USAID | COLOMBIA
DEL PUEBLO DE LOS ESTADOS UNIDOS DE AMÉRICA

BIOREDD+ Program

DELIVERABLE 9: COLOMBIA FLEET BUY OUT EXTENDED CONCEPT DOCUMENT. PROVIDING ECONOMIC AND ENVIRONMENTAL BENEFITS TO THE COLOMBIAN PACIFIC

Subcontract number: EEP-I-00-06-00013-00-Smithsonian-01
Name: Smithsonian Institution

March 2015

This document was produced for review by the United States Agency for International Development. It was prepared by Smithsonian Institution for the BIOREDD+ Project, task order number AID-514-TO-11-00002.

Executive summary

Bottom trawling is an industrial fishing technique whereby a boat drags a net across the seafloor to collect fish, shrimp and other animals. Trawling is considered one of the least selective fishing methods responsible for a high level of by-catch of around 5:1 non-target to target catch, extensive habitat damage that reduces biodiversity by 50% on the seafloor and is fuel intensive, using around 15 gallons of diesel per hour when trawling.

In the Colombian Pacific there are two shrimp trawl fisheries, one targeting shallow water shrimp in waters down to 40m and one targeting deeper water shrimp in waters around 150m. Both fleets have been in decline since the late 1990s. The overexploitation of shrimp, the rising fuel prices and the falling dockside value, has left the fleet over capitalized with many trawlers not leaving dock as their projected catch revenue would not exceed their costs. In 2009 the shallow water fleet made a combined loss of $500,000 and the fleet has continued to contract. The active fleet contracted from 40 boats in 2014 to just 25 in 2015.

As the shrimp fleet struggles economically captains are vulnerable to making poor fishing choices, extending their range or expanding their fishing gear to increase fishing effort. These changes impact coastal communities. Trawlers encroach into near shore waters used by small scale artisanal fishers and use their fishing gear to target fin fish instead of shrimp. These activities affect catch levels of local small scale fisheries and the livelihoods and food security of coastal communities.

There now exists an important opportunity to solve the economic problems of the shrimp trawl fishery, provide measurable protection to marine biodiversity and remove the spatial conflict between industrial and artisanal fishers in the Colombian Pacific. Using external finance through a combination of philanthropic money and novel finance mechanisms capital can be raised to buy out the shrimp fleet.

The total value of the 25 remaining shrimp boats is estimated to be around US$ 5 million. This can be raised from philanthropic donors interested in the large positive impacts removing trawling will have on marine biodiversity. This philanthropically funded buy out of shrimp trawling occurred in Belize in 2009. Government funding could also be used to assist this program by transferring the current fuel subsidy of 1,500 pesos per gallon (US$0.65) into the fleet buyout. Based on the estimated fuel use of the existing fleet this would accrue $500,000 a year.

A combination of philanthropic donor interest, technical expertise and government support must be garnered to enable this solution to solve this problem and work with the fishing industry to end trawling in the Colombian Pacific. The background to this idea and a path forwards are detailed in this document.

An overview of trawling

Trawling, actively dragging a net to catch fish and shrimp, is a method of fishing that has been used for centuries. In fifteenth century Europe nets pulled by horses were dragged across mud flats at low tide to catch shrimp. Around the same time, concern about the impacts of trawling emerged. The first law to protect areas from trawling was passed in Flanders in 1499 and cited that this fishing method “rooted up and swept away the seaweeds that served to shelter fish”.

Trawling today has evolved into an intensive industrial fishing method. The trawls used to catch shrimp, including those used by the Colombian shrimp fleet, are known as “otter trawls”. Otter trawls consist of a 50 to 75 meter long funnel shaped net, which is lowered to the sea floor and dragged across its surface. As the net is pulled by the fishing boat, the two large boards at the mouth of the net are pushed apart by the flow of the water to keep the net open. The top of the net is kept up with floats whilst the bottom of the net is weighted to stay on the bottom. The bottom edge of the net normally has "tickler chains" which create noise and disturb the sediment to move animals up off the bottom and into the net. In areas with rocky substrate, large steel balls can be attached to the bottom of the net to bounce the net up off the bottom. These balls, called “rock hoppers”, protect the net from being snagged and also break protruding rocks reducing bottom complexity.

Trawling is a fuel intensive fishing method. The heavy net with its wide mouth and small mesh size creates significant drag as it is pulled through the water. On average a shrimp vessel uses around 15 gallons of diesel per hour of trawling. On a three month fishing trip a trawler will use around 15,500 gallons of diesel.

Trawling for shrimp uses around 15 gallons of diesel an hour

Trawling is normally conducted in two hour sessions. The net is then retrieved and the contents emptied onto the deck of the vessel. Shrimp and other higher value species are sorted and retained from the mixture of marine life that was collected in the net. The remaining species are discarded back into the sea. Most of these animals will have been killed through the trawling process, either having been disturbed by the tickler chains or by being crushed in the back end of the net as it is dragged through the water. Opportunistic sea birds such as gulls follow trawlers in large numbers to consume this smorgasbord of unwanted biomass.

Impacts of Trawling

Trawling reduces the biodiversity and abundance of marine life through its unselective nature that removes a wide range of both motile and sessile marine organisms. Bottom trawling also affects habitat quality through the disturbance and damage to the seafloor. Trawling is considered one of the most damaging fishing techniques currently employed in industrial fishing.

Seafloor impacts

The shrimp fishery creates environmental impacts through habitat disturbance as it rakes the seafloor during its trawls. This has been likened to the clear cutting of forests (Watling and Norse 1998) and the associated disruption of ecological processes (Thrush and Dayton 2002). Trawling profoundly disturbs the structure, composition and function of the marine environment. Trawl nets remove shrimp, fish and other animal and plant species, the fishing gear break, crush, and bury seafloor communities and habitat structures through which they are towed. Repetitively raking the same patches numerous times per year means that animals and plants do not have sufficient time to recover (Watling and Norse 1998). The destruction of the seafloor ecosystem significantly reduces the productivity of the area for the shrimp fishery, and affects critical habitats for other commercially and ecologically important marine and coastal species.

The impact of trawling on life of the seafloor has been likened to clear cutting of forests

Changing the structure and function of the seafloor

Trawling leaves the seafloor flattened and homogenizes the important texture and topography that provides refuge for seafloor dwelling organisms. Removing these structures and habitats can decrease the availability of refuges for plants and animals reducing successful settlement of juveniles and leaving them exposed to greater predation as they grow.

Smoothed

Seafloor sediment structures such as ripples and sand waves have important hydrodynamic functions, creating a boundary layer of lower water movement that provides shelter from currents close to the seafloor enhancing the ability of recruits to settle. These are wiped away by trawling.

Overturned

Larger structures such as rocks, stones and pebbles are overturned, reducing cover and predator protection. Encrusting organisms like sponges, corals and tubeworms that attach to the solid surfaces are killed. Many marine organisms attach their eggs to solid surfaces to anchor them in place. These eggs are detached and damaged by trawling.

Broken

Trawling removes biogenic structures (structures built by animals such as shell aggregates, tunnels, tubes, and reefs) as well as the animals that build them. In additional to providing habitat, these structures and the processes that build them have essential biogeochemical roles in oxygenating the deeper sediment layers, and stabilizing loose sediments.

Impacts on Sediments and Geochemical Cycling

The seafloor sediments including organic matter that is decomposed and locked away by seafloor organisms. These important biogeochemical pathways are disrupted by trawling as sediment is re-suspended in the water column, changing the nutrient dynamics, water sediment load and light attenuation of the area. Trawling may make the water increasingly turbid reducing light penetration and limiting photosynthesis in shallow waters. Suspension of non-organic particles of silt and clay also reduce the efficiency of filter feeding organisms as they expend energy sucking in and expelling particles with no nutritional value.

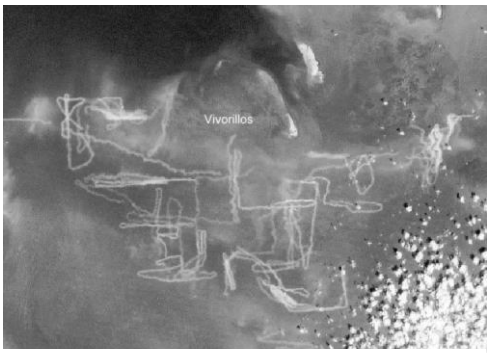

Figure 1 – Trawlers leave sediment plumes in their wake that are visible from satellite. This suspension of particulates significantly reduces carbon cycling on the seafloor

Trawling may also expose and recirculate toxins such as heavy metals. Coastal pollution discharges heavy metals and other toxins into the coastal zone. The seafloor locks these away in the sediments, but with trawling these contaminants will be dispersed to other ocean habitats and remain in the water column for longer. This may be specifically important for mercury on the pacific coast of Colombia.

Food quality and availability for bottom feeders is reduced. Organic matter deposited on the surface of sediments typically contains the highest quality food particles. These nutrients are re-suspended and oxidized before resettling as lower quality food.

Significant amounts of carbon that are in the process of being locked away in the seabed sediments are disturbed are released back into the water column. Frequent trawling can have a huge impact on carbon cycling of the seafloor and the efficacy with which atmospheric carbon is locked away

Community composition

Trawling removes the animals and plants from the seafloor and changes the composition of the community reducing it from a mature, diverse ecosystem, to a few opportunistic species. The early colonizers that first return to disturbed areas are not the same as those that form the climax community of undisturbed areas. Short lived rapidly reproducing species such as nematode worms dominate colonising communities before larger longer lived organisms such as sponges, can become re-established. If trawling is frequent then more diverse communities never have the opportunity to recover having a significant impact on biodiversity. These chronic impacts of trawling of altering the community composition reduce biodiversity on the seafloor by 50%. Reducing structural complexity and the long established community can change complete food webs. Enduring changes are likely when large quantities of fish and other species are removed and the habitat is significantly altered. As long as intensive trawling continues the composition of the community is unlikely to revert to its original state. In some cases the community may adopt an alternate stable state dominated by a completely different suite of animals.

Trawling reduces biodiversity by 50%

By Catch

The nets of trawlers are nonselective. All species in the path of the net can be swept up and will be retained if larger than the mesh. But, as the net continues and the mesh at the backend is blocked by the animals already caught, animals below the mesh size are also retained. Trawling removes species with no commercial value such as sand dollars, sea stars, corals and sponges as well as juvenile fish and even large vertebrates. Catch that is either unused or unmanaged and is not the principal target of the fishery is called bycatch (Davies, Cripps et al. 2009). Unused catch refers to catch that is discarded (alive or dead) and neither sold nor used after landing. Unmanaged catch are individual species or groups of species that are of economic value that are caught and retained by the fishery but do not have specific regulations within the fishery to ensure the take is sustainable.

The weight of bycatch far surpasses the targeted species in trawl fisheries (Andrew and Pepperell 1992). Shrimp trawlers as a whole produce the highest level of bycatch of any fishery, with the mean global composition of shrimp trawls being 84% bycatch and only 16% shrimp (Alverson, Freeberg et al. 1994). This means that for every 1 kg of shrimp caught there is an associated 5.25 kg of fish bycatch. The weight of the other marine life that are caught such as sponges, plants and seaweed is rarely quantified.

There are a number of devices that have been integrated into the trawl fishing gear to reduce the level of associated bycatch. These include Turtle Excluding Devices (TED's), Fish Escape Devices (FED's) and Bycatch Reduction Devices (BRD´s). These devices are often associated with the reduction of catch rates in a specific species or family (Watson and McVea 1977) (Criales-Hernandez, Duarte et al. 2006) (García, Perez et al. 2008). But despite the introduction of these devices, bycatch remains a significant issue (Manjarrés, Duarte et al. 2008).

Large numbers of commercially valuable finfish can be removed by the shrimp trawl. Importantly these include juvenile and sub-adults causing growth overfishing (Gallway, Longnecker et al. 1998) (Herazo, Torres et al. 2006). For example, the shrimp fishery in the Gulf of Mexico removes significantly more individuals of red snapper per year than the fishery targeting red snapper. 65% of the snapper caught in shrimp nets were under one year old (Workman and Foster 1994; Gallway, Longnecker et al. 1998). Other published examples of the shrimp fishery impacting fin fish fisheries include in the Belize (RDA 1991), Cuba (Valdés, Villafuerte et al. 2010), and the Colombian Caribbean (Herazo, Torres et al. 2006).

About the Colombian trawl fishery

The industrial shrimp boats in Colombia average 25 meters in length and are powered by diesel engines of between 320 to 680 HP. They use otter trawls to harvest five target species of shrimp. Trawls are concentrated at night due to greater associated catch rates but (Duarte, Gómez-Canchong et al. 2006) but may also occur during the day. The duration of the fishing trip is dependent upon shrimp production, but may last up to three months. During this period the fishing vessels rendezvous with a transport ship to transfer their harvest and receive supplies and fuel to continue fishing.

Shrimp fishing is a fuel-intensive enterprise. Shrimp boats use up to 15 gallons per hour when they are trawling. Fuel contributes between 50% and 70% of the daily operating costs. During a 90 day fishing trip a vessel would use around 15,500 gallons of diesel.

Fuel is therefore the largest single cost factor that determines if it is profitable to trawl or not. With escalating fuel costs since 2001, shrimp fishermen have paid record prices for fuel while receiving historically-low prices for their shrimp. Colombian boats receive a fuel subsidy in the form of a tax break of US$0.60 per gallon but even with this assistance the profit margins have reduced considerably. AS a result the Colombian fleet has continued to contract in size and licensed vessels remain tied up on the dock during fishing season. In 2015 only 25 trawl vessels were actively fishing at the start of the shrimp season on March 1st

Spatial conflict from the Shrimp Industry

The falling profitability of the shrimp fishery may explain why there are increasing reports from affected coastal communities of the industrial shrimp fleet trawling close to shore and around their principal fishing grounds.

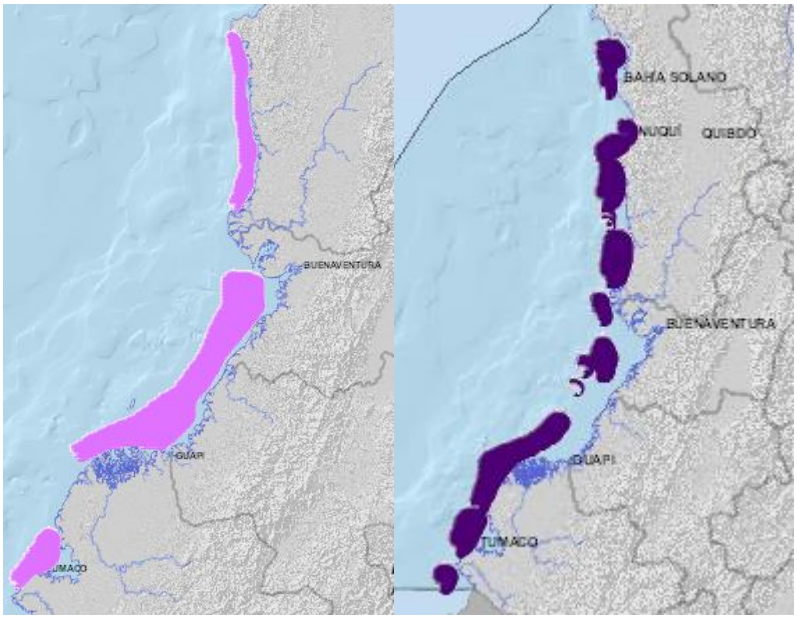

Figure 2 – Shallow water trawling grounds (left= cover 4500 km^2 of the Colombian Pacific. Deep water trawling grounds (right) cover 4000km^2. Data from INVEMAR

The fleet are based from Buenaventura and the deep water shrimp grounds extend for 4000 km^2 from the border with Ecuador up to Bahia Solano. Shallow water grounds are in near shore waters covering 4500 km^2 across the entire extent of the Colombian Pacific with the exception of the Gulf of Tribuga which has been declared a no trawling zone. The extensive range of these fishing activities means that they have the potential to cause spatial conflict with all communities of the Colombian Pacific and the estimated 11,000 fishers that fish in this region.

Solving the problem

Closing the shrimp trawl fishery would provide a lasting solution to the problems associated with the trawl fishery. The government can permanently close the trawl fisheries on the Colombian Pacific and use a combination of public and private funding to compensate the owners of the vessels who have invested in the fishery infrastructure. This solution would not only provide economic relief to a struggling fishing sector but would guarantee the protection of large areas of marine biodiversity from chronic disturbance, remove spatial conflict among fishing fleets and demonstrate a policy to help and prioritize small scale fishers from afro-descendant communities.

Under this restructuring plan the artisanal sector for shallow water shrimp also needs to be improved. Tighter controls must be applied to remove the existing use of illegal fishing gears including “baby trawls” (Changas) from the artisanal fleet to ensure that they do not simply replace the industrial trawlers with a fleet of small trawlers. Further the artisanal fishery must respect the shrimp closed season. The closure of the industrial shrimp fishery can be used as an opportunity to negotiate management agreements and form responsible fishing charters with the afro-descendant communities especially in the south areas around Buenaventura and Tumaco. The artisanal fishers realize that removing the competition from the industrial fishery is a great advantage for them and demonstrates that the government is prioritizing the artisanal sector and their interests. With that prioritization comes an obligation to fish responsibly. To provide a market incentive for these changes artisanal fishers can be connected up to the same packing plants that currently process shrimp from the industrial boats. The aim is to have a well-managed small scale shrimp fishery to replace the industrial trawlers with the objective of increasing dock side value for local fishers and maintaining good market condition of the shrimp.

The cost

The fleet continues to contract in response to rising costs and falling revenue. In 2015 just 25 trawlers were licensed in the Colombia Pacific. At the beginning of the shrimp fishing season only 7 of the 25 went fishing. Many vessels did not leave port because they projected that catches would not exceed costs.

The vessels are steel hulled trawlers and their total value including fishing gear is around US$200,000 each. Purchasing the vessels and scrapping them to remove them from service would therefore cost around $US 5 million.

The Funding

The large marine conservation gains available through closing trawl fishing are attractive to large international philanthropic organizations. In Belize the trawl fleet closure was funded by philanthropy. An agreement between donor foundations and the government of Belize was reached where by the donors would fund the fleet buy out and the government would sign legislation to prohibit trawl fishing. If the government later reversed that legislation they would have to pay back the initial investment plus accrued interest. There are several international foundations such as Oceans 5 that support large, opportunistic projects and so would likely be interested in funding a similar solution in Colombia.

Further, the Colombian government could also assist in funding the closure. The government currently offers a fuel subsidy in the form of a tax break on fuel for trawlers. This subsidy is 1,500 pesos (US$ 0.65) per gallon. A trawler will use around 31,000 gallons of fuel during the fishing season, assuming 6 months of active fishing. With the 25 boats remaining in the fleet this means the government is potentially subsidizing the fleet to around $500,000 per year. This subsidy could be realigned to the buyout fund or used to assist in the transition of artisanal boats into responsible shrimp fishing. The closure of the trawl fishery would reduce carbon dioxide emissions by 7,800 tons per year that the government could also incorporate into its carbon offset budgets.

Steps to closure

1. **Establish a political champion for the trawl closure**

Engage the Colombian Ocean Commission to provide a clear message and garner political support that resolving the economic problems in the shrimp fishery helps the industry whilst also providing measurable marine conservation outcomes for Colombia

2. **Consensus with industrial fishers**

The industrial fishery sector must be engaged so that this initiative is seen as helping its struggling economic outlook by compensating vessel owners to leave the fishery.

3. **Pass legislation to prohibit trawl fishing**

Fisheries legislation must be put in place to permanently ban trawl fishing on the Colombian Pacific

4. **Confirm philanthropic investors to fund fleet buy out**

Develop funding agreement from philanthropic investors to finance the closure of the shrimp fleet. Funders will seek clear political will for the closure demonstrated through legislation

5. **Realign fuel subsidies to artisanal transition**

Develop mechanism to use the potential fuel subsidy from the trawl fleet to assist artisanal fishers remove damaging fishing practices such as baby trawls and adopt best fishing practices for shrimp

6. **Engage afro descendant fishing groups to adopt responsible artisanal shrimp fishing**

Fisher associations and community councils must agree to prohibit and prevent the use of baby trawls in the near shore areas and adopt a transition to improved small scale shrimp fishing practices.

7. **Realign market chain to supply packing plants**

Work with communities and packing plants to establish supply chains from artisanal fishers into local packing plants that can process high quality shrimp for both national and export markets

8. **Establish long term monitoring program**

Measure the recovery of the seafloor biodiversity once trawling is removed and the benefits to the local fishers to demonstrate that the policy worked to provide both environmental and economic benefits

Logical time frame – Closure in 2016

The shrimp fishery is struggling now so it is opportune to try and resolve this problem as soon as possible. A road map to closure can be established during 2015 that engages the government, industrial sector and artisanal fisher groups to form consensus for a funded fleet closure. Engaging and establishing agreements with donors could be in place to buy out the fleet during 2016.