

Community management of fishing at scale: a view from inside and outside the Pachitea River Basin, Peru

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SUMMARY

At a superficial look, the Pachitea river basin gives the impression of being a space "without" fisheries "management" (absence of authority, uncertainty, exclusion). Nevertheless, following this general overview, we have observed the presence of institutional arrangements and various community management initiatives that reflect a "local order for fishing." This article analyzes the form and the options that such "local order" has to become a co-management initiative in the river basin. To this end, we have cases located in different scales: low, medium and high areas; the same which have differentiated social and cultural composition and have different management needs (subsistence, commercial, sport and ornamental fishing) from which we explore various fishing management strategies. Without doubt, the decentralization process started years ago in Peru represents to the inhabitants as well as to their local and regional authorities a great challenge for the management of fisheries resources, but also provides a range of opportunities to be exploited to improve the management of fishery resources in the Amazonian area. These are the strategies that are constructed and reconstructed for each case, those that occur in each one of these areas of complex and dynamic socio environment.

Keywords: Amazonian area, Co-management, communities, rules and fisheries.

1. INTRODUCTION

In the Amazonian area of Peru, as well as in other areas, tropical fisheries are an important common property, being a renewable resource, with an impressive biodiversity, and with a dynamic relationship with the various existing aquatic and riverside ecosystems; fisheries is one of the basic sources of the diet in local communities, as well as in major urban centers of the Amazonian area; it also generates direct and indirect employment throughout the flow of the process of the fishing activity.

However, in recent years the over-exploitation of fisheries in the Amazonian area and worldwide is evident, generating concern in communities and in different spaces of existing discussion forums. Fish production has not been equivalent to the increase of pressure and the greater fishing frequency. Currently, numerous stocks and fishing species have diminished and some have even collapsed, thus raising the urgent need to improve resource management, with an increased participation of the stakeholders involved, more strict fishing agreements or the establishment of protected areas by the State (Pinedo y Soria, 2008; Castro et. al. 2008; Riofrio, 2008).

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To ensure a proper sustainable fishing management for the Amazonian area context, it is necessary to build models of collaborative governance that include various components, such as socio-cultural, biological, economic and normative ones in order to have an appropriate environmental management, linking the community, the indigenous organizations, the local governments and the public institutions with competence in the field of fisheries. In that regard, a community management should emphasize good governance, social relations, adaptation and maintenance of the ecosystem productive potential (Berkes, 2008). To achieve the construction of a model that suits best to the context, it should be done through participatory processes with effective participation of the community, re-evaluating local knowledge and local regulations related to fishing, using the appropriate legal framework and the required political will of the local governments.

Proposals for the construction of fishing management models in the great basin of the Pachitea river is the outcome of different learning processes and lessons learned during nine consecutive years. Within the scaling-up and out investigation focus (Carter & Currie-Alder, 2006) the study seeks to deepen and reflect on the lessons of previous studies made in the Pichis sub-river basin, and from them start to promote water resources management systems in other contexts to see its replication and the promotion of changes in the legislation and policies in favor of a more sustainable use of fisheries resources in the Amazonian area (Instituto del Bien Común, 2008).

In this scaling-up and out effort the same research tools have been carried out and applied to ethnically differentiated populations living in different socio-political and ecological contexts to that of the Pichis river basin. Adaptation, contextualization and not merely replication of the experience in the Pichis river led to new indigenous groups in the Low Pachitea, the Zungaroyacu and the Ampiyacu-Apayacu river basins, and it requires experimenting with new institutional arrangements in order to scale-up the management of fisheries, which is an important part of this article.

However, low understanding or more effort for understanding is still seen in communities to be adapted to fishing management systems with collaborative governance, of the adaptations of existing rules on the resource use and management. In this regard, environmental management should not be felt as an imposition to local populations, but as a strategy adopted by them as of the social arrangements for the use of resources under the principle of not to exhaust natural capacity limits or stocks allowing to continue fishery dynamics (Pinedo & Soria, 2008).

In this context, the objective was to build management models for community management of fisheries at different scales: low, middle and high areas of the Pachitea river basin of the Amazonian area in Peru.

2. STUDY AREA

The work was carried out in the Amazonian region located between the departments of Pasco, Huanuco and Loreto. The target region is dominated by the rivers known as Pichis, Pachitea, Zungaruyacu, Ucayali, Apayacu, Ampiyacu and the Amazon, and includes an intricate system of meandering floodplain, lakes, canals, swamps,

limited by high inter river plains. The region is covered by dense rainforest with rainfall between 1000 and 3000 mm hence rivers increase their banks up to 10 meters from its normal level (Cecchi, 1999), seasonal river action that provides sediments with mineral nutrients that make up various alluvial agro systems (Kaliolla et. al. 1993).

To study and improve our understanding of the fishing activity among various indigenous people and communities, the region under study was subdivided into : low, medium and high levels. The lower zone: formed by communities of the Low Pachitea river basin and communities of the Ampiyacu-Apayacu river basins; the middle zone: formed by communities of the Zungaroyacu river basin; and the upper zone by communities of the Pichis river basin (Charts 1 and Picture 1).

The variation in number of inhabitants was, at least 74 in a Bora community of Ampiyacu, while the maximum of 375 people in a Shipibo-Conibo community of Low Pachitea. The average population distribution is 54% men and 46% women, of which 43% or the total population is made of children under 12 years old; these are relatively populations conformed generally by young people. The households are made up of clans or family groups. The total number of households per community allowed us to determine the minimum sizes of households to be interviewed (10-20%).

The criteria used to select the communities were: belonging to an indigenous people (Asháninka, Shipibo, Cacataibo, Bora, Huitoto, Yaguas) and villages of mestizos riverside ribereños²; riverside community with commercial and subsistence fishing patterns; by the existence of forms or rules of fisheries management; by its location in the basin, located on a header or flood zone; surrounding community of natural aquatic environments (rivers, ravines and/or lagoons); that the community is within the scope where the Instituto del Bien Comun carries out works through its relevant programs.

Access to communities was usually made by the main river or through one of its tributaries. Once in the community various presentation and consultation meetings were held to carry on the activities; later on was the recognition of fishing and aquatic ecosystems that are most important to the community, and the identification of their main activities and of the families and key people according to the work goals.

Each one of the areas has a diverse ecology, different bioclimatic characteristics, with specific economic activities and major own socio-cultural characteristics of each indigenous people. The Pachitea river basin is part of some important endemic areas for the fauna and flora of Peru (Brack, 1986; Rodriguez, 1996, Castro et. Al. 2008). The Pachitea river basin is an area that has high species diversity in fish, compared

² In the Amazonian area there is a theoretical debate on the definition of "riverside mestizos". In indigenous communities it is recognized in Spanish as "mestizos" any person who is not part of the indigenous group. Under that local perception, the study identified as a "riverside mestizo" the person who does not belong to any indigenous people, whether riverside or inland and who are usually concentrated in villages or towns of social, cultural and territorial structure different to that of a native community.

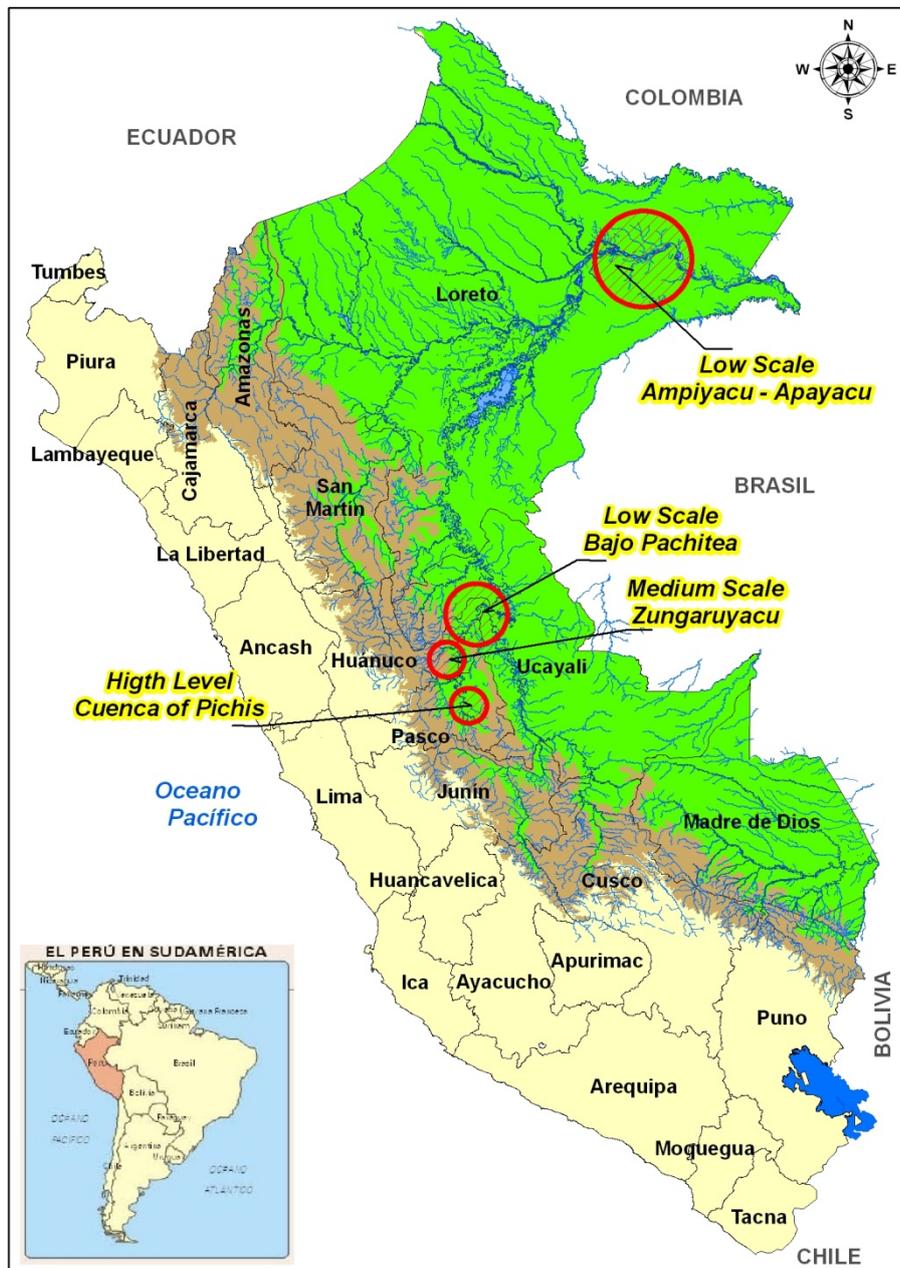
with other major Amazonian area river basins; the area with higher species richness corresponds to the Pichis river basin (240 species), followed by the sub-river basin of the Pachitea and Palcazu (215 and 186 species respectively). The specific composition at the level of orders is quite similar in the three sub river basins, with predominance of *Characiformes*, *Siluriformes* and *Perciformes*. Some groups, such as *Osteoglossiformes* (*Arapaima gigas*, paiche) and *Osteoglossum bicirrhosum* (arahuana) are only reported in some small water reservoirs of the low area of the sub river basin of the Pachitea (Castro et. al. 2008).

Chart 1. Scale, river basins and selected communities in the study area.

| Scale | District | River Basin | Community | Indigenous People | Linguistic Family |
|--------|-----------------|-------------|---|-----------------------|-------------------|
| Low | Honoría | Pachitea | Dos Unidos Antiguo Honoría | Shipibo Mestizos | Pano - |
| | Pebas | Ampiyacu | Tierra Firme Pucaurquillo Huitoto Pucaurquillo | Huitoto Boras | Huitoto |
| | Las Amazonas | Apayacu | Yanayacu | Yaguas | Peba-Yagua |
| Medium | Codo de Pozuzo | Zungaroyacu | Santa Martha | Cacataibo | Pano |
| High | Puerto Bermúdez | Pichis | Nuevo Nevati Santa Isabel de Neguache | Asháninka | Arahuaca |
| | | | Boca Samaya | Colonos Israelitas | - |

The study combined different methods of qualitative research, through a socio-cultural analysis from a gender perspective in order to understand the social and organizational structure of the communities further to characterizing the context. The research instruments used were: participatory research (focus groups and participatory mapping of threats and use of resources), open and structured interviews, participant observation and biological sampling. It is important to state that throughout the process it was taken under consideration each indigenous people's cosmos vision (traditional knowledge, myths, rituals, spiritual fathers of the plants and fish, etc.) understood as self-regulating ways of the system that surrounds them. Then the information was analyzed and integrated and an approximate comprehension of the status of fishing for case studies was obtained and from these results we proceeded to build participatory fishing management models for each context.

Picture 1. Area of study scales in the Amazon of Peru



3. FISHING MANAGEMENT, INSIDE AND OUTSIDE THE PACHITEA RIVER BASIN

Community management of natural resources is defined as the set of actions that are developed from the community in order to organize and regulate the exploitation and use of natural resources in a given geographical area. Community management can take many forms, including the regulation among members of a community or inter-communities, for one or more natural resources, successful community-based management systems, flexible community management systems, among others. However, all these experiences share the fact of having prepared rules regulating user behavior with the intention of organizing the exploitation of fishing resources. In

this regard, during our research process in the study area different conditions of fishing community management have been determined within and outside the Pachitea river basin (Chart 2).

Chart 2. Community management conditions within and outside the Pachitea river basin.

| Within the Pachitea River Basin | | Outside the Pachitea River Basin | |
|---|---|---|---|
| Pichis River Basin | Pachitea Low River Basin | Apayacu River Basin | Ampiyacu River Basin |
| It applies <u>a system of prohibitions and permissions</u> for access to the main fishing areas among subsistence fishermen and livestock breeders (Pinedo, 2008, Soria & Rodríguez, 2008). | It uses <u>a system of prohibitions on commercial fishing</u> in the small water reservoirs Charuya and Inturuya since 1960. There were prohibitions on the use of fishing nets (commoner and foreign). The sanctions were warnings, confiscation and eviction of fishing areas. Currently, the system is flexible. | It applies a <u>control system for commercial fishing</u> in the small water reservoirs within the territory of the Yanayacu community, includes foreign and community commercial fishermen | <u>It applies an entry control system to foreign commercial fishermen to the fishing areas of the river basin,</u> on the condition of a monetary contribution for the entrance, which is provided to the Indigenous Federation of the river basin. |
| Authorizations and prohibitions are applied according to the fishing "technique" used: poison, dynamite and agrochemicals ³ . | Controls the use of "waiting" and "hauling" nets and the commercial fishermen who use conservation systems based on ice blocks, in the understanding that those are for fishing larger | Controls the commercial fishing activity; are identified when using more than one boat and carry blocks of ice for preservation. | No regulation for fishing; only controls the entry of foreign commercial fishermen who do not have permission from the Indigenous Federation |

³The specific rules established on ravines shared by indigenous people and settlers were referred to the prohibition and / or authorization of use of "barbasco" a vegetal biocide (Lonchocarpus utilis), dynamite and agrochemicals. In the case of barbasco, the rules were established between subsistence fishermen and small livestock farmers, the same that could be for authorization or prohibition. The authorizations were issued based on recognition of barbasco as ancestral technique for indigenous use. In such situations, the indigenous people who use this technique report in advance to the livestock owner with the intention of putting it aside for 24 hours and thus prevent livestock to drink contaminated water. However, there are other ravines -even within short distance of the previous- where the use of barbasco as a fishing technique is strictly prohibited. In the case of dynamite it was prohibited in all ravines. Therefore its use is totally illegal. Finally, agrochemicals as fishing techniques are totally prohibited by the local population and are only used eventually by unscrupulous individuals who are passing through the area.

| | | | |
|--|--|---|--|
| | quantities. | | |
| Gender exclusion in the community. Accordingly, in cultural terms pregnant women and women during their menstrual period can not participate in fishing. | Gender exclusion in the community. Accordingly, in cultural terms pregnant women and women during their menstrual period can not participate in fishing. | There are no gender exclusions observed in the community for the case of women. | Gender exclusion in the community. Accordingly, in cultural terms pregnant women and women during their menstrual period can not participate in fishing. |
| Significant use of local knowledge to zone fishing areas, fish migration and reproduction, myths, legends, and "secret" fishing. | Significant use of local knowledge associated to fishing for: zoning areas, fish migration and reproduction, but <u>weakened</u> for myths, legends and fishing secrets. | Significant use of local knowledge associated to fishing for: zoning areas, fish migration and reproduction, but <u>weakened</u> for myths, legends and fishing secrets.. | Insignificant use of local knowledge associated to fishing for zoned areas, fish migration and reproduction; weakened for myths and legends. |
| Actions to strengthen the initiative of community management. | Actions to strengthen the initiative of community management | Actions to provide legal certainty to the intervention and management of the community fishing areas. | Actions to redirect, improve and strengthen management in the river basin. |

As shown in the comparative Chart, the different research areas show in a greater or lesser degree their own management strategies to organize fishing exploitation in their respective areas. There are some similarities and particularities between these strategies, according to the context. Common elements include the ability to ensure control over determined fishing areas, which according to their importance have been previously identified and selected. Consequently, actions of control over areas, determine also fishing practices and techniques.

Although there are common aspects in the need for control over fishing areas and activities, system strategies differ for each zone. Thus, in the case of the Pichis river basin the need for regulation seeks to ensure *the provision of fish for subsistence*. To this end, the use of inappropriate fishing practices in certain ravines is limited. This system of regulation for fishing, is based on the criterion of maintaining "good relations between neighbors." There are no severe penalties or conventional procedures for violations; in no case severe penalties have been reported, it was only limited to a public warning or threat to confiscate the fishing equipment.

Control and surveillance tasks are performed by community members –whether to watch themselves or their neighbors- for the development of their daily activities; ravines or lakes are located in such a way that security does not represent a high cost, except at the night time. However, this control shows its weaker side when they face "the outsider", there is uncertainty and conflict, and they can be often unauthorized.

Indeed, when a person who does not belong to the area where rules exist, disobeys them, it creates a sense of frustration among local people. For example, during fishing seasons of species of major value in the market which attract the presence of foreign commercial fishermen, the local rules system is completely unused or neglected.

Within the Pachitea river basin

In the case of the low Pachitea (Comunidad Dos Unidos and Caserío Antiguo Honoria), there also existed the need to control certain fishing areas. But unlike the Pichis river basin, the role of fishing management rules has different origins. For the Dos Unidos Community the rules were a way of defensive reaction against foreign fishermen, leading to improve the agreement with its neighboring community of Vista Alegre to establish restrictions on commercial fishing in the Pablococha lagoon which provides subsistence, and which is shared by both communities.

The rule system is usually applied with success on foreign fishermen, it presents many disadvantages when applied internally for cases of commercial fishing by community members. On the contrary, in the Old Honoria village the rules for commercial fishing restrictions on the Charuya and Inturuya small water reservoirs were established at the creation of the village, applied to the local population as well as to outsiders. The presence of commercial fishing during the decade of the 90s strengthened these rules against the external market pressure; presently these rules have been made flexible.

However, the Low Pachitea river basin presents an important factor for the analysis of community management; it refers to changes in the course and structure of the Pachitea and Ucayali rivers. It is raised that the modification of greatest impact occurred in the decade of the nineties by the change of the course of the Ucayali river in the Masisea sector, which lead to other changes of ecological and economical impact for the area (Coomes et. al. 2009) affecting up to the Lower Pachitea area.

These changes in the river course encouraged the increase of fishing pressure toward fishing areas of the Low Pachitea since distance (in time and costs) to the main market in Pucallpa had been reduced. It also encouraged some community members to engage as well in commercial fishing; at this juncture the first rules of community control appear in the Dos Unidos community and its neighbors where they were traditionally subsistence fishermen.

Also, there have been changes in the course of the Pachitea river as well which have affected ecosystem and economic activities in the river basin study area; at present further modifications, lagoon sedimentation and integrity of human settlements by

the riversides remain as threats. In recent years, the towns of Nueva Alianza, Dos Unidos and Honoria have been relocated more than once due to the erosion of the riversides and widening of the Pachitea river bank.

In this dynamics, due to the erosion of the river, most important lagoons are at risk of disappearing. Current conditions in the use of rules and control in the area have become considerably flexible due to various factors such as population growth, shortage of hydro-biological resources, and prioritization of other productive activities. Therefore, management of fishing resources must be raised as a diversified strategy, with management of other natural resources of interest implemented by ecotourism activities for which the area possesses a significant potential.

Outside the Pachitea river basin

The control of fishing activities in the Ampiyacu river basin is determined by the need of establishing an order for the resource exploitation in the Ampiyacu river and its lagoons⁴. In the Ampiyacu river basin inhabited by the Boras, Huitotos and Ocainas communities, it is perceived that all communities in the area consider and put into practice activities to care for the areas affected by extractive activities within the river basin. Thus, the population of Pucaurquillo, Estiron of Cuzco and Tierra Firme collaborate with the Indigenous Federation⁵ on the monitoring role of the extractive activities including fishing.

In practical terms currently the "control of access by contribution" does not mean any benefit to protecting the resource and the ecosystem, because it is simply limited to grant entry to an increasing number of commercial fishermen in the areas of extraction, but there is no real control by authorizations granted relating to the type of fishing instruments used, the conditions under which the extraction takes place (harmful, inappropriate and illegal practices) and the catch quota or extraction control, it is to merely verify the contribution and authorize the entry (whether from the community or outsiders).

Due to the intensity of exploitation in the fishing areas and other natural resources, the communities of Ampiyacu in meetings held at their annual conferences of the years 2008 and 2009 have prohibited the granting of any authorization to develop commercial fishing activities in the Ampiyacu river and its lagoons. This decision leads to social conflicts between the different users and raises new terms for negotiation, for example, it is analyzed the possibility of granting authorizations only to formalized fishermen who are members of the San Pedro craft fishermen association of the Pevas district prior presentation of the fishing permit issued by the

⁴ First Dialogue between Commercial Fishermen of Pevas and the Federation of Native Communities of Ampiyacu, Pevas, May 2010.

⁵ The Federation of Native Communities of Ampiyacu (FECONA) founded in 1982. Establishes a system of rules to develop extractive activities in the community; which for the right to extract timber, fish and hunt wild animals must provide a monetary contribution to the Federation; with these funds the Federation finances its representational activities. Later, these rules were extended to outsiders, whether they are hunters, fishermen or loggers. Usually, when they enter into the zone they do not perform a specific activity, on the contrary, they draw everything in their power or opportunity.

Regional Directorate of Production, thereby excluding informal commercial fishermen of the Ampiyacu river basin.

In the Apayacu river basin the main reason for the establishment of rules is to ensure the protection of the lagoons that are within the territory of the Yanayacu community to exploit them economically. Commercial fishing is the main economic activity for the river basin populations. The main problem related to fishing are the permanent conflicts over the control and use of fishing areas; so we have, that the most frequently recurring conflicts occur between the Boca Apayacu commercial fishermen and the Yanayacu community commercial fishermen.

Yanayacu is a native community recognized by the State; within its jurisdiction, there are about 14 small lagoons, the struggle for the use of these fishing areas leads to conflicts between the community and foreign fishermen. Both actors use different strategies to try to control the resource, for example, while the Yanayacu community members restrict access to their fishing areas, the Boca Apayacu commercial fishermen limit the Yanayacu community members the entry of blocks of ice for commercial fishing as retaliation against the control functions imposed by them. Likewise, for any form of strategy control they always find concealed alternative methods that would allow them to continue with their activities.

It has been generally observed that fishermen of Boca Apayacu are better informed about the fisheries legal regime and use this knowledge to meet local regulations; and in this way they often use fishing permits issued (current or expired) by the Production Direction Zone of Pevas to break through the control strategy and "legalize" or formalize their activity.

The rule system of the Yanayacu community is extremely flexible and lacks any type of support from other public or private institutions and faces situations of greater tension and social conflict than other areas of study. This control system is supported by the strength and resistance of the villagers and therefore is much more vulnerable.

A common element among all community management strategies is the local knowledge associated to fishing. This knowledge in all cases is quite significant for the environmental conditions of the ecosystem and the biological conditions of the fishing population. That is, people easily identify fishing areas, stages of reproduction of species, migration, quality of the dry and wet river seasons, and the areas conditions, threats to ecosystems, etc. Nevertheless, traditional knowledge associated to the use of myths and legends about lake guards or sources of fishing techniques and fish and the use of certain ancient fishing techniques is fairly weak.

In the Pichis river basin with a majority indigenous population of the Ashaninka group and in the Ampiyacu river basin with majority indigenous population of Bora, Huitoto and Ocaina have still more local knowledge related to fishing. However, in the Apayacu river basin with a minority of Yagua indigenous population and in the Pachitea river basin of minority Shipibo indigenous population, the knowledge and use of myths about fishing is very weak. While in the past, cultural rules as myths

and legends of fish protectors, as Kiatsi⁶ (Pinedo, 2008; Soria & Rodríguez, 2008), fathers or mothers⁷ of the lakes that produce “muyuna”⁸ represented customary law governing the behavior of fishermen and imposed severe penalties for violations. Today, these rules have been relaxed considerably and have become obsolete in the communities of the study areas.

Another common feature in these communities is the exclusion from fishing activities of women during their pregnancy or during their menstrual period. This element of gender exclusion forms part of the indigenous tradition, by which women in these periods enter into a state of impurity, damaging the development of fishing or risking their own lives as a result of the action of mythical beings who want to make them their wives (Belaunde, 2005). On this subject, it is widespread in the Amazonian area women prohibition to get close to the river or lagoons during their menstrual period, for fear of being turned into a water mythological creature. Similarly, for the use of barbasco (biocide) it is also prohibited the presence of women during their pregnancy or menstruation, because they cause the effect of "softening" the water and preventing the toxic effect on the fish.

Finally, it is made necessary to strengthen all these community management strategies for fishing, for which it is important the understanding and cooperation of institutions with jurisdiction over fishing and other support organizations.

4. MODELS OF FISHING MANAGEMENT

In a review of the Peruvian legal framework for fishing management tools for the Amazonian area, we find classical instruments of effort control, consisting of time when fishing is prohibited, spatial, regulation of tackles and fishing techniques, management programs⁹. The Peruvian government, through the Ministry of Industry and the Regional Offices, is responsible for implementing the country's fishing policy and the implementation of the legal framework under the criteria of rational utilization of the resource, promotion of private investment and environment conservation. However, public administration capacity is limited to cover the whole Amazonian area and therefore there are areas where conflict or tradition arise new rules and agreements that organize the exploitation.

Previous experience of the fishing management model carried out in the Pichis river basin, where public administration and community organization established forms of cooperation, applying support mechanisms to resource management, considering as strategy the implementing of *the model of partnership for fishing management between the local government and communities*. Based on the results and lessons

⁶ Kiatsi represents within the Ashaninka worldview the fish father. Its main function is to protect the adequate fish supply, therefore imposes low capture fees and sanctions trapping excess, the abuse in the use of certain fishing techniques. Sanctions are always of magic type including different types of diseases even death.

⁷ These fathers or mothers of small water reservoirs, are represented in the Amazonian area by different characters, where boas, yacuruna, large lizards, dolphins and mermaids are included..

⁸ Eddies in the water, with storms that limit the entry of fishermen into some small water reservoirs and excludes the development of any fishing activity in these areas.

⁹ The basic framework of fishing regulation in Peru is made up of Law No. 25 977, Fisheries General Law, D. S. 012-2001-PRODUCE, Regulation of the Fisheries General Law, and Supreme Decree N ° 015-2009-PRODUCE, Regulation of the Fishing Activities Strategy for the Amazonian area.

learned in the Pichis river basin management models will be adapted, contextualized and built at different scales of the scope of the study.

Theoretical aspects

Two main questions encourage efforts to work on scaling up and out approaches. First, determine the real benefits of implementing them, and establish the factors that we must expand. Carter & Currie-Alder (2006) outlined several benefits for using scale analysis to support and implement strategies for natural resources management initiated at the local level. The scale increase upward and outward involves: 1. A comprehensive approach to natural resources management, regardless of political and administrative boundaries in areas in which they develop. 2. The need to know, understand and integrate western and local expertise on management, in a constant learning experience and interactive experimentation. 3. The possibility of a more equitable distribution of costs and benefits of natural resources management through the integration of the users various interests.

Secondly, it sets out the need to determine what to expand. The implementation of scaling-up implies expanding three types of factors: technology, concepts and institutions. The expansion of technology focuses on the widespread adoption of a single practice or procedure, for example, the use of hybrid seed varieties. The increase of the scale at concepts level focuses on the distribution of a set of ideas, principles and techniques related to the implementation of a point of view, for example, river basin conservation and fishing management. The increase of institutions focuses on the promotion of agreements to facilitate development, such as roundtables, producers co-management associations, and research networks (Carter & Currie-Alder, 2006). In practice, scaling often involves the application in varying degrees of the three elements and all can improve the capacity of organizations, in the cultural and institutional aspects of social change.

In our working experience within and outside the Pachitea river basin we try to expand the scale for the fishing resource management by applying the three elements: process, concepts and institutions. As shown, the rules governing the fishing activity in the local area can be weakened, modified, enhanced or adapted over time. According to Pinedo, et. al. (2002) community management of natural resources corresponds to a nonlinear process. That is, over the years on management it may present intensive stages and other stages of relaxation in rules and actions. These situations depend on social and natural environment factors that influence the continuing adaptation of management strategies. The most relevant factors are nature and intensity of conflict, the terms of community leadership, the level of community organization and the establishment of clear rules.

However, an additional factor to evaluate the continuity of these rules in time, turns out to be its relationship with the state legal framework. How to adjust successful community management strategies at the local level that is being implemented? Or how to support management strategies that start to be applied to a specific area when confronted with the legal fishing framework in force in Peru? Do these systems have any chance of being accepted and recognized, under legal figures or

categories that would allow them greater stability or legal security to develop and strengthen?

As from our research, the analysis of the relationship between community resource management forms and the state legal framework can take two approaches: local and state. From a local view, the relationship between the two allows the following situations:

- a) A relation of enforcement of the fishing legal framework over traditional forms or local institutional arrangements.
- b) A relation of adaptation between both systems, regarding the elements that each of them require to regulate local situations (Soria & Rodriguez, 2008).

On the other hand, from the state point of view, local management strategies identified during the investigation reveal the existence of an alternative system to the official or legal one, whether when establishing inward (community, village members) or outward (multiple users of the same area¹⁰) rules. From this perspective the relationship between the two forms of management could assume the following situations:

- a) The state legal framework for fishing management could make invisible or ignore local strategies. In other words, its existence is known, but nothing is done about it, either because it is impossible to intervene or simply because it is not a priority for the public sector.
- b) Could be pursued, since they are considered illegitimate and illegal actions, not admitted by the State and opposed to the law.
- c) Could be recognized by the State. Regarding this last item there is still plenty to be done on the Peruvian case.

The big question in this dichotomy of perceptions is to combine both perceptions under a comprehensive, inclusive, integrated and participatory strategy for fishery resources management, with the purpose of ensuring subsistence by preservation to later exploit and enjoy management economic benefits, in the form of fishing management strategy with greater range of criteria, to be recognized by the Peruvian legal framework.

As from our position, there are ways that enable collaboration and cooperation between the two forms of resource management, models called shared management between the government and the communities. The fishing resources management can be done through scientific, community or shared management approach (Rufino, 2008). From our experience most of the management in the Amazonian area is done through the scientific approach driven mainly from the public sector. Community-based management and shared management of the resource are options under initial implementation in the Peruvian case and occur primarily through Fishing Management Plans or Programs.

¹⁰Fishing management at the local level offers informal alternatives, established outside the sector legal framework as they express exclusions of access, determinations and conformations of rules, rights of use, catch quotas, seasons, not authorized nor regulated by the production sector.

Sen & Nielsen (1996), consider five ways of co-management, according to the user 's level of participation:

- a) Instructive; whereby the government informs the user only in respect of management actions to be taken.
- b) Consultative; mechanisms exist for consultation with users within which suggestions and opinions of local people are received, but decisions are taken by the government.
- c) Cooperative; under this form of management users and government are equal partners for making decisions.
- d) Adviser; from this perspective, users guide the state on decisions to be taken, based on the faculties transferred by it.
- e) Delegating; in which government delegates authority to users so that they themselves make the decisions, corresponding to the government only to be informed on the implementation of actions

The first two models are applied in developing countries, while the latter are applied in developed countries. Currently in the Peruvian case, the co-management models between government and users apply through management plans or programs which are technical and administrative instruments complementary to the management statutory framework and which aim the controlled exploitation of a specie or group of species in a particular environment, under rules and regulations regularly monitored¹¹.

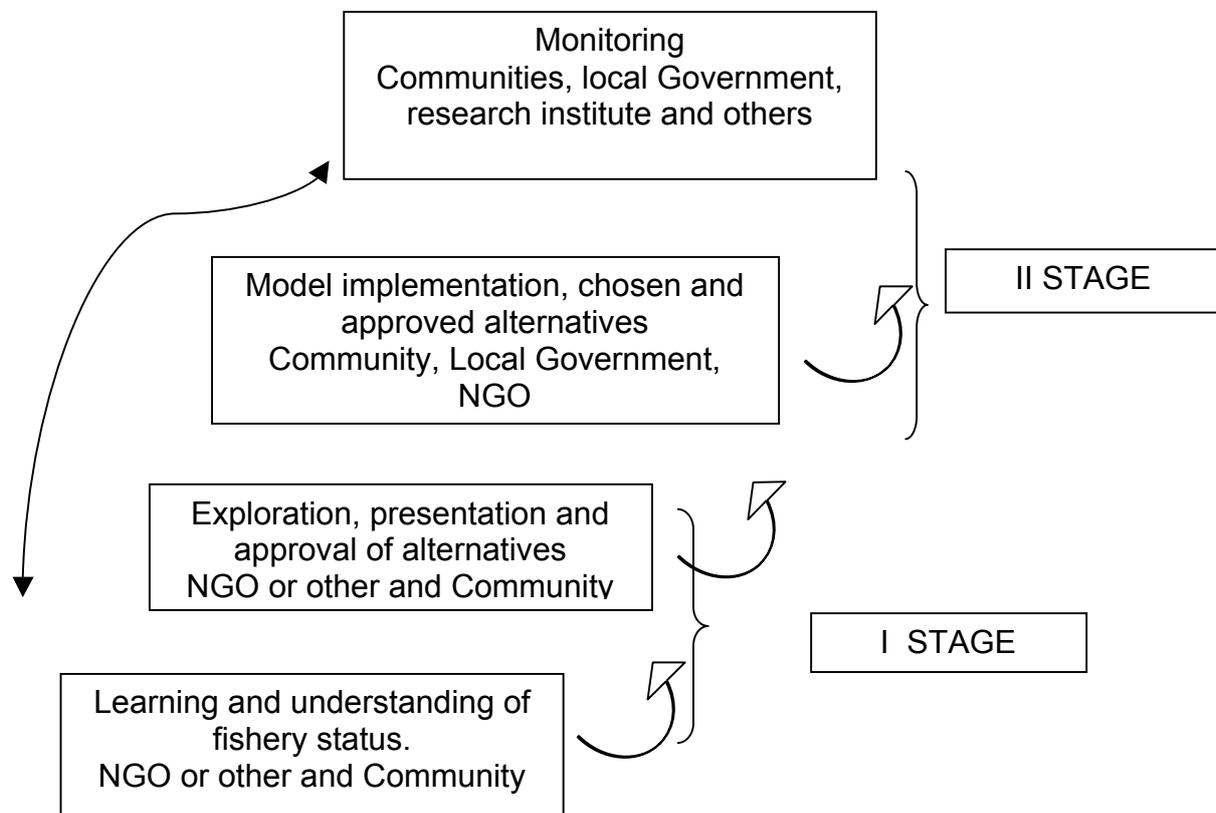
The main characteristics of these management programs are: co-participation between participants (fishermen, technical scientific team and state administrations), target species and defined areas of exploitation, self-generation of scientific information to improve the basis of the Fishing Management Plan (MAPE for the acronym in Spanish) and its potential temporary evaluation and adjustments of production. However, the real possibilities of implementation of a MAPE in the Amazonian area are quite disappointing, due to the costs and administrative requirements. In principle, any organized fishing community may request a MAPE, as well as by initiative of private or public institutions related to the national or international fishing industry. Moreover, all cases must count with the assistance of a recognized scientific institution. A contrary reading would lead us to believe that a non organized fishermen community and public and private institutions not linked to the fishing sector could not apply for a MAPE.

Management programs are used in the Peruvian case for geographical areas of major conflict or for natural protected areas. Nevertheless, the areas in which we work are not located within areas with these characteristics, except the case of the Apayacu and Ampiyacu river basins in Loreto. Since this research it is aimed to work on the basis of strategies that promote co-management in the cooperative mode.

Practical Aspects

¹¹ D.S 015-2009-PRODUCE, Regulation of the Fishing Activities Strategy. Art. 7.1

The detailed description of the procedure expansion has meant in all cases the completion of two stages. A first exploratory stage and a second stage of implementation of actions, as shown in the following scheme:



As expected, each process and stage present s its own challenges and complexities, nevertheless for the specific case of the second stage more effort, perseverance, dedication and patience is required. In the implementation of actions, the participants involved in the proposal are of different range, including local participants represented by the Municipal Environmental Commission (CAM), the Municipality District, the Governor, National Police of Peru, educational institutions, unions and associations representatives, NGOs, among others, the Production Sector (Fisheries), indigenous organizations and communities. Likewise, provincial municipal governments share also this managing experience, when the experience started in one municipality district and then toward the regional governments as the last space of institutional coordination within the same river basin.

In parallel to the formalization work of the management system within the Pachitea river basin, a similar strategy in the Ampiyacu-Apayacu river basin is performed, with the purpose of observing similarities and differences that would allow us to set out a comprehensive management model for other areas of the Amazonian area.

4.1 Fisheries partnership model: local government and communities

This co-management model takes into account management needs in places where the production sector is absent and is basically oriented to regulate subsistence fishing needs. At the absence of the sector there is a gap or institutional uncertainty concerning who executes fishing competencies in its different aspects (rules planning, control, monitoring and Surveillance, aquaculture, etc.). According to the fishing regulatory framework the policies, strategies, resource access conditions are defined, the big question would be who executes them in areas where the sector is not present or when its performance is eventual due to people and time limitations and where there is also need for regulation or strategy for the small-scale fishing.

According to Berkes (2008), two basic conditions are needed in the attempt to seek management alternatives for this type of fisheries. First, the need to consider the natural and social system as interdependent systems, should be lead to count on fishing managers that would be interdisciplinary, so that they can deal with fish, environment and people at the same time. Second, it is also important that these models consider the need to protect ecosystem processes and environmental health, basic for the fishery. Following these assumptions and in consideration of the five thematic areas over which it is suggested to work such as: a) change in the philosophy of resource management; b) assessment of the fishery as linked social-ecological systems; c) the importance of local knowledge and traditional fishermen; d) The need to address sustainable livelihoods in general environmental processes, and e) community management and local governance; we intend to work the management of small-scale fisheries through two tools:

- a) The general environmental tools: Local System of Environmental Management.
- b) The sector tools: Communal Fishing Monitoring Committees (COLOVIPES) and Management Plans

According to our research, the combination of both tools allow an integrated and participatory approach in the management of fishing resources at local level.

The environmental tools: Local System of Environmental Management

The Local System of Environmental Management (SLGA for the acronym in Spanish)¹² is a management tool used at local level (district and provincial municipalities), regional and national environmental management organization, setting priorities and establishing procedures for collaboration between public, private and civil society. This tool is implemented through a process, whereby the municipality (authorities and officials) assumes a leading role in promoting local development. The Local System of Environmental Management -SLGA, has two main elements: the specific management tools (Diagnosis, Planning and Environmental Agenda) and levels of action: formed by the Council and the Office of Environmental Affairs of the municipalities, the Municipal Environmental Commission, the Technical Groups and other support institutions.

¹² With the Municipalities Organic Law, municipalities are strengthened as promoters of local development. Local governments should develop and implement the Local System of Environmental Management established in paragraph 7 of article 9 and paragraph 13 of Article 20 of the Organic Law on Municipalities, Law No. 27 972.

The use of this strategy involves building the conditions for the exercise of a sustainable fishing management at local level through initiatives that include legal support and provide legitimacy for the involvement of users. Consequently, the use of this tool is of a general environmental character, it is of great importance for local fishing management to the extent that:

- a) Determines as local environmental management policy, the sustainable fishing management. Therefore, the municipality and the rest of its institutions as well as the private sector and the population in general, adapt their structures to that mandate. Normally, these mandates are approved by municipal ordinances, including the differing priorities of environmental management for the district. The use of the SLGA as strategy to manage fisheries at local level is also important because it is associated to the setting up and execution of environmental management in an integral way. In other words, fishing constitutes one of the various priorities of environmental management. Regarding the Pichis river basin, within the SLGA it has also been considered of great importance, to protect the upper parts of the river basin (headers) in order to protect the quality and quantity of water, other actions are the appropriate management of solid and liquid wastes, the promotion of bio-businesses and environmental education programs¹³.
- b) Within this framework of environmental management, concrete measures are raised to address fishing management. This approach is made based on information collected in the field. Here come to carve the fishing rules and agreements identified during the investigation and are applied in the Pichis and Pachitea basins. This raises the conformation of the Village Surveillance Committees, the drawing up and official recognition of local fishing agreement. In all cases the priorities for local users are not the same. For example in the case of Pichis, the priority is to limit the use of banned nets used in commercial craft fishing, as well as the use of barbasco and dynamite. While for the Pachitea users, the concern is to limit the development of commercial fishing by outsiders. Within the communities exists instances that are fulfilling these functions for the domestic or inter communities, but when they try to oppose foreign or commercial fishermen, the surveillance system is weakened. In that sense, these community surveillance committees or any other instance in lieu thereof, require the respective legal recognition to enable them to intervene in these cases. This recognition has come to the case of Pichis, awarded through the Regional Ordinance of the Regional Government of Pasco¹⁴.

On the other hand, the three infractions considered important for the population are adapted by municipal devices. With this action it is aimed to bring closer the general environmental legislation and local space needs. In

¹³ Municipal Ordinance No. 009-2008 MDPB approving the Environmental Action Plan of the District, within which activities are foreseen up to 10 years, divided in four fronts: Green Front referred to the management of Biodiversity and Territorial Code. Brown-Front Management water quality and solid waste management, Blue Front-Education and Environmental Awareness, Gold Front Eco-Business, ,
¹⁴ Regional Ordinance No. 120-2007-GR PASCO / CR approved on July 25, 2007

this way, through the district's ordinance there is a prohibition of fishing with dynamite and proscribes its marketing¹⁵.

An important factor in the implementation of this model is the ability to finance the measures taken. Thus, for the operation of communal Surveillance committees three possible sources of financing were considered: funds of the district municipality, funds raised to finance the provincial municipality, regional funds and a potential source of funding from the international cooperation. Currently, the Fishing Surveillance Committees Implementation Project is being supported by the Provincial Municipality of Oxapampa. This achievement was important because of the advocacy work carried out by the Ashaninka Indigenous Federation and the District Municipality, both members of the Environmental Commission of Puerto Bermudez.

On the other hand, the implementation of a strategy of shared control between population and government, involves the formation of surveillance committees in the communities and the presence of a fishing inspector in the district in order to proceed to execute the control and monitoring system. However, paying the salary of a production sector official in the district, involves costs that are difficult to cover for the public sector. In addition, for small-scale fishery that is developed in the Pichis river basin, where the rules system works based on "maintaining good neighborhood relations" between Ashaninka users and settlers, the intervention of the sector would be eventual.

The functions of control and surveillance of fisheries infringements could be undertaken by the Ministry of Interior through the agency of the National Police of Peru with detachment at Puerto Bermudez. According to the fishing policy framework, the functions of control and surveillance of fishing activities correspond to the National and Regional Directions of Control, Monitoring and Fishing Surveillance in close coordination with the Harbor. However, parts of the country that do not have the presence of either institution, alternatively these functions are assumed on a subsidiary basis by the National Police of Peru (PNP)-Ministry of the Interior¹⁶. In this way, the intervention of the PNP is a factor to strengthen control and monitoring of Pichis ravines.

Finally, we must say, that although the experience of fishing management in the Pichis river basin has begun with rules and agreements to limit the use of dynamite, barbasco and prohibit networking from biological research component of the Instituto del Bien Comun who has been working for ten years in the production of scientific information to strengthen the elaboration of regulations based on contextualized data on characterization of populations, habitat, reproduction processes, technological change, impacts from the use of toxic substances, among others. During the present year working with the Puerto Bermúdez CAM and the Production-Fisheries Sector representative in preparing new management tools such as the use of

¹⁵. Municipal Ordinance No. 010-2006/MDPB which prohibits the marketing and use of explosives in the district of Puerto Bermudez, and authorizes the establishment of Communal Fishing Monitoring Committees.

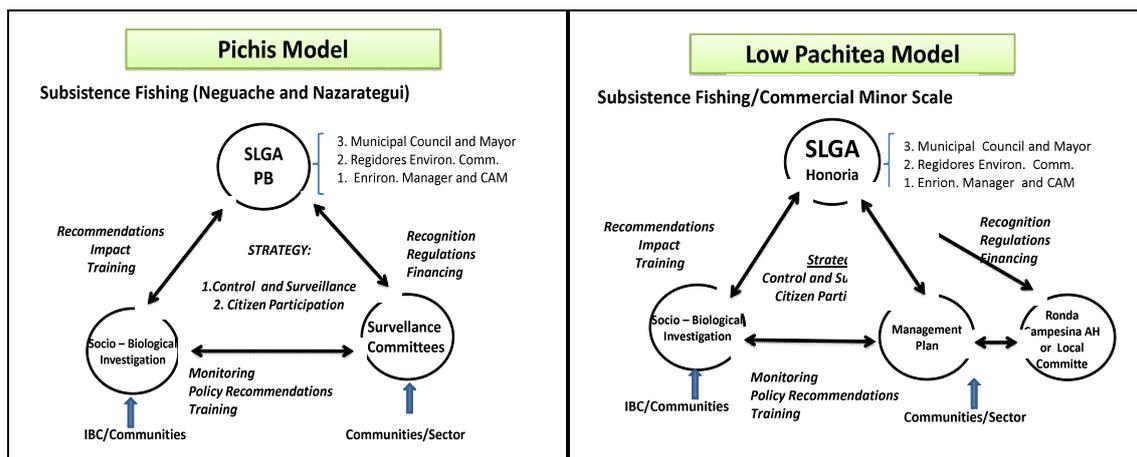
¹⁶ Decree Law N° 25977; Article 73 – General Fishing Law.

temporary time to forbid fishing in general and forbid fishing by species as well as specific regulations of networks depending on the composition and characteristics of the fishing population in the area.

- c) A monitoring stage of actions implemented. Although shared management actions in the Pichis sub river basin are relatively recent (2006 onwards).

So, in the Pichis river basin fishing management strategies are in place and their continuity depends largely on the strength of its institutions, the continuity of actions and perseverance of users. There is some uncertainty among all participants of this strategy due to the proximity of a municipal election that might change the institutional composition in the district. The great challenge for the future constitutes the monitoring of the implementation process of this collaboration model between municipalities and the production sector.

The model of collaborative governance of the Pichis and the Low Pachitea river basin with their main articulation components are presented in the following scheme:



Sector Tools: local committees for fishing surveillance and management programs

Community fishing surveillance committees represent a strategy of community participation and of institutional collaboration between communities and the production sector. These committees constitute support groups to fisheries management mainly for control and surveillance of prohibited activities within their community lands or in areas adjacent to them. According to the rules that define their activity and prior recognition and training by the production sector, these instances are responsible for recording the violation and reporting the event to the competent authority.

From our point of view, there are different experiences of conformation and performance of these Committees within the Amazonian area. For the case of

Ucayali¹⁷ and Pasco¹⁸ the formation of these instances did not require further formality than the official recognition granted through a resolution by the respective Regional Direction. However, in the case of Loreto and Pachitea¹⁹ the conformation of Surveillance Committees is subject to the formalization of Craft Fishermen and the formation of their respective Association.

Both case studies within the Pachitea (Pichis and Pachitea) river basin will work with the surveillance component, with the difference that for the Pichis these Surveillance Committees will constitute support groups by micro river basins and for the specific case of the Pachitea regarding the village Antiguo Honoría these functions will be assumed by the Ronda Campesina²⁰ organized and recognized in the area, they carry out functions of internal order control and in practice execute in a way the surveillance work of the Inturuya Cocha; regarding Dos Unidos, the Community Surveillance Committee will continue assuming it.

4.2 Models of collaboration between local governments, production sector and communities

This fisheries management model is proposed for the Ampiyacu and Apayacu river basin in the Loreto region. Their social, environmental and fisheries realities are totally differentiated compared to those of the Pachitea river basin.

Using as base of the process previous experiences, the model includes an important component: the Local Environmental Management System (SLGA) as a tool for general environmental management and their respective sector tools. For the Ampiyacu river basin, in addition to SLGA, it is considered community²¹ fishing agreements and management plans for one or two lagoons in the Tierra Firme Community. While for the case of the Apayacu river basin it includes in the model the collaboration between the Production Regional Direction of Loreto to organize the fishermen in the Yagua Indigenous Community of Yanayacu.

The Ampiyacu river basin management model

The fishery management model of the Ampiyacu river besides using the SLGA for planning environmental management priorities in the district will use fishing agreements that organize access to the river, ravines and lagoons of the Ampiyacu river basin.

¹⁷ O.R. N° 120-2007-GR PASCO/CR approved on July 25, 2007.

¹⁸ O.R. N° 011-2004 – GRU/CR on the conformation of Villages and Native Communities Regional Control Surveillance Local Committees with direct access to river meadows of the region, 2001.

¹⁹ DS 015-2009-PRODUCE, Regulations of the Fishing Activities Strategy of the Amazonian area, May 2009.

²⁰ Law N° 27908, recognizes legal status to Rondas Campesinas, as an autonomous and democratic community organization, supports the exercise of jurisdictional functions of Rural and Native Communities, collaborates in conflict resolution and performs functions of extrajudicial conciliation under the Constitution and the Law as well as functions related to security and community peace within its territorial scope.

²¹ In Peru there is no legal framework to support the establishment of fishing agreements as the Brazilian experience, but there are some indirect mechanisms that can include fishing arrangements identified in rural areas and that could be assumed by shared management strategies that could go beyond management plans.

Since the '80s, in the Ampiyacu river basin rules for use of natural resources were established for members of communities in the river basin by the Indigenous Federation. Accordingly, the development of extractive activities within the territory of the river basin was subject to the delivery of a monetary contribution to the Federation. The Federation in return agreed to carry out control work on activities in the various critical points of the river basin. The monetary contribution allowed the Federation to finance their various representation activities.

This taxation system by exploiting natural resources was later extended to foreign residents as an effect of limiting the access and as a strategy to grant continuity to the financing of the Federation activities. In this river basin, unlike the river basins of the Pachitea and the Pichis the role of the Federation for the control and monitoring of natural resources is much more strengthened. Although, with time, this system has weakened, actually users of the river basin are willing to continue giving a contribution for the resource exploitation²².

Even though these control measures are still incomplete and greater efforts should be devoted to consolidate them as more comprehensive management strategies, the experience gained by the validity of the entry rights to the Ampiyacu river basin has generated agreements between users on the desirability of its implementation.

In that regard, now the San Pedro Fishermen Association and the Indigenous Federation of Ampiyacu (FECONA), which includes fourteen communities of the river basin, have agreed to continue with the contribution procedure for admission to the fishing areas, but want more assurance on the continuity of the system. A key factor in the fishing agreements between formalized commercial fishermen and indigenous federation is the exclusion of informal fishermen that attempt to enter the river basin.

In this river basin, unlike the ones mentioned before, the exploitation problem is not related to resource scarcity, but to a need of a strategy for fishing activities. It is important for the populations living traditionally in the area to retain control of their territories, while ensuring their social and economic structure of which they depend. In the formal sector, there is no opposition to this system of "contribution" or they are not well informed. System users require only that through the contributions their entry is guaranteed and not subject to uncertainties, to be able to develop their activities; they recognize the contribution because they consider that "if someone is in charge of taking care, it is normal to receive something in return, could be money or something else"²³.

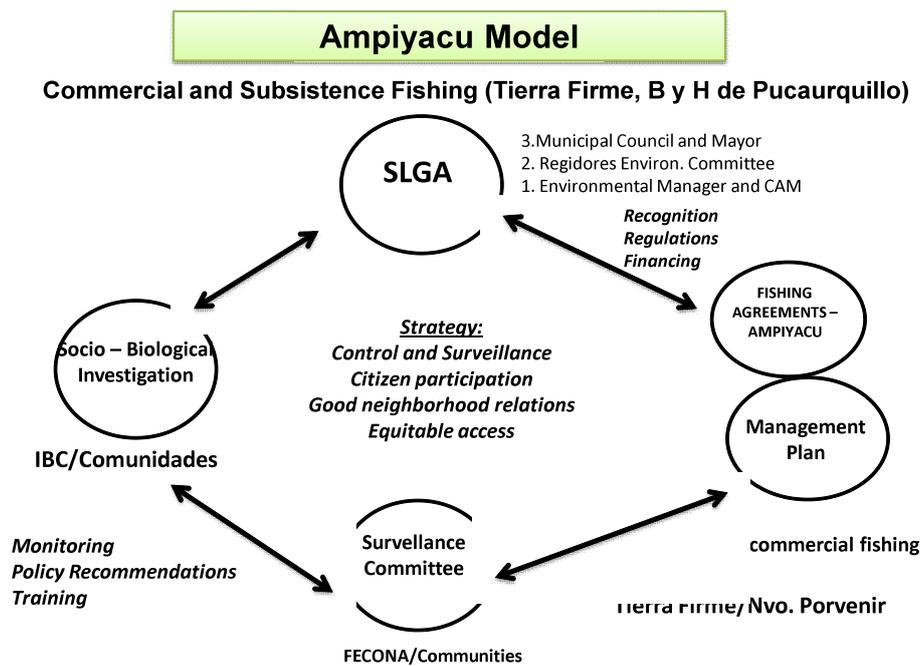
However, at this stage of the process both participants are discussing to facilitate or not access to fishing areas, but not the management elements. One of the major deficiencies of this system is the bribery by outsiders to Federation leaders, for which the entry is authorized, but in no case the development of the activity itself is controlled. In this regard, the entrance authorization is not complemented by control measures such as quota or catch amount by entrance, frequency of entrance per

²² Two main factors have contributed to the weakening of this system, corruption within the heart of the Federation and the loss of leadership.

²³ Interview to Mr. Julio Pérez, formal fisherman from Pevas. June 2010.

season, fishing areas, review of techniques or fishing skills, species spawning season, minimum sizes, among others. It is expected to correct and implement gradually effective control measures and surveillance.

In this regard, current conditions make possible the work of the organization to control the natural resources of the river basin, using environmental management tools with the municipality and sectors with fishing management plans for lagoons in the Tierra Firme community sector and fishing agreements between the Ampiyacu Indigenous Federation and the San Pedro Craft Fishermen Association. The Ampiyacu model components are presented in the following scheme:



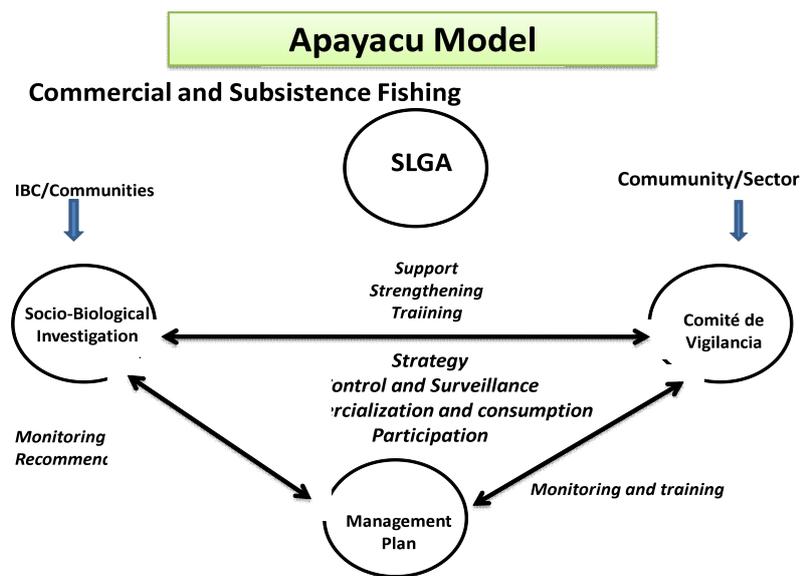
The Apayacu river basin management model

In the model of fishing management for the Yanayacu community the SLGA will not be used as an Environmental Management tool, but a strategy of direct relationship between the “El Manatí del Apayacu” Fishermen's Association and the Production Regional Direction of Loreto. The SGLA component is not incorporated due to the district delimitation uncertainty of the community, because while its title recognizes it to belong to the district of Pevas, in reference maps of the Regional Government of Loreto and the National Institute of Statistics and Informatics it is considered in the district of Las Amazonas. However, the community receives municipal and sectors (education and health) sporadic assistance from both districts. In addition, the two district capitals are quite distant from the community to be able to be articulated to a possible SLGA, that is why, for the implementation of the model, it is easier to articulate the fishing sector because of its relative proximity to the city of Iquitos, where the Production Regional Direction operates.

This management model reflects the current tension around commercial fishing, where both users have a better understanding of the fishing legal framework and

therefore wish to implement legal tools that allow them more reliability in the development of the activity.

Although the fishing surveillance committee in the Yanayacu community was established two years ago, the formalities, paperwork and the nature of the exploitation prevented its full operation. The conflict over access to the community lagoons are frequent and control actions, monitoring and reconciliation agreements between resource users are required to achieve sustainable exploitation in an area considered for the Loreto region as one of the major fishing areas. The Apayacu model components are presented in the following scheme:



5. FINAL CONSIDERATIONS

The formal fishing management in the Amazonian area does not rely on a clear strategy for the management of hydro-biological resources and diverse aquatic ecosystems at the different scales of this study. In spite of the efforts made by the State that developed a national policy framework for Fishing and a regulation of the fishing activities strategy in the Amazonian area of Peru, the situations related to fishing from a socio-cultural, economic, ecological and biological point of view are diverse and complex, leading to the need of building models of fishing community management, inclusive and collaborative with specific components according to their needs and context.

Besides, the legal framework on fishing (which in the practical sense is little disseminated and hardly known in the rural Amazonian area), there are judicial forms with direct and indirect environmental competences granted to local governments based on the organization and implementation of: the Local Environmental Management System, and its management tools that can assist in giving priority and addressing issues of natural resources and ecosystems, specifically related to fishing. Local governments are the primary authority and the closest that exists in the area of marginal Amazonian communities. Currently, the SLGA is scarcely

organized, implemented, and lacks sustainability in many local governments in the Amazonian area; the management tool is underutilized, but given the current trends and environmental pressures, are increasingly expanding and gaining political will on its importance.

In the communities, meanwhile, different strategies and forms to defend and organize the exploitation of fishing resources that they consider as their own are constructed and reconstructed. Conflicts and uncertainties continue, and the pressure for the extraction of fishery resources is growing; insensitivity, basic needs of local people, anarchy and state absence are rapidly causing negative impacts on biodiversity and ecosystems in many remote areas. In this context, we are convinced that under the decentralization process that Peru goes through since 2001, regional and local governments, social organizations and communities can become key actors in building participatory proposals that would enable to change the philosophy of "do nothing or not do much" for the fishing management of natural environments, to "do something useful" for it.

In that regard, it is important to work only based on lagoon management plans, which as tools for the conservation and legal protection of space are an important alternative, but its bureaucratic approval and high costs for its preparation and implementation limit their urgent application. This requires to integrate management plans pursuing more comprehensive and collaborative governance strategies such as the Local Environmental Management System (SLGA) wherever necessary and feasible.

SLGA offers spaces for platform, analysis, discussion and consensus of a shared vision of the type of development and environmental management that is desired for the local area. SLGA, by including fishing management, allows it to be linked to water, wood and solid waste local management as well as to other important issues at local level. Likewise, allows defining different actors roles, highlighting the role of municipalities, indigenous federations and social organizations. Meanwhile, municipalities become promoters and management supportive authorities, releasing the necessary legal instruments, facilitating and promoting various activities financing.

It is needed to continue with the analysis of processes in the implementation of models; there are signs of the necessary focus to be incorporated in the strategies, such as fishery resources management with a river basin focus, and not just specific lagoon management by the dynamic of the hydro-biological resource, plus opportunities for environmental services for community lagoons and natural resources management, preservation and ecotourism combined focusing in lagoons, among others. The study allows us to determine that despite the challenges there are conditions to improve and implement collaborative models for fisheries management. It will not be an easy path, we need organized community members, with effective participation in the process, united, empowered, proud of their cultural identity, and at the same time include positive changes at decisions level and in the political willingness of regional and local governments. Progress is advancing, slowly, and is not an easy path, but it is necessary and positive to achieve a more participatory and sustainable management of fishing for the benefit of local

communities and the conservation and proper management of the ecosystem in the Amazonian area.

RECOGNITIONS

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6. BIBLIOGRAPHY

Belaunde, Luisa Elvira. *El Recuerdo de Luna: género, sangre y memoria entre los pueblos amazónicos*, Lima: CAAAP, 2008.

Berkes Fikret. "La pesquería de pequeña escala: alternativas al manejo convencional de recursos" (capítulo 17) en *El manejo de las pesquerías en los ríos tropicales de Sudamérica*. Instituto del Bien Común, Perú. 2008.

Brack, E. A. "Las ecorregiones del Perú". *Bol. de Lima*, 1986, 44: 57-70.

Castro Edgardo, Stephanie Borios y Percy Summers. "La pesca en la cuenca andino-amazónica del río Pachitea, Perú" (capítulo 3) en *El manejo de las pesquerías en los ríos tropicales de Sudamérica*. Instituto del Bien Común, Perú. 2008.

Carter, E. Simon and Bruce Currie-Alder. "Scaling-up natural resource management: insights from research in Latin America" *Development in Practice*, Volumen 16, Number 2, April 2006: 128:140.

Cecchi. S. K. "Genetic diversity dynamics in traditional agricultural systems of Peruvian Amazon". MSc. Thesis. Department of Land Use and Blanning, Appalachian State University Boone, North Carolina, USA. 1999.

Coomes T. Oliver, Christian Abizaid and Michel Lapointe. "Human Modification of a Large Meandering Amazonian River: Genesis, Ecological and Economic Consequences of The Masisea Cutoff on the Central Ucayali, Peru". *AMBIO: A Journal of the Human Environment* 38(3), 2009:130-134.

Instituto del Bien Común. Municipios y comunidades indígenas en acción: construcción de modelos de gobernanza colaborativa para cuidar los recursos acuáticos y pesqueros amazónicos en el Perú. Propuesta para una iniciativa de investigación-acción. Lima-Perú: Instituto del Bien Común, 2008.

Kalliola, R., A. Linna, M. Puhakka, J. Salo & M. Rasanen. "Mineral Nutrients in Fluvial Sediments From the Peruvian Amazon". *CATENA -an interdisciplinary*

Journal of soil science-hydrology-geomorphology, vol. 20, Cremlingen, 1993: 333-349.

Soria Carlos y Vanessa Rodríguez. "El marco legal formal y consuetudinario de la pesca de subsistencia en el río Pichis, Perú" (capítulo 5) en *El manejo de las pesquerías en los ríos tropicales de Sudamérica*. Instituto del Bien Común, Perú. 2008.

Pinedo, Danny, y Carlos Soria. "Introducción: las pesquerías como bienes comunes" (capítulo 1) en *El manejo de las pesquerías en los ríos tropicales de Sudamérica*. Instituto del Bien Común, Perú. 2008.

Pinedo Danny. "La orfandad de los peces: uso consuetudinario de los recursos pesqueros en la cuenca del río Pichis, Perú" (capítulo 4) en *El manejo de las pesquerías en los ríos tropicales de Sudamérica*. Instituto del Bien Común, Perú. 2008.

Riofrio José C., Walter R. Ferre y Daniel Velarde. "Contribuciones para el manejo de la pesquería comercial en Pucallpa (Ucayali, Perú)" (capítulo 7) en *El manejo de las pesquerías en los ríos tropicales de Sudamérica*. Instituto del Bien Común, Perú. 2008.

Rodríguez, L. O. *Diversidad biológica del Perú: zonas prioritarias para su conservación*, Lima: FANPE, GTZ, INRENA. 1996.

Rufino Mauro L. "Gestión compartida de recursos pesqueros en la Amazonia" (capítulo 11) en *El manejo de las pesquerías en los ríos tropicales de Sudamérica*. Instituto del Bien Común, Perú. 2008.

Sen, S. y Nielsen, J. R. "Fisheries co-management: A comparative analysis". *Marine Policy*, 20(5), 1996: 405-418.