



USAID | **COLOMBIA**
DEL PUEBLO DE LOS ESTADOS
UNIDOS DE AMÉRICA

BIOREDD+ Program

DELIVERABLE 5: MANAGEMENT STRATEGIES FOR MARINE & COASTAL FISHERIES AROUND BUENAVENTURA PART I - PIANGUA

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

September 2014

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.

The Target

The “Piangua” *Anadara tuberculosa* is a “blood cockle” found in mangrove estuaries along the Pacific coast of the Americas from southern Baja California Mexico to Northern Peru. Individual cockles are found amongst the prop roots of mangroves, buried at about 15 cm depth in the estuarine mud.

The Fishers

Piangua are harvested by hand from mangroves at low tide. Collectors walk through the mangroves and identify signs of piangua hidden in the mud by finding a syphon hole. The syphon acts like a snorkel to provide air to the buried mollusk. Collectors push their hand in to the mud locating the piangua by touch before pulling it out. Piangua collecting is often a communal activity with groups of women foraging for piangua together, often accompanied by their children.

The Importance of Piangua

1. *Low cost fishery*: No specific equipment is needed to enter the fishery so the collection of piangua can be especially important in low income rural communities where the costs of fishing gear and boats may limit access to other fishing activities.
2. *Food security*: Piangua provide a source of high quality protein to families and supplemental income to coastal communities. The collection and consumption of piangua provides an important nutritional safety net. If the catch from other fishing activities is not sufficient families can fall back on collecting piangua from surrounding mangroves to supplement their daily diet. The many recipes of piangua used in local dishes also form an important part of the region’s culinary heritage.

*...piangua provide a
nutritional safety net for
coastal communities.*

3. *Supplemental income*: Although unlikely to be sufficient as the sole source of income for a household, the sale of piangua provides an opportunity for additional income. Piangua in trade are sold by collectors to local merchants who provide the economy of scale necessary to reach main cities for national consumption and export through informal market chains. Eighty Percent (80%) of the piangua in trade are

destined for Ecuadorean markets as beyond the coastal zone consumption of piangua in Colombia is limited.

4. *Livelihoods for women and social cohesion*: Collecting piangua for local consumption and sale provides employment for women in areas where few alternative livelihoods exist. As a communal activity the fishery provides the opportunity for groups to work together and unite around a common task. These groups have the potential to be organized as “natural management units” for the fishery.

The Good News about Piangua

The piangua fishery underpins local food security, is predominantly women oriented, and provides supplemental household income in rural areas. Ensuring sustainable piangua fisheries should therefore be a fisheries management priority. Compared to multispecies fisheries, targeted by a variety of fishing gears, deployed by a range of different fishers the piangua fishery presents a much simpler management scenario. Piangua is a single species fishery, harvested in a highly targeted method with no by-catch, habitat damage or other deleterious fishing impacts.

The sedentary nature of the piangua also provides a simple proposition for management compared with the complex life cycles, habitat shifts and migratory behaviors of many commercially important fish. Unlike free swimming fish, which may move between near shore and off shore areas or migrate along the coastline passing by multiple fishing communities, once piangua have settled into the mangrove root mud they are not going to move to another area. This means it is relatively simple to connect fishers to specific “stocks” of piangua and focus work on how to help them manage their area and their population of piangua sustainably.

Piangua is also a relatively high profit margin fishery. Although the unit sale price of Piangua is low, the collection costs are very low and there are no upfront costs to enter the fishery. Collecting Piangua is also relatively resilient to increasing fuel costs. There are no fuel costs for harvesting and fuel costs to reach collection grounds would be minimal. Transport costs to market would be affected by rising fuel costs, but these increases are absorbed by the market chain rather than an upfront investment by the piangua collector. These economic considerations are important as piangua collectors would be unlikely to end up in debt as a result of the fishing excursion. Debt in fisheries is a wide ranging problem pushing overexploitation and poor fishing behavior as fishers try to recover from previously accumulated debts

where the costs of the fishing trip exceeded the catch revenue. As fuel costs rise and catches fall this is a growing problem in most fisheries sectors but fortunately one that the piangua fishery is resilient to.

A New Approach

The piangua fishery has commonly been framed as a fishery that is in need of urgent attention because of concerns of over exploitation to supply high demand in Ecuador. Top down management has been encouraged to implement minimum sizes and policies to try and boost domestic consumption whilst controlling the current informal exports to Ecuador.

Trying to achieve these management objectives through a centralized, top down approach would seem to be difficult and prohibitively expensive, with management costs easily able to exceed the total revenue from the fishery. The remote locations of the fishing communities, the ease of maritime transport and the established market chains to reach Ecuadorian markets combined with the low presence of government institutions responsible for fisheries management would all seem to hinder this approach.

Encouragingly, however, the piangua fishery presents an unusual opportunity to reverse the management emphasis from top down control to a bottom up, participative framework that can align economic incentives with sustainable fisheries objectives. Strong connections exist between individual fishing communities and their collection grounds. By

Data from BIOREDD shows connections between communities and collection areas

		Community			
		Bazán Bocana	Puerto España	La Plata	Encanto
Piangua Area	Estero Bazán		Estero Barrial	Manglar de piangua grande	La Marcela
			Estero Cojón	Estero Grande	Agüero
			Estero Pital	Luisico	Guachalito
				Manglar de la Pajarera	Audón
				El Cucho	Aguacaliente
				Manglar Santa Rita	Guachal
				Manglar de Dos Peñas	El Pipón
				Manglar de la Quincha	La Herradura
				La Peregrina	Posita
					Zambrano

Commented [PH1]: SE PUEDE PONER EN MAPA? CON COLORES POR NOMBRE DE COMUNIDAD ASOCIADO A LOS ESTEROS O SITIOS DE COLECTA QUE USA.

working to formalize these connections under a rights-based-management (RBM) framework, that grants exclusive use of defined areas to specific communities, there is an incentive for local groups to provide the management oversight necessary to ensure both a sustainable fishery and improved long term productivity.

The BIOREDD data suggest that there is strong site fidelity between specific communities and their harvesting grounds as well as clear separation among communities, so that piangua collection areas are

rarely shared by different communities. These attributes provide a perfect foundation for fostering rights based management at a community level.

Commented [PH2]: PLUS THE LEGAL LAND TITLE THAT MOST AFRO COMMUNITIES HAVE IN THE PACIFIC COAST

Rights Based Management Approach

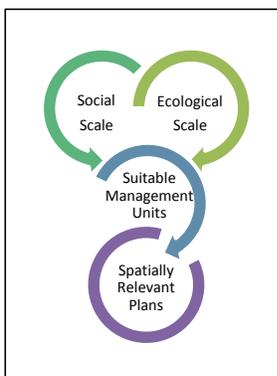
Globally there is increasing emphasis on finding solutions to end overfishing in small-scale, low governance coastal fisheries by empowering communities to become stewards of local resources. The consensus from experts is that rights-based management which provides individuals or groups secure rights to a defined resource delivers better results for conservation, fisheries, and ecosystem management than an open access fishery where fishers compete with each other to take fish.

Rights based management removes this motivation to “race to fish” by providing a guarantee to fishers that if they leave fish behind it will still be there in the future and not taken by someone else. Stopping this race can improve stewardship and long term planning and in so doing strengthen the conservation focus of fishing communities creating a positive spiral of stock improvement, growing harvests, and sustainable fisheries.

Establishing Rights Based Management

Step 1 – Define socially relevant spatial scale

The socially relevant spatial scale for the collection of piangua is a map of which communities use which mangrove areas for the collection of piangua. Connections can be defined through the use of existing data sets that identify communities and their collection grounds. Understanding the “natural” boundaries among neighboring communities in terms of their existing use of mangrove areas contributes to defining suitable spatial management units for exclusive use agreements.



Step 2 – Define ecologically relevant spatial scale

Piangua are obligate to mangroves and do not live in areas without *Rhizophora* mangroves. At the coarsest scale defining the spatial extent of the fishery can be done by mapping the presence of intertidal mud around *Rhizophora mangle*. Once piangua have settle into the mud they stay in one place for the rest of their life. Piangua, however, have a larval dispersal phase where eggs and larvae are

moved by prevailing currents. This dispersal means that piangua found in different mangrove areas may be connected together as part of one larger population due to larvae from one location seeding another area. To define how piangua are connected among different mangrove areas requires combining a near shore oceanographic current model which shows how water moves in the area, with larval life-cycle data for piangua. Both these data sets are currently available. A model can be produced to help identify likely connectivity patterns and help define natural boundaries between different areas. Natural boundaries may occur where local eddy currents retain larvae within a specific area, or river outflows that cause barriers to near shore connectivity by pushing larvae out to sea.

Step 3 – Suitable management units

Understanding how piangua areas are connected together ecologically can help determine which communities need to work together in order to implement effective management over that population.. Overlaying the ecological relevant management units of the piangua as determined by connectivity matrices¹ with the social management scales as determined by bank usage by communities, can help identify the boundaries and appropriate scale of management for the fishery across the region of interest.

Step 4 – Spatially Relevant Plans

Once an understanding of which communities are sharing a common resource, it is then possible to focus on bringing communities together to form management strategies that will benefit their common interest.

Delineating the fishery into management areas that connect communities to piangua banks can be achieved by building on both the social and ecological data. This is then the basis for formal inter-community access right agreements defining which communities can use which banks.

By scaling the management to the relevant ecological and social scale of the fishery and then granting specific communities both exclusive access and management responsibility for the area, communities that manage their resource effectively will see the benefits in their own fishery.

Building management plans

¹ A table that describes how connected two places are based on the probability that larvae from one area will reach the other area under prevailing current conditions.

Commented [PH3]: EXISTE PARA LA ZONA DE BUENAVENTURA??

The following steps can help form spatially explicit management plans

Communicate with all stakeholders

It is important to include all piangua collectors for the relevant area within the planning and design of the bank specific management strategies.

Actions required

- *Identification of stakeholders* – Define the total region of interest (ROI) in this case the communities around Buenaventura from Puerta Espana in the north to the village of Joaquinquito (Naya Community Council) in the south. Establish a census of all piangua fishers in each of the communities within the ROI to determine who in each community will participate in the fishery.
- *Discuss the connections between collectors and specific banks* - Explain the data collected by the BIOREDD project that supports their different levels of dependence on different areas and how **there is little or no overlap among communities** in using different areas.
- *Describe ecological connections* – Explain simple current patterns and life cycle diagrams to explain how different areas are connected ecologically and show where communities need to co-manage areas. On Map 1 communities that are likely to need to work together in the management of piangua are highlighted by one color².
- *Map out proposed areas for community management* – Map and confirm which communities are linked to which areas and overlay the likely connection and separation of the piangua population. Identify obvious natural markers or potential boundaries such as rivers to delineate proposed borders and agree on which communities would need to work on joint management plans.
- **Create formal agreements** – Reach consensus among piangua collectors in the communities to delineate the fishing grounds in the agreed way and formalise agreements across the ROI and seek government recognition of the local management strategy.

Commented [PH4]: PODEMOS INCLUIR UN MAPA QUE MUESTRE ESTO?

Commented [PH5]: TENER EN CUENTA QUE YA EXISTEN ACUERDOS DE CONSERVACIÓN / PESCA RESPONSABLE FIRMADOS POR PARTE DE ESOS CONSEJOS COMUNITARIOS.

Next Steps – Developing Site Specific Management Plans

² These connections need to be confirmed by the current models described previously

Instead of treating the piangua fishery as one large fishery across the entire region of interest, splitting up the piangua fishery into relevant spatial management units means that each area and the respective communities can develop and refine their own management strategy.

In addition to the existing minimum size of 50 mm, communities will need to decide on the management strategies they want to employ in their areas. These could include a combination of effort, harvest controls and area controls such as:

- A rotation system using different areas on a specific timetable.
- Defining no take areas to provide “seeds” to other areas.
- Closed seasons
- A limit on total number of fishers
- A total allowable catch per time period, per area, or per fisher

In addition to these management questions the mechanism for management will also need to be defined. These need to include:

- How to monitor their own fishery
- How to set targets and what to do if they are achieved or missed
- Decision making system for the members of the fishery
- Enforcement mechanisms both internally and externally

Programs should look to help communities identify and resolve questions related to managing their mangrove areas with the aim of building local decision making and management capacity with the piangua sector particularly women’s groups.

Summary

- The piangua fishery has a great foundation for building a rights based management approach on the Pacific coast by granting collectors in a community exclusive rights to specific collection grounds and taking advantage of the Community Council local management scheme and land titles that are already granted by the Colombian government.
- From the data collected during the BIOREDD project it is clear that different communities are collecting Piangua on discrete banks with little overlap among communities in terms of the banks they use.

Commented [PH6]: YA SE HA HECHO EN VARIAS DE LAS COMUNIDADES, EN EL MARCO DE LOS CONVENIOS QUE HA FINANCIADO BIOREDD

- Collectors may already be informally organized in to piangua groups, through the social natural of piangua harvesting. These groups need to be strengthened with the aim of becoming local management units for their piangua areas.
 - The design of community level management plans covering different areas is a priority to replace a centrally regulated management strategy for piangua.
-

Commented [PH7]: A TRAVÉS DE LOS CONSEJOS COMUNITARIOS?

Spatial Management of Piangua



The rights based management of Piangua in the communities around Buenaventura needs to be nested at three spatial scales:

1) **Region** –All communities in the Buenaventura area need to form consensus on the exclusive access rights agreements for the communities and overarching regulations on piangua such as minimum size.

2) **Sub region** – where the communities that have banks that are connected ecologically through larval dispersal agree to coordinate their management strategies.

3) **Community level** -where the piangua collectors within a specific community form a management unit and a plan for their set of collecting areas.

Data from BIOREDD suggests that at the community level identifying connections to specific collections banks is straight forward. At a sub-regional level the data enabled us to identify six areas that would be natural sub regions units for Piangua management: Puerto Espana; La Plata; Santa Ana; Pital to El Encanto and Chamuscado. The communities in these area are likely to share a common resource and need to work together to manage the resource. Within each of these larger areas the individual community will be connected to a specific set of banks and will form their own community management plan for their areas.

Across the region the status of the piangua fishery is not uniform. Some areas seem to have higher average size and better catch per unit efforts than other areas. Based on available data we ranked and classified communities depending on the apparent status of their piangua fishery. This is important as understanding the current status of their resource can help communities develop appropriately focused management strategies. We have defined three broad categories for communities based on the type of focus the management plan for their area will need to adopt:

- A. Sustainability,
- B. Improvement
- C. Recuperation

These different plans are outlined below.

Commented [PH8]: MAPA DE TALLA PROMEDIO DE PIANGUA POR COMUNIDAD?

Categories Based on Management Focus

La Plata	1	Sustainability plan	
Santa Ana	2		
San Joaquin	3		
Santa Cruz	4	Improvement plan	
Chamuscado	5		
Joaquincito	6		
Punta Bontia	7	Recuperation plan	
Pital	8		
Bazan Bocana	9		
Encanto	10		
Puerto Espana	11		
Guayabal	12		

Commented [PH9]: ES IMPORTANTE RELACIONAR ESAS VEREDAS A LOS CONSEJOS COMUNITARIOS A LOS QUE PERTENECEN Y TENER EN CUENTA LOS LÍMITES DE LOS TÍTULOS DE DICHS CONSEJOS, EN LOS CASOS QUE EXISTEN.
 QUÉ PASÓ CON LAS COMUNIDADES DE ANCHICAYÁ – RAPOSO?

Sustainability plans

These communities seem to have the highest catch per unit effort and average collection size and so the resource is likely to be in the best condition. The management strategy for these zones should focus on ensuring that these levels remain stable and focus on monitoring the catch per unit effort. The community can build a plan to rotate through different grounds and use CPUE per bank as a trigger for management. If CPUE begins to fall on a bank then the community can rotate to a new area allow the population to recover.

Improvement plans

These communities either have warning signs from collecting too many undersize piangua or their catch per unit effort is low. Depending on the which of these two issues is foremost, the community should focus management attention on resolving that issue. If CPUE is low they should look to reduce total exploitation levels until the population recovers locally. If a large proportion of piangua are being collected under size, then the community should work with individual collectors to improve compliance on minimum size secure in the knowledge that no other community will come and take the piangua if they are left to grow up, as the community has exclusive use of the area. Management plans in these areas should look to bring up the catch per unit effort and the minimum size compliance to build a sustainable fishery.

³ Larger version of map available at end of document

Recuperation plans

Communities who need to implement a recuperation plan had low catch per unit effort scores and a high proportion of undersize individuals. These are warning signs that the fishery may be under excessive pressure and corrective actions need to occur to help rebuild the piangua population. Plans in these communities need to focus on not only improving compliance with minimum sizes but also on identifying areas that can be left alone from harvesting to boost the local population. Once specific areas are improved then the community can start rotating through these areas to enable other areas to recuperate. Communities in this category have the greatest management challenge as their resources are likely to have been under the most pressure. However, Piangua populations should rebound well when allowed to recover because they are a fast growing and prolific species.

Measuring efficacy of management plans

In all communities the ongoing monitoring of CPUE per bank and minimum size can provide a simple mechanism for managing their fishery. Groups can set “trigger levels” to stop using a specific bank if the catch per unit effort or the proportion of undersize individuals falls to a certain pre agreed point. This type of management works well in group settings as the decisions are made upfront and the action is also agree apriori so is easier to implement.

Further these types of controls are logical and will help improve the efficiency of the fishery over time. At the moment switching banks when catch levels drops probably happens as an innate process because collectors they are spending too long at a bank to find sufficient piangua then they will not revisit that bank for a while. All this system of management is really doing is formalizing that decision making process for the group at large.

Working with the community to establish their selection process in how they choose to visit different locations each day and helping to formalize a mechanism to let banks “rest” if collections drop below a certain level could benefit the sustainability of the fishery and help to incorporate the collectors into participative, rights based management.

What if nothing is done?

As piangua populations decrease, spatial competition among communities may increase and so collectors would be increasingly competing to take as much as they can before it runs out. This is contrary to the objective of sustainability.

It would be prescient to develop legal access rights for registered groups of piangua collectors, before spatial competition occurs. Connecting individual fishing communities to specific fishing zones, before spatial competition increases means that reaching inter-community agreements would be much easier.

[Piangueras as Mangrove guardians](#)

One of the issues with gaining traction in mangrove conservation is that whilst different user groups identify with the concept of mangroves being “important” few livelihoods can be tangibly connected to the total area of available mangroves. For example fishers targeting snappers may realize that the mangroves are reproductive or nursery areas for these fish, but may not readily associate the loss of mangrove area with the gradual reduction in the productivity of their fishery.

Many fishers are undergoing a gradual shift to target non-mangrove associated species such as off shore tuna and other pelagic fish, but this shift in focus may be too gradual for them to associate with declining near shore fisheries or with mangrove damage occurring near their traditional fishing sites. The production of the piangua fishery by contrast has a direct correlation with the area of mangrove root systems available for piangua to inhabit. This provides a tangible and measurable connection between the extent of mangroves and a resource user. As such Piangua collectors can be empowered as champions of mangrove conservation as it is in the direct interest of their fishery that the mangroves remain intact, unpolluted and productive.

