welfare of all involved in the fishery, including final consumers. Larger fish produce a better processed product as well. It generates more value added. With the power of market demand, the processing sector can provide the market (intermediary) lever to control the harvest of juvenile sardinella.

The Cayar experience points the way for improving sardinella abundance, ecosystem health, and welfare of fisheries stakeholders at a larger scale throughout the Senegalese coast and in other countries with similar situations (e.g. Ghana). It involves organizing and strengthening groups of women processors through fisheries leadership training; literacy training; training in good processing methods and hygiene, packaging, and labeling; and, improved processing facilities and ownership of facilities. Another action that has been demonstrated in CRC projects in Tanzania and Thailand to be effective and have very large benefits for small investments is support of small-scale savings and credit revolving funds. Savings and credit with women's groups in particular have been successful.

Key features of the Sardinella fisheries

- A very productive and economically important fishery; represents 70 percent of fish landings in Senegal
- Fish stocks are over exploited
- IUU fishing common, especially by foreign industrial ships
- No regional or Senegalese management plan, but process is under way
- 80% of sardinella is purchased and processed by local women
- Women can play a potential influential role in the fishery, but they need organizing and strengthening
- In Cayar the women have agreed on a "Code of Conduct", which includes not buying and processing juvenile sardinella

Bridging the Gender Gap: A Stronger Role for Women in Senegal's Fisheries

It's a mosaic of sights and sounds: A group of women in brightly colored dresses sitting in a circle laughing, singing, beating on drums, and clapping. In the middle, two women move to the music, bending down and dancing. These women are fish processors in the coastal city of Cayar, Senegal, and they exchange ideas, improve their livelihoods, and celebrate life through song and dance.

Women Work Together

In 2011, the USAID/COMFISH project started working with these women to pioneer eco-friendly fish processing methods and boost their incomes. The project, which is managed by the Coastal Resources Center at the University of Rhode Island Graduate School of Oceanography, works across Senegal to increase the resiliency of coastal communities to climate change and to build an ecosystem-based management plan for six priority fish species, which provide much of the dietary protein for people in Senegal.

To successfully use an ecosystem approach, local fishers, processors, and the community must all take part in fisheries management to address a range of human and ecosystem needs simultaneously. As part of this process, USAID works with leading women's fish processing associations to organize into committees with specific responsibilities, such as ensuring hygienic standards for fish processing.

At first, many women fish processors lacked the tools and resources to reach their full potential. So the project set a goal: To establish environmentally sustainable processing sites for them. But this involved attaining land and permits from local authorities, some of whom discriminated against women. Project staff spent a lot of time lobbying stakeholders and explaining the ways women processors could benefit the environment, the economy, and the community. It was an arduous process but it paid off when they obtained land for a new processing unit for women in Cayar.

The site, which is home to fish smoking ovens and a modern 1,500-square meter processing facility, allows the women to work more productively and collaboratively. Over 200 women work there to salt, ferment, dry, and roast the fish. They manually process the fish into different products such as the fermented and dried fish known as *gej*, the salted and dried fish known as *sali*, and the roasted and dried fish known as *keccax*.

Empowerment Through Community Organization

The women are working together to improve their processing methods. With support from USAID/COMFISH, they developed a code of conduct to govern their trade, the first of its kind in the women's fish processing sector. The code ensures that fish are processed in a hygienic and safe manner that complies with environmental regulations. One section of the code requires that the women not buy or process immature or juvenile fish, a prohibition that contributes to the fishery's resilience against climate change impacts. These new standards will enable the women to sell the fish products with a recognized label guaranteeing their quality, making them much more lucrative.

But illiteracy made it challenging to ensure all women could understand and adopt the code. To make sure they understand the intricacies of the new processing methods, USAID developed easy-to-understand literacy modules on hygiene, quality, and other topics.

The project also embraced the power of culture, community, rhythm, and melody. Project staff engaged the processors in performing traditional women's songs and dances in Wolof, the local language, which explained the code. The lyrics address the freshness of the fish, cleaning the work area, and personal hygiene–and dances bring them to life. "I can easily understand and memorize the code of conduct through our local songs and dance," said Fatou Kiné Diop, a fish processor in Cayar.

The women are now working together to build their business and help each other grow. They gather each month over tea and biscuits to discuss their work and plan initiatives to boost their productivity and earning capacity. USAID/COMFISH helps organize these meetings and put their plans into practice. Among the successful initiatives is a literacy program to enhance livelihood opportunities and to further empower them. "With the literacy program, I am now able to write my name, dial a number on my mobile phone, and, more importantly, hold my accounting in a notebook," said local fish processor Outé Yade.

Case 3: Indonesia blue crab association sets size limits and obtain price premium (Single Species)[2]

Background

The blue swimming crab species (*Portunus pelagicus*) is found throughout the Indian and West Pacific Oceans). In Indonesia, the Blue Swimming Crab (BSC) fishery began in the mid-1990s, and is now one of the country's most important export fisheries. Most of the product (more than 50%) going to the United States, where it is the largest source of imported swimming crab. BSC is caught by small-scale fishermen who primarily use collapsible traps and gillnets.

Most of the crab that is exported is canned. While some of the plants processing crab for export are vertically integrated (that is, they buy the crabs directly from the fishermen, then cook, pick, and process the cooked meat for export), most are not. The supply chain varies widely, with possible levels including fishermen, collector (or collectors), mini-plants (which may cook and pick, or just one or the other), and finally processor.

According to research done by the Sustainable Fisheries Partnership (SFP 2011), there are about 65,000 fishermen involved in the fishery, and over 600 mini-plants where initial processing (cooking and picking) is done. The wide diversity of locations, fishermen, and intermediaries means that there is a high level of variation in all aspects of fishing and processing BSC (Warmbrunn and Hutabarat). Some companies are vertically integrated, but most are not. Some mini-plants act as lender to fishermen and expect loyalty in return, but many others do not. Crabs are caught as both target species and bycatch (especially in prawn fisheries).

Blue swimming crabs are caught by small-scale fishermen in nearshore waters. They are predominantly caught by boats of under 5 GT fishing inside of the 4 nautical mile district jurisdiction, where boats are merely registered (not licensed). This means that the BSC fishery is unregulated and unlicensed. There is no control or limitation put on catch or harvest methods. There is discussion of using newer, data-poor methods[3] for better understanding the health and status of the crab stock, but for the moment, the status of the stocks are uncertain. Limited data gathered at landing spots over recent years, however, has shown a decline in the average size of blue swimming crab, indicating that there is widespread overfishing (SFP 2011).

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[2] This case study is a slightly adapted version of a section of DeAlessi, M (2012) Currents of Change: The Political Economy of Fisheries and Marine Conservation in Indonesia, a report to the World Bank's ALLFISH Program.

[3] Fisheries management decisions (e.g. setting allowable harvest levels or determining overfishing thresholds for species) are traditionally based on complex models and stock assessments that require large amounts of data. However, many developing countries lack the technical capacity, human capital, and funding necessary to use these techniques—without rigorous data, these fisheries are considered "data poor".

APRI and exports to the United States

The BSC fishery is a relatively new fishery for Indonesia, where mud crabs (*kepiting*) are generally preferred to swimming crabs (*rajungan*) for local consumption. The first American company to begin exporting BSC from Indonesia was Philips, in 1994. Up until this time the local market for BSC was thin and the price was very low. Philips was looking for swimming crab supplies to meet U.S. demand for blue crab amid a declining fishery in the Chesapeake, and other companies soon followed. In order to maintain supply, Philips has taken a leading role in promoting sustainable crab fisheries overseas, and was a leading force behind the creation of APRI, the Indonesian Blue Crab Association (*Asosiasi Pengelolaan Rajungan Indonesia*). APRI was formed with 9 members, and today there are 10 members of APRI who collectively account for 85% of the BSC exported from Indonesia to the U.S.

In 2009, 12 companies in the U.S., mostly importers of crab, formed the Crab Council, which later became the NFI (National Fisheries Institute) Crab Council. Members of the NFI Crab Council represent 80% of crab imports to the U.S. The Council was also formed with the leadership of Philips, and has as its mission to support sustainability measure in the countries its members import crabs from. One outcome of this effort was a recommendation from the NFI Crab Council in March 2011 that encouraged processors to set a minimum size limit of 8 cm for the crabs they sourced. According to research by SFP, 10 cm would have been a better limit to set for conservation purposes, but 8 cm was the compromise reached (SFP 2011).

In Indonesia, the Ministry of Marine Affairs and Fisheries (MMAF) acted ceremoniously on this, and in April 2011 MMAF's Directorate General of Fishery Products and Marketing sent a letter to each provincial fishery office stating that it encouraged collectors and mini-plants to follow the same size limit. In July 2011, the members of APRI formally agreed to adopt the 8 cm minimum size limit.

Compliance and enforcement

The progress made by APRI and the NFI Crab Council to date is impressive. An 8 cm minimum size appears to be a reasonable starting point, and if enforced, would likely have a positive effect on the sustainability of the crab fishery. Enforcement, however, is particularly tricky in this fishery. Fishing effort is widely dispersed over large areas, and the numbers of both small-scale fishermen and intermediaries are daunting. Anecdotally, it is not difficult to determine whether picked crab meets the minimum size limit, but in practice the measurement is labor intensive, and there are clear incentives for intermediaries to include undersized crab in picked meat. Also, as long as undersized crabs are purchased, albeit at a lower price, there is little incentive for fishermen to stop catching them. Without vertical integration, there are also wide-ranging incentives from the pickers on up through the supply chain to mislabel and sell undersized crabmeat. As long as there is little vertical integration in the fishery, enforcement from exporting processors will be quite difficult.

Considering the complexities and uncertainties of regulatory and legal approaches to improving sustainability in Indonesia, price-driven measures to impose minimum size limits are attractive, and the amount of the market for crab taken up by the members of APRI gives them quite a bit of market leverage. There are, however, significant exports to other countries, as well as companies that are not members of APRI. If undersized crab meat is simply being sold to those companies, then the sustainability advantage of paying more for crabs over 8 cm may be lost. Each mini-plant, let along each port and landing site, is different, so experiences should not be extrapolated.

Undersized and dead crabs are sold for significantly less than alive and large enough. However, despite the lower price, it is likely that smaller crabs are still purchased to help provide livelihoods for fishermen. It seems unlikely that undersized crabs simply go to waste. Are they cooked and picked? If so, where does the meat go? Understanding what happens to undersize crab purchased by mini-plants (or sold anywhere by fishermen) is essential to understanding the potential effectiveness of the minimum size limit imposed by APRI and the NFI Crab Council, but to date there is little information available.

Philips is closely monitoring its processing plants around Indonesia, and has at least one vertically integrated facility in Lampung where they are taking crabs from fishermen to export. In other areas, however, volumes are not large enough to justify this integration. And even in those cases where Philips buys directly from fishermen, those fishermen may still be able to sell undersized crabs elsewhere.

Little research has been done on the organization of the fishermen themselves, but this seems like a fundamental aspect of moving toward sustainability. Again, each location will vary, but formal institutions (organizations such as *kelompok nelayan*), informal institutions (such as village-based territories), and even underground institutions (such as the lending and loyalty relationships between collectors or mini-plants and fishermen) may all have significant bearing on the ability of processors to affect fishermen behavior, and will likely be a fundamental to lasting sustainability measures. While the current minimum size limit is likely having a positive effect on the sustainability of the fishery, because there are buyers outside of APRI, and because the incentives along the supply chain favor the inclusion of undersized crab, it is not clear exactly what effect the minimum size limit is having. More rigorous monitoring and enforcement will ultimately have to start on the water, and without any sort of exclusive access or territories in the crab fishery, it will be exceedingly difficult to align the incentives of the fishermen with a sustainable fishery.

Key features of the blue swimming crab fishery

- Open access fishery
- The area where the fisheries is taking place is large—ranging from Sumatra through Java to Sulawesi and beyond—and the community structure varies widely within the area
- Simple management measures, such as setting a minimum size limit and reducing catch of berried females has the potential to generate significant conservation improvements.

- There are large numbers of "mini-plants" where crabs might be bought, cooked, and/or picked before being canned
- There are a small number of processors who predominantly export to the U.S.
- The processors have formed an association (APRI), which has agreed on a minimum size limit of eight centimeters; there is leadership and funds from the U.S. Crab council
- The enforcement of the eight centimeter rule is not clear

References

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Case 4: The Lesser Sunda Sustainable Fisheries Initiative (Multi-Species)[4]

Background

The Lesser Sundas are a chain of islands stretching from Bali in the West to East Timor. It includes Komodo National Park and is one of the 11 eco-regions of the Coral Triangle. It is also characterized by very strong currents and, in recent years, destructive fishing, overfishing, pollution and coastal development (Wilson et al 2011). These activities have been focused around Bali and Lombok, however; many fisheries around the central and western islands are not yet well-developed.

Because of the islands' proximity to each other and to the markets of Bali, fish are largely transported by truck (and the occasional ferry) to Bali, even from further islands. At present, there is significant loss (up to 40%) of product due to spoilage during transportation. Reducing losses through the supply chain is one of the opportunities targeted by the Lesser Sunda Sustainable Fisheries Initiative (LSSFI), an industry-led project to develop a profitable, sustainable fishery in the region.

The LSSFI is led by P.T. Bali Seafood International (BSI), a Bali-based joint venture between North Atlantic, Inc. (a seafood processor, importer, and distributor based in Portland, Maine) and its Indonesian partners (which include processors, distributors, and exporters). The LSSFI has

[4] This case study is a slightly edited version of a section of the following report: DeAlessi, M (2012) Currents of Change: The Political Economy of Fisheries and Marine Conservation in Indonesia, a report to the World Bank's ALLFISH Program.

also reached out to a broad range of organizations to collaborate on research and development of more sustainable fisheries in the Lesser Sundas, including the Sustainable Fisheries Partnership, The Nature Conservancy, the World Wildlife Fund, LINI (a local Indonesian NGO), the Indonesian Ministry of Marine Affairs and Fisheries, and academics at UC Santa Barbara.

Key components of the LSSFI:

- Using economic incentives to move fishermen toward sustainable practices by:
    - having exclusive agreements with buyers
    - helping to create exclusive access for fishermen to both fishing areas and premium price markets;
- Developing mini-plants throughout the region to improve quality and reduce transport-related losses of product;
- Minimizing the role of middlemen, who often have debt-related strangleholds on fishermen, by
    - instituting a transparent price system and prompt payment
    - providing fishermen with micro-financing support through company mini-plants;
- Creating a public-private licensing system that allows only certified fishermen to access markets and to receive higher prices from a network of buyers and collectors, including incentives for reporting unlicensed fishing and/or buying and selling of fish;
- Targeting a suite of species including both pelagic species such as Tuna, Swordfish, and Mahi and reef fish such Snapper, Grouper, and Emperor;
- Engaging the scientific community in developing data-poor methods of assessing fisheries sustainability, as well as teaching fishermen and/or buyers to record these measures;
- Engaging local government to create fishery management plans including local regulation of fishing effort and licensing of all fishing boats (including plans to allow district to extend its management authority to the provincial limits, that is, from 0-4nm to 4-12nm);
- Engaging national and provincial governments to ensure that local success is not subject to regional or national political opportunism;
- Creating no-take marine reserves, especially to protect spawning areas, under the auspices of local government and with economic incentives for local enforcement.

The LSSFI is still under development and it will be some time before it is up and running. Hence, it is not yet possible to assess its effectiveness. It certainly does not lack for vision and for an approach that takes into account the incentives necessary for sustainable fishing at all levels, from fishermen to buyers to processors and exporters, from local to national government, and through academia, NGOs, and development agencies that have a similar interest in sustainable fisheries and livelihoods.

The LSSFI is clearly aware of the fundamental importance of limited access to sustainable fisheries. It is not simply a private initiative; it is a public-private partnership depending on the

local and district public sectors to take many potentially controversial steps to limit access to both fishing grounds and markets. Direct engagement and partnership with the public sector in the definition of rights and territories is ambitious, but fundamental to the success of the project. On the other hand, it also risks trading what is essentially a legal, regulatory, and political vacuum for the uncertainty of dependence on public agencies for not just enforcement but the creation of limited access. On top of this uncertainty, the LSSFI was developed before the marine concession aspects of Law 27/2007 were struck down. It is apparent that provincial and district government still have the authority to manage fisheries and marine areas but some legal uncertainty remains.

If successful, the LSSFI could be a model of engagement at all levels of government, the fishing industry, and the academic/NGO/development community. Implementation, especially with a population of approximately 25,000 fishermen in the region, will be tricky and likely politically contentious. If successful, however, the LSSFI will be a model for market-based sustainable fishing in Indonesia.

Key features of the Lesser Sunda Fisheries

- Access rights to marine resources in Lesser Sundas are generally not well defined
- Widespread corruption and instability of regulation and enforcement
- Middle men and their roles are well established in the region
- Local fishermen have low incomes and are often indebted to middlemen who provide loans and credits
- Fisheries lack organized supply chains to bring fish from the water to international markets without significant spoilage
- Lack of reliable data related to the status of fish stocks and catches
- Growing interest in limiting access to fisheries, but no precedent for involving local government in defining exclusive access to fishing grounds and markets
- There is broad-based support from NGOs, academia, the private sector and development agencies to support the LSSF

References

De Alessi, M (2012) Currents of Change: The Political Economy of Fisheries and Marine Conservation in Indonesia, a report to the World Bank's ALLFISH Program.

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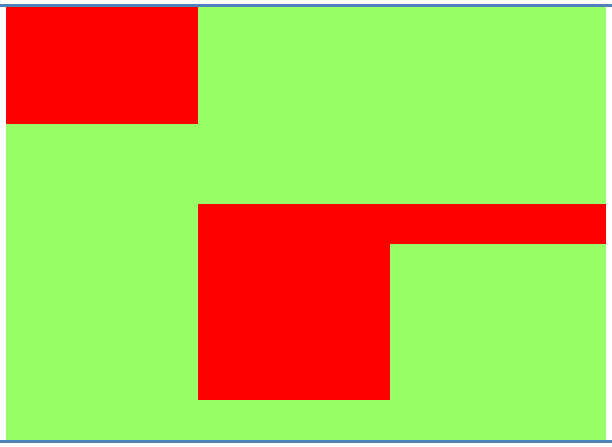
Wilson, J., A. Darmawan, J. Subijanto, A. Green and S. Sheppard, 2011. "Scientific Design of a Resilient Network of Marine Protected Areas: Lesser Sunda Ecoregion, Coral Triangle." Asia Pacific Marine Program Report 2/11. 96 pp.

How do the case studies fit into the spectrum of success/failure characteristics?

Below is a summary of how the case studies fit into the spectrum of success and failure characteristics. Boxes shaded in green meet the success characteristics whereas the boxes highlighted in red fit the failure characteristics. The more green boxes, the more likely a case is to succeed.

BEST CASE	MEXICO LOBSTER	INDONEISA BLUE CRAB	SENEGAL SMALL PELAGIC PROCESSING	WORST CASE
Organization				
Homogeneity among members				**Heterogeneity among members**
Clear goals				**Lack of or conflicting goals**
Risk sharing				**Uncertainty and risk**
Transparency				**Lack of transparency**
Strong leadership				**Poor leadership/corruption**
long term thinking				**Short term thinking**
High capacity				**Low capacity**
Fisheries characteristics				
Tenure by fishers				**Open access**
Value of product (high price)				**Low value product (low price)**
Market characteristics				
Market access (nearby)				**Market access (distant)**
Policies that limit # of producers and/or entry into fisheries				**Highly competitive/open entry**
Fishers can influence price				**Fishers lack control of price setting**
Limited # of buyers (limits cheating)				**Many buyers**
Provision of services				
Access to new gear				**No services**
Access to training/information/capacity				**No services**
Access to credit				**No services**
Fisheries and processing characteristics				

Economies of scale (reduced input cost per unit)		**No economy of scale**
Steady supply of product		**Supply/catch varies**
Traceability		**No traceability**
Branding/quality of product		**Varying product quality**
Food safety standards		**No food safety standards**
Production efficiency		**Inefficient production**

Best case

Worst case