

Socio cultural diversity and ecological changes, complex scenery for community management of fishery in the Peruvian Amazonian

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SUMMARY

The management of the fisheries resource in the Amazonian area is an important concern for its inhabitants. Efforts have been made to mitigate the over exploitation of this resource, the improper practices, control of illegal fishing and to improve the relationship among the fishermen, the traders, and the subsistence fishermen. As an outcome of the interventions it has been possible to have some relevant solutions but in some cases the problems are still unsolved. There are also ecological factors that increase the complexity, such as the changes in the river flow, the dry lagoons and deforestation of the riversides. One issue in the Amazonian area is its high socio cultural diversity among 42 indigenous peoples grouped in 13 linguistic families living together also with human settlements of migrants usually known as mestizos, each group of indigenous people has its own cosmos visions, skills and they use in a different way their natural resources with different transcultural levels. Also, the national government has issued rules and policies with regard to fishing, oriented mainly to sea fishery, and has left aside the importance of subsistence fishing and there are inconsistencies with regard to the commercial fishing and the conservation of the Amazonian fisheries resources. This complex issue give way to the need for the institutional learning to be adapted to political reforms that may speed up decentralization as a key process for the strengthening of experiences that may allow to create participatory and inclusive governance for the management of fishery according to the condition and dynamics of the aquatic ecosystem by areas and communities taking into account the socio cultural features of the Amazonian people.

Key Words: Amazonian area, complexity, diversity, management and fisheries.

1. INTRODUCTION

In the Low Amazonian and inter fluvial area of Peru, where this study is being made, there are more than ten indigenous peoples that belong to various ethno linguistic families (Ministry of Agriculture and the Peruvian Indigenous Institute, 1994; Brack and Yañez, 1997), and also living in the area are the settlers that come from other areas of Peru and are known locally as “mestizos”, and their families are settled in the riverside areas of the main rivers, inflows and lagoons. The various economic activities of the Amazonian people are based mainly on the extraction of natural forest resources (lumber, resins, mountain meat, medicinal plants, fruits), the subsistence fishing combined with the commercial one in lagoons, tahuampas (flooding areas), rivers and streams, complemented with an itinerant slash and burn farming using the wet soils of the annual floods, and mostly seeds and traditional techniques (Bergman, 1990; Balée, 1989; Kalliola, et al. 1999; Denevan, 2003; Labarta, et al. 2007; Latournerie, et. al. 2009).

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Since the days of the first inhabitants of the Amazonian area up to now, fishing is one of the main economic activities for the people living by the riversides, and it is an important part of the family diet (Denevan, 1979; Bayley, 1981; Tournon, 2002; Castro, et. al. 2008; Coomes, et al. 2010); but it is evident that the fishing resources in the Amazonian area are over exploited more heavily in some areas than in others, and the main factors for this are: the increased population that need more fish, the deforestation of the riversides, the use of improper practices such as the use of toxics (agrochemical and vegetal), fishing during the reproduction season, the use of large nets and the pollution of the water ecosystems of the main rivers with solid wastes and liquids, the discharge of fuel and the large earth sliding in the river basin heads (Pinedo, et. al. 2002; Castro, et. al. 2008; Pinedo, 2008; Riofrio, et. al. 2008; Soria y Rodríguez, 2008). This trend is putting in risk food security for the local population and it affects also the hydro biological diversity with regard to quantity and quality.

To revert this condition its is necessary to understand better the issue of fisheries in the various ecosystems of the Amazonian area and in this way be able to submit adaptable options through community participatory processes linking also the other stakeholders involved such as the local governments, public institutions working on the issue of fishing activities, research and development institutions, among others, in order to have a sustainable management of the aquatic ecosystems and the hydro biological resource. Up to now, there are few successful experiences with cooperative governance with regard to community management, as only few of them are promoted in the National Protected Areas and the Regional Conservation Areas, which in general are supported by non governmental organizations with the aim to get closer and to establish a link with the public institutions.

The tropical fishing, as is the case of this study, is a classic example of a study of the common goods, in which an analysis is made of the specific issues of each area (Gordon, 1954; McGrath, 2000; Pinedo, 2008), Including the relevant conflicts and uncertainties with regard to the rights relevant to the fishing resources that give way to tensions or conflicts among the local people that use the resource directly for subsistence, and the formal and informal commercial fishermen that come to the area to extract the resources without taking into account the relevant issues of management and respect for the families living in the local area. In general, the formal fishing institutions do not work in these marginal Amazonian areas, and if they work there they do not have the human and financial resources required to develop a cooperative management, for a rational and regulated use with community participation.

In this context, the Instituto del Bien Común (IBC) of Peru, with the support of the International Development Research Centre of Canada (IDRC) are implementing a participatory research action with indigenous people of the Low Amazonian and Inter fluvial area of Peru, with the aim to create cooperating governance models among the community, the indigenous organizations and the local governments oriented to the conservation of the hydro biological resources. Is in this regard that the aim of this article is to identify and analyze the socio cultural and ecological factors that would affect the community management of fishery in the Amazonian area of Peru.

2. THE SCENERY: THE LOW AMAZONIAN AND INTER FLUVIAL AREA OF PERU

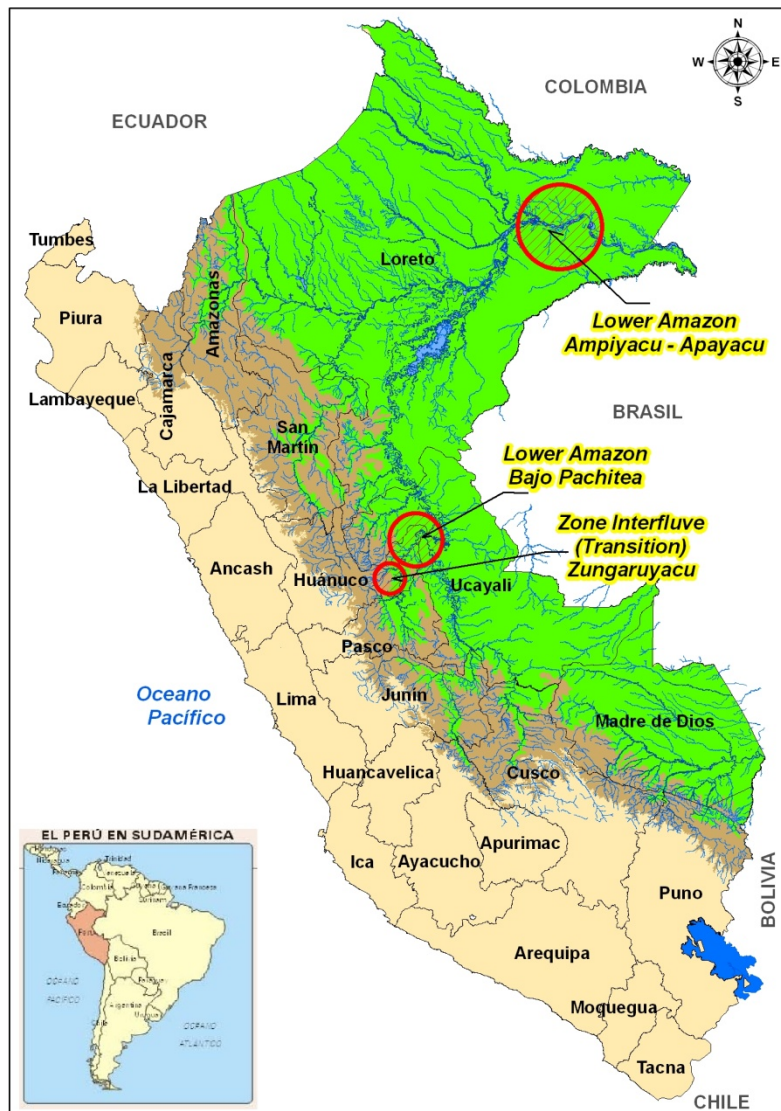
The Low Amazonian area includes two study areas: in The low sector of the Pachitea river and the Ampiyacu-Apayacu rivers in the inter fluvial area and the study located in the basin of the Zungaroyacu river (Picture 1). Each area has different bio climatic features with regard to their main economic activities and their social and cultural features relevant to each indigenous people. The Amazonian area in Peru has the largest biodiversity worldwide. The biological diversity or biodiversity of the ecosystems, species and genetic resources is the most complex in the world with a wide diversity of forestry and aquatic ecosystems placed in short spaces and along the whole Amazonian river basin as well as for its wide cultural diversity (Brack, 1994).

The low sector of the Pachitea river where the river of the same name is affluent of the Ucayali River, is surrounded by four lagoons that in whole represent 410 hectares of water meadow areas that are most important for the biological dynamics of the fishery areas where the inhabitants in the river area are mestizos and the Shipibo-Conibo indigenous communities, that is one of the most important ones in the watershed of the Ucayali river. The low sector of the Pachitea river belongs geographically to the Department of Huánuco, Province of Puerto Inca and District of Honoria. The main activities are agricultural based on corn production (*Zea mays*) and banana (*Musa sp.*) that are sold mainly in the markets of Pucallpa (Department of Ucayali). According to the classification of the Living Areas of the Holdridge System adapted and interpreted according to the geography of Peru (Zamora, 2009) The low sector of the Pachitea river belongs to the bh-PT (Humid Forest pre Tropical Mountain, that is transitional to Tropical Humid Forest); according to information from SENAMHI (2010) the average climatic data for ten years (2000-2010) for the annual rain is 1867 mm and a temperature of 26 °C; located at an altitude of 255 meters above sea level.

The area of the Ampiyacu-Apayacu rivers, tributaries of the Amazon river, both river basins are surrounded by more than 15 small lagoons that represent an average of six hectares of water meadows of biological importance as a spawning and growth area for some hydro biological species. In the basin of the Ampiyacu river live the Boras and Huitotos indigenous communities, while in the basin of the Apayacu river live Yaguas communities and groups of "mestizos". Geographically, the basins of the Ampiyacu-Apayacu rivers belong to the Department of Loreto, province of Ramón Castilla and district of Pevás and Las Amazonas respectively (Picture 1). Fishing is the main activity in the area at both the commercial and subsistence level the extraction of forest resources, as well as art crafts made of vegetable fibers that are sold in the city of Iquitos. According to the Classification of the Living Areas of the Holdridge System adapted and interpreted according to the geography of Peru (Zamora, 2009) the basins of the Ampiyacu-Apayacu rivers belong to the bh-T system (Tropical Humid Forest, transitional to Very Humid Forest Premountain Tropical); according to information from SENAMHI (2010) the average climatic data for ten years (2000-2010) for annual raining is 3007 mm and a temperature of 26.7 °C; located at an altitude of 101 meters above sea level.

The inter fluvial area is the transition (Picture 1) between the high jungle and the low jungle, and it is located in the basin of the Zungaruyacu river that is tributary of the Pachitea river; the inhabitants in the area are communities of the Cacataibo indigenous people, with mosaics that shelter indigenous people living in voluntary isolation known as “camanos”, and also living in the river basin are “colonos” dedicated to the breeding of bovine cattle for which large pasture areas have been set up. Geographically the area belongs to the Department of Huanuco, province of Puerto Inca and district of Codo de Pozuzo. The main activities of the communities is the extraction of forest resources such as wood species, resins and medicinal oils that are sold in Codo de Pozuzo and Puerto Zúngaro; fishing, hunting and crops are mainly subsistence activities. According to the Classification of the Living Areas of the Holdridge System adapted and interpreted according to the geography of Peru (Zamora, 2009) the basin of the river Zungaroyacu belongs to the bp-PT system (Pre mountain Tropical Rain Forest); according to information from SENAMHI (2010) the average climatic data for ten years (2000-2010) for annual raining is 2113 mm and a temperature of 23 °C; located at an altitude of 707 meters above sea level.

Picture 1. Study areas in the Amazon region of Peru



In the study areas, there is a minimum of 74 inhabitants in a Bora community of the Ampiyacu river, and as a maximum 375 inhabitants in a Shipibo-Conibo community of the Low Pachitea river. The average population distribution is of 54% men and 46% women, of whom 43% of the total population are children under 12 years old; with populations generally of young people. The domestic units are formed by clans or family groups. In the community they are nuclear families, but it is common to see large families that include other members such as grandchildren, grandparents and uncles and aunts.

3. MAIN THREATS FOR THE COMMUNITY AND FOR FISHING

Through participatory research processes with men and women from seven communities in the study it was possible to identify the main current and potential threats for the community and fishing, and to point out also the areas or critical points where these threats take place or may take place. The threats were identified by their origin as threats related to the human activity and those of an environmental type.

In general, the current threats for the community have various trends and intensities in the Low Amazonian and in the inter fluvial areas, according to the particular issues of each context such as the different, extractive economic activities, the few sustainable economic options for the families, the increasing acculturation process of the indigenous people, the lack of organization or the division of the communities due to the conflicts among clans or family groups, the invasion of community territories by settlers from the nearby areas, the lack of food security due to the scarcity of resources in the forest, the scarcity of fishes and the problems of alcoholism among some community members. The potential threats for the community that require more information are the presence of oil concessions in the community territory and the concession of lagoons by private companies that would limit the use of the resources for the families living in the area.

The threats for fishing show the same trends for the study areas, as for instance an excessive use is identified of waiting and hauling nets of large size that are used by the commercial fishermen without respect for the minimum sizes of the fishes or the stages for spawning or when fishing is forbidden for some species of higher economic value. It must be mentioned also that the commercial fishermen that come from other areas, and also some community fishermen, use this type of nets for subsistence and to sell the surplus fish and also are identified the foreign commercial fishermen that throw the fish wastes with the relevant pollution of the selective fishing, and they select the fishes of best quality and size, throwing back to the water or in the river side the non-selected fishes; the fishing with fuel, the use of chemical toxics (Endosulfan) made by unscrupulous fishermen and the fishing with bioacids of vegetal origin such as barbasco or cube (*Lonchocarpus utilis*) and huaca (*Clibodium remotifolium*) that they use frequently in the community and are considered as threatening for the hydro biological resource and the pollution of the aquatic ecosystem; similar findings are reported in studies made by Pinedo (2008); Castro et. al. 2008; and Soria & Rodríguez (2008).

Likewise a threat for fishing that give way to conflicts among the formal commercial fishermen and the subsistence fishermen of the community are the granting of

authorizations or permits for fishing provided by the Fisheries Division (when they are present in the area) to carry out fishing without previous technical studies to set up the areas and to reserve those areas of biological importance without considering the large presence of communities in the areas, together with the problem of the sector that do not have the human and financial resources for an effective regulation and control of fishing in the area. Likewise, in some communities the local population increase is considered as a threat for fishing because of the increased demand for food, but according to the perception of other communities no danger seems to be perceived because they assume that subsistence fishing is not a threat for the fishing resource.

As environmental threats for the community and for fishing are the immeasurable erosion of the relevant sections of the riversides, but it must be mentioned that the main reason for this erosion was the deforestation of the riversides during the past decades with the establishment of crops and pasture plantations that gave way that in the high season there is a river erosion that changes its flow and affects the biological dynamics of the fishes and the life of the families living in the riversides. Another threat of environmental type, because of the climatic changes that have taken place in the last years, is the longer summer season that is affecting the water level in the rivers, ravines, and lagoons and give way to the water heating, and it cannot be perceived if these changes of temperature are affecting directly the biology and health of the fishes, and affecting also the crops that in many cases are lost.

Because of the identification of the various threats, the communities give priority to the care against human activity threats that affect the community and fishing, such as to strengthen a community surveillance system to monitor the commercial fishermen, more information and awareness about the existing legal regulations, improved organization and care with regard to the problem of the potential concessions of lagoons, among others; but to implement these actions it is necessary to develop a participatory strategy that requires the community willingness and an important institutional presence of the government, as well as the support of the local government and of the non governmental organizations.

There are other threats that have not been identified by the community because of its complexity, the bureaucracy “technical criteria” and political “decisions” that affect the communities’ well-being. Usually these threats are caused by the Government, possibly under the influence of interests and the contradictory point of view that the “global development” concept has in the Amazonian context, mainly among the indigenous people. For instance, the Forestry Law in Peru (Law N° 27308) does not recognize the communities as owners of their lands, only of lands of agricultural use, and while it is true that they have preferential use, the forests, lagoons and all that is underground in the community belongs to the Government. This Law is giving way to many social conflicts in the communities such as territorial invasions, superposition of oil concessions, forestry, aggressive fishing, and industrial crops concessions, among other problems in the community territory.

Likewise, in many communities the property titling of community lands is still pending and mainly the demarcation of the territories. The sector responsible to care for these demands is changing constantly its policies, roles and transfer to the regional

governments and they do not have the financial and human resources for an urgent work, and there are requests and conflicts that remain unsolved since twenty years ago. Besides, the lack of knowledge in many public sectors and the society in general about the rights of the indigenous peoples and of the Agreement 169 of the International Labour Organization (ILO) in favor of the communities that may permit a preferential, contextualized, flexible, consulting and respectful attention to the local customs; however, many times this lack of knowledge give way to transgressions, impositions and abuses in the indigenous communities.

4. THE FISHERIES SITUATION

In order to have a better knowledge and approach with regard to the fisheries situation in the study area a research was made with a social, cultural and biological approach. The biological samples were made during three different moments in three ravines of the Zungaruyacu river, three lagoons of the Low Pachitea river and five lagoons in Ampiyacu-Apayacu rivers, which will allow us to know the diversity of the species and its condition, and that can give us approximate indicators of the fisheries situation; previous information of the Pachitea river basin described by Castro et. al. (2008) and in the quick inventory made in the Ampiyacu-Apayacu rivers (Pitman, 2004). However, it is significant to make evident the shortage or the low frequency of species of economic importance such as the paiche (*Arapaima gigas*), harahuana (*Osteoglossum bicirrhosum*), paco (*Pyaractus brachypomus*), gamitana (*Colossoma macropomum*), tucunare (*Cichla ocellaris*), among others.

According to the experts, the three biological evaluations programmed in the study are not enough to determine the fisheries situation from a biological approach that may support the decisions to be made, as for a better approximation it will be necessary to have at least four yearly evaluations during more than five years which may even not be enough to determine a real situation, given the complexity of the behavior of the hydro biological species in the Amazonian area. At least one of the three evaluations made will be the proposal of temporary and spacing closed seasons for identified species, minimum capture sizes and other recommendations to be adapted in the local agreements for the community management of fishing.

In order to know the perception of the families of the community with regard to the fisheries situations, 145 interviews were made in seven communities in the study area; the answers for the case of the Low Pachitea river where more than 82% of the families perceive that each time there are less fishes, and that reflects the difficulty to have enough fishes for the family food; in the same case 8% of the families state that there are not fishes in the rivers and lagoons and 10% of the families perceive that there are fishes as usual. This last perception moved our attention and we explored the information that is based on the criterion that the fishes because of their survival instinct have modified their migration and food habits, and that makes more difficult to locate them at the fishing time and for that the fisherman must have very special capabilities to continue fishing as always. This might be a reason, but in general in the low sector of the Pachitea river the shortage of fishes is evident in the increased fishing effort that must be made many times with insignificant outcomes.

The perception about the situation of fishing among the families living in the communities of the area of the Ampiyacu-Apayacu rivers shows different features

with regard to the case of the Low Pachitea river. Thus, we have that 57% state that there are less fishes and they must make more efforts to obtain some fishes and 43% of the persons interviewed affirm that there are fishes as always. But in this case, some of them recognize that it is increasingly more seldom that they can fish large size species as it used to be in the former years. One particular feature in this area is its intricate aquatic ecosystems network, formed by creeks that are tributaries of the Ampiyacu-Apayacu rivers more than fifteen lagoons and a wide number of tahuampas (flood forests) that are appropriate for the spawning, growth and reproduction of species.

In the Ampiyacu- Apayacu rivers there are periods of time when some of these aquatic ecosystems (tahuampas, lagoons) do not have an adequate increase of water level and the fishes remain practically “confined” with no fishing pressure due to the difficult access for the boats during the flood time, as the large floods take place in an average of every five years, and these aquatic ecosystems are connected by the ditches and ravines to go into the rivers and to allow an increased production, a biological dynamics every certain time, and because of those conditions it might have sense the perception about the fisheries situation. The main problems with regard to fishing in the Ampiyacu-Apayacu rivers is not the scarcity of the resource, but the social conflicts among the foreign commercial fishermen with the fishermen of the communities.

In the case of the river basin of Zungaroyacu in the interfluvial Amazonian area, the perception about the fisheries situation has a similar behavior as the case of the Low Pachitea river. 72% of the persons interviewed state that there are less fishes every day, and the rest of the people affirms that the number of fishes is as usual. In this area, in different moments there have been up to two natural events related to sediments overloads by earth alluviums in the upper part of the river basin, with the relevant general death of hydro biological resources, and according to the local people it is taking many years to have again the presence of fishes in the area.

The main reasons for this situation were described before, but for an increased detail, the families in the interview mention the excessive use of “waiting” and “hauling” nets by the foreign commercial fishermen (56%); the local population growth (18%); fishing with toxic poisons and the use of dynamite (13%); and the fishes go away because of the fishing with nets (6%); fishing with spawning (1%), the waste due to selective fishing (1%), among other less frequent factors. To change this situation, the interviewed people suggest that an improved organization is required in the community to enable the people to talk about the problem, and to have trainings, as well as to be careful and perform moderate fishing according to the community agreements, set up surveillance committees, recover the local knowledge, look for incentives and coordinate with the other communities located in the river basin.

5. SOCIO CULTURAL AND ECONOMIC CHARACTERISTICS

The communities of the five indigenous people, the Bora, Huitoto, Yagua, Cacataibo, Shipibo-Conibo and the mixed or mestizo population living in the research area, have among them general common characteristics and also very specific issues for each people, as well as among communities in each indigenous

people, due mainly to the origin of the community, its culture, the language, its proximity to the main cities that have incidence on their economic activities, their local knowledge to carry out daily activities, their ancient habits as well as their geographic location that provides them with several ecosystems.

Of the general characteristics that may be common among the community of the different indigenous people is that all them depend of the extraction of natural resources of the forest, the rivers and lagoons to cover their basic subsistence needs and according to the availability and opportunity to sell the excedent in the community or in the nearest markets. The quantity and frequency of the extraction of natural resources depend of the decrease or increase of the water flow in the river and on the minimum or maximum rainfall during the fruitful season.

It can be seen that culturally some indigenous peoples are more related to fishing because they are closer to the large water reservoirs and rivers as is the case of the Shipibo-Conibo in the basin of the Ucayali river and the Yaguas in the basin of the Apayacu river, while more linked to the forest for hunting and crops are the Cacataibo of the Zungaroyacu river; while the Boras and the Huitoto of the basin of the Ampiyacu river combine the activities of forest resources extraction and the fishing activities. In all cases, the traditional agricultural activities are for subsistence, even with the conservation of an important agricultural diversity (De Jong, 1995; Collado, 2002) combined with crops introduced and promoted by development projects. However, according to the distance from the market the Shipibo-Conibo communities sell banana and corn and that is the main economic income source for the families.

The necessary pressure made on the indigenous communities to be linked to the market economy, despite the distance from the community to the market, and the need to have economic income options that may allow them to cover important needs with regard to the current time, such as clothing, medicines, and food relevant to the local consumption patterns (spaghetti, canned goods, salt, sugar, soda water, liqueur, farm chickens, salted fish and mountain meat), fuel, electrical domestic equipment, river tickets, payment for electricity hours and the school fees have given way to an over exploitation of natural resources, that is in disorder and is improper for the demanding need for survival that may affect the good living condition and food security of the communities if they do not think about this and change the current consumption trends. For that, it is essential to put into practice sustainable management plans for the natural resources.

5.1 Economic activities

Recognized by the communities as their main activities are: those activities that generate economic income (some are permanent and others by periods of time), the subsistence activities and according to its perception those activities that need some conservations actions. In the study area the main activities carried out by the communities are: art crafts, fishing, hunting, agriculture, livestock breeding, poultry, and pigs, extraction of forest resources (fruits, resins, fibers, oils, medicinal plants, and lumber), selling in family stores and hiring of labor force to third parties.

The economic income generation activities of the Cacataibo in the interfluvial area are the breeding of small animals and the hiring of labor force as workers, in the Low Amazonian area among the Shipibo- Conibo and Mestizos of the Low Pachitea river, the agriculture activities are banana and corn crops and labor force work, among the Yaguas in the basin of the Apayacu river the activity is fishing, and among the Boras and Huitotos of the Ampiyacu river the activity is art crafts based on the vegetal fiber known as “Chambira” (*Astrocaryum chambira*). The other main actions are subsistence activities, and occasionally some type of casual marketing. However, the activities that are considered basic for their subsistence are fishing, agriculture and hunting. In this regard, given the current situation of the natural resources and its importance for food security, they perceive that it is necessary to make conservation efforts with regard to fishing, the forests and hunting, in that order of importance. In the same way, even if it has not been identified as necessary for diversity conservation in the communities, it is necessary to support also the in situ conservation of the phylogenetic resources that show in the same way a large number of factors that affect their sustainability.

5.2 Basic services, migration and poverty

The basic services such as education, health, drinking water and electricity are cared in a relative way in the communities, but they are deficient, culturally inadequate and in many instances they do not even exist. These basic needs are also a priority in the communities and they claim for care in the relevant institutions. Because of the marginal condition of the communities the care provided is limited and that gives way to inconvenience, disappointment, and lack of trust with regard to the authorities.

With regard to the education issue, in the process for the integration of the communities to the national education system there have been several processes and questioning about how the education in the indigenous communities should be, and currently efforts are being made to have a bilingual intercultural education system, and it has been possible to include a contextualized curriculum for teaching that is not being used in a proper way, and text books have been prepared with local contents for the larger indigenous groups. Despite the efforts made, education in the communities shows many limitations and deficiencies such as deteriorated and inadequate infrastructures, insufficient number of equipments, non-bilingual teachers that come from other areas in Peru and must go through a slow adaptation process, and the absence of students that must stay home to support their parents in the household activities.

Besides, in the communities not all the basic levels of study are being considered and in most places the education is only up to the primary education level and the students must go to other community or populated center if they want to continue with the secondary education, otherwise they cannot continue studying. Finally, it is recognized that the education level in the Amazonian region is in general lower and deficient with regard to other regions nationwide. The communities give value and respect to those persons that have completed higher studies, they become important and are consulted always for the community decision-making. When these “prepared” persons are not available, the protagonist role is assumed by the school teacher, who is the one that provides advice and support to the community with regard to the relationship and work with formal institutions.

In that education context, if currently some progress or improvement is being recognized in rural education, in the former decade the situation was even more acute without the government presence and the few schools available in the rural area, and for that reason in the communities there are still illiteracy levels, in particular among women. In the study area the research made among the family heads, the random sample of 110 interviews shows that almost 41% of the women or family mothers have not finished their primary education, 28% have finished primary education and only 4.5% finished secondary education. The sample does not show that a woman was able to have technical or university education.

It is evident that the women have less access to education, and that is due to the fact that parents decide that the woman must help in the home tasks or also because at an early age (adolescents) they have their children and to take care of their family they must leave the school. In the case of boys and family parents the average is almost 26% have not completed their primary education, have completed primary education and did not complete secondary education, and it is significant that 8% were able to finish their secondary education and 7% went to higher level studies, and this was more frequent in the communities located in the Ampiyacu river basin. They were able to reach this advanced level sponsored by an Evangelic church.

Education is one of the main reasons for migration from the communities, taking into account that most family parents are not willing to leave the community, but they work and make every possible effort for their children to migrate to the important cities to complete their basic studies and if possible to be able to continue higher education, something that only few young people can achieve. Of the reduced number of professionals that as community children had to go to other surrounding areas, some of them achieve their objective, and in some cases because of their deficient basic formation they cannot finish the higher education and must go to work in the cities in service labor. In this regard, the migration of young people to continue with their studies, is also oriented to look for paid work opportunities, or to go voluntarily for two years to the military service, or to form a family in another community, and all these trends give way to a temporary migration that in many instances becomes a definitive one, according to the distance from the community.

With regard to the other basic services, the most concerning one is the lack of drinking water supply, because the main water supply comes from the river, or from a nearby ravine and in some cases from artesian wells that supply water only for some hours. The most affected ones by the lack of a water supply system are the communities in the Low Pachitea river where the only water supply comes from the river, as they are the last communities in the low sector of the ravine where the water collected to drink have gone through the main populated centers in the upper area of the ravine and it has received various contaminating emanations that make the water unsuitable for human consumption. Besides, in the winter season the water comes with sediments and can be used only after several days, and in the summer season the water is at such a low level and overheated that is it is not suitable for human consumption. Also, the water course runs far away and it is necessary to go to distant areas to collect water for the family basic consumption. The access to safe water is a priority issue to be cared for in order to reduce the various problems and gastrointestinal diseases that affect the communities.

With regard to the health problems, in the communities or surrounding populated centers the government has set up Health Posts for basic health care, but they are not sufficiently implemented and do not have enough staff, therefore the more serious health cases must be derived to the capital of the district or to the capital of the department. The most frequent health problems are the respiratory diseases caused by sudden climate changes, the diarrheic infections because of the water and hygiene conditions, and the childbirths. Despite the fact that some families continue to use their medicinal plants, in extremely serious conditions they go to the health post.

Up to this date, there is not a permanent electrical energy service in the communities; the local governments provide support with electronic group stations that because of the high cost of fuel they work only two or three hours a day and the families must pay monthly for these services. Despite the fact that this is a restricted service the communities have purchased massively electrical domestic equipments such as TV sets and DVD, and in the afternoon hours children, young people and adults go to the household that have the equipments in order to see the various films.

According to the World Food Programme (2007) and its vulnerability map with regard to children's chronic malnutrition in Peru, the study area has a chronic malnutrition rate for children from 6 to 9 years old that is between 20% and 80% and the high rate is in the communities of the Low Pachitea river and the lower rates are relevant to the ravine in the Ampiyacu river. The vulnerability level is low, moderated or moderated low. The variables to determine the malnutrition rates are basically the child's height and weight, but no information is being specified about the quality of the children's nutrition in the communities.

According to the Poverty Map of FONCODES (2006) based on the data of the national Census of year 2005 made by the National Institute of Statistics and Information (INEI) the study areas in the Department of Loreto and Huánuco are considered to be the poorest areas, as determined by the indicators of population without water and sewage, without electricity, illiteracy among women and malnutrition percentage. The methodology to determine the poverty areas may be questioned, as it would be expected that the economic income measurement can be a main indicator to determine poverty, likewise, the fact of using occidental indicators to determine poverty in the indigenous communities is being questioned because of their cultural condition and good living styles that not necessarily includes the implementation of water and sewage services, light or education. However, the information may be used to make evident some deficiencies and increased vulnerability to poverty in the indigenous communities, as the undeniable need to solve the need for access to safe water.

5.3 Culturing process in the communities

The human societies are dynamic and in a continued process of getting adapted to changes, and that affects also the maintenance of traditional knowledge. The big problem of the indigenous people is that they are not using their cultural heritage when they stop practicing the local knowledge that could be complemented with the

best occidental knowledge for the benefit of the community. There are various factors that are producing these changes in the social and cultural structure, and they could be direct or indirect influences that are deteriorating the use of the language, their ancestral customs and practices for the use of the resources. However, it is relevant to recognize that the process has generated also “new” opportunities and life styles for the communities, but there is still a great effort to be made and a challenge to reevaluate the culture, its cosmos vision and traditional knowledge in order to strengthen the cultural identity of the indigenous people in the Amazonian area.

The factors of the communities acculturation process are related to the integration to a market economy, the relative nearness to the main markets, the temporary migration of the young people (men and women) looking for better study and work opportunities, the national education system that considers in a limited way the contextualization in the curriculum, teachers with poor knowledge of the Amazonian reality because they come from different regions, few bilingual teachers, lack of valuation of the local knowledge, sustainable development policies and programs based on intensive productive activities applied by the Government and Non-Governmental Organizations, as well as new perspectives of the communities with regard to the construction of its habits referred mainly to the changes in the community’s social structure based on the styles of life provided by the current modern technology.

As acculturation examples we can mention that currently some young and adult people of the community are losing their fishing and hunting capabilities, as they have lost the ancient fishing practices as well as the mystical cure secrets using medicinal plants that were practiced with the newly born children in order for them to be good fishermen or hunters, as well as curing when they are going to carry out the activity. The indigenous people started an adaptation and change process according to the fishing situation in the areas, by using the mestizos’ techniques and using also more frequently the nets, thread nets, among other fishing utensils and techniques. (Pinedo, 2008).

The main challenge for the indigenous people will be to reevaluate and maintain their culture, notwithstanding their increasing and irreversible contact with the modern skills. Despite the trend for changes in the social structure of the community the population makes efforts to remain as a whole indigenous community, and in some of the communities they live without the presence of mestizos that want to stay in the community, while in other communities they accept to have mestizos living in the community. However, despite this acculturation process it is important to recognize that in the case of the Shipibo-Conibo people of the Low Pachitea river they are still using daily the local language by all the family members including adult people and children, and the women are still using their very traditional colored dresses made by themselves. In the meantime, the Cacataibo, Yaguas, Huitotos and Boras are losing the use of their local language and other habits.

5.4 Gender approach

Among the Amazonian indigenous people the complementarily among genders is a ruling subsistence principle of the organization, including fishing. The distribution of

tasks among men and women as a couple and the community is based on complementarities and reciprocity. The men take on the heavy effort tasks such as cutting trees to open a new farm, cutting firewood, house building, hunting and fishing. The women work in farm crop activities and forest fruits, and food cooking. The food brought by husband and wife are valued and the food that combines vegetables and meat express in a material way the gender complement in the daily life (McCallum, 2001; Belaunde, 2005).

For the people living in the riverside, the basic food is fish and while the fishing of large species is a typical activity for men, the women, besides their agricultural activity in the crop fields, do some fishing at family level using huaca (vegetal toxic) and during the collective activities or community fishing, they fish using barbasco (vegetal toxic). In some occasions the women fish also with a fishhook and they accompany their husbands rowing in the canoe. The women tasks are centered in cleaning and preparing of fish, that can be for immediate consumption or for preservation (smoked or salted) as well as the sale of fish excedent.

The gender difference and complementarity are also an essential part of the cosmos vision and of the indigenous environmental management practices. Traditionally, the productive activities of both genders are limited by the reproductive condition of the couple. For instance, women in menstruating, pregnant and childbirth condition as well as men that have had recent sexual relation cannot go into the forestland or be involved in fishing activities because the smell of sexual substances will reveal their presence and will frighten the animals. Besides, the smell of the menstruation blood frightens the spirits are "owners" of the forest animals and the fishes, destroys the traps and fishing tools, neutralize the barbasco and attracts the bad spirits that are nourished with blood, thus putting in risk the peoples life (Belaunde 2005; Rivas, 2004).

For the children fishing is a game that they start to practice with their friends when they are seven or eight years old, as training issue for the future. But their availability for fishing depends of their school activities. For women, it is and irregular entertainment and it only permits to complement the family food. The men fish usually in small water reservoirs and rivers, using in a combined way nets, traps and casting nets, and with less frequency fishing hooks of different sizes, harpoon and arch and arrows, depending of the season and the fishing point, in the small water reservoirs and rivers. The men have also a special knowledge of the natural habits of the various fish species (reproduction, food, smell, location, etc.). When the man is not in the community for a long period of time it can be seen that some women assume the man's roles for the regular search of fishes and use the same fishing techniques as men such as the casting net or small traps. However, there is also a significant number of women and children that do not perform fishing activities.

Fishing for consumption is part of the family economy in which both genders share different responsibilities. While fishing is mainly a man's task, its processing is framed in the reciprocity of services that keep the couple together in the task of taking care of their children. Although officially the man is recognized as the family chief, fishing is not an activity to be performed only by men. The participation of children in the fishing activity is also part of the child breeding process and it is the

transmission of knowledge that permits the acquisition of productive activities for the future adult people.

5.5 “Natural” changes in the rivers flow

In the Amazonian area, through the rivers flow and since the old days the main river flows have change in form and structure according to the current aquatic ecosystems, and there are several dynamics such as a wider flow, straightened curves, generation of new lagoons of meandering formation that affect other areas that are filled up with sediments. Currently, these phenomena have become more acute along the main rivers because of the intensive deforestation of the riverside areas by the human activities. Each year during the high raining months (from December until March), when the rivers reach the highest level of the stream there are permanently riverside erosions that affect the life of the communities living by the riverside, and very often these changes may be positive for one side and negative for the other (Kaliolla, et. at. 1992; Abizaid, 2007; Coomes, et. al. 2009).

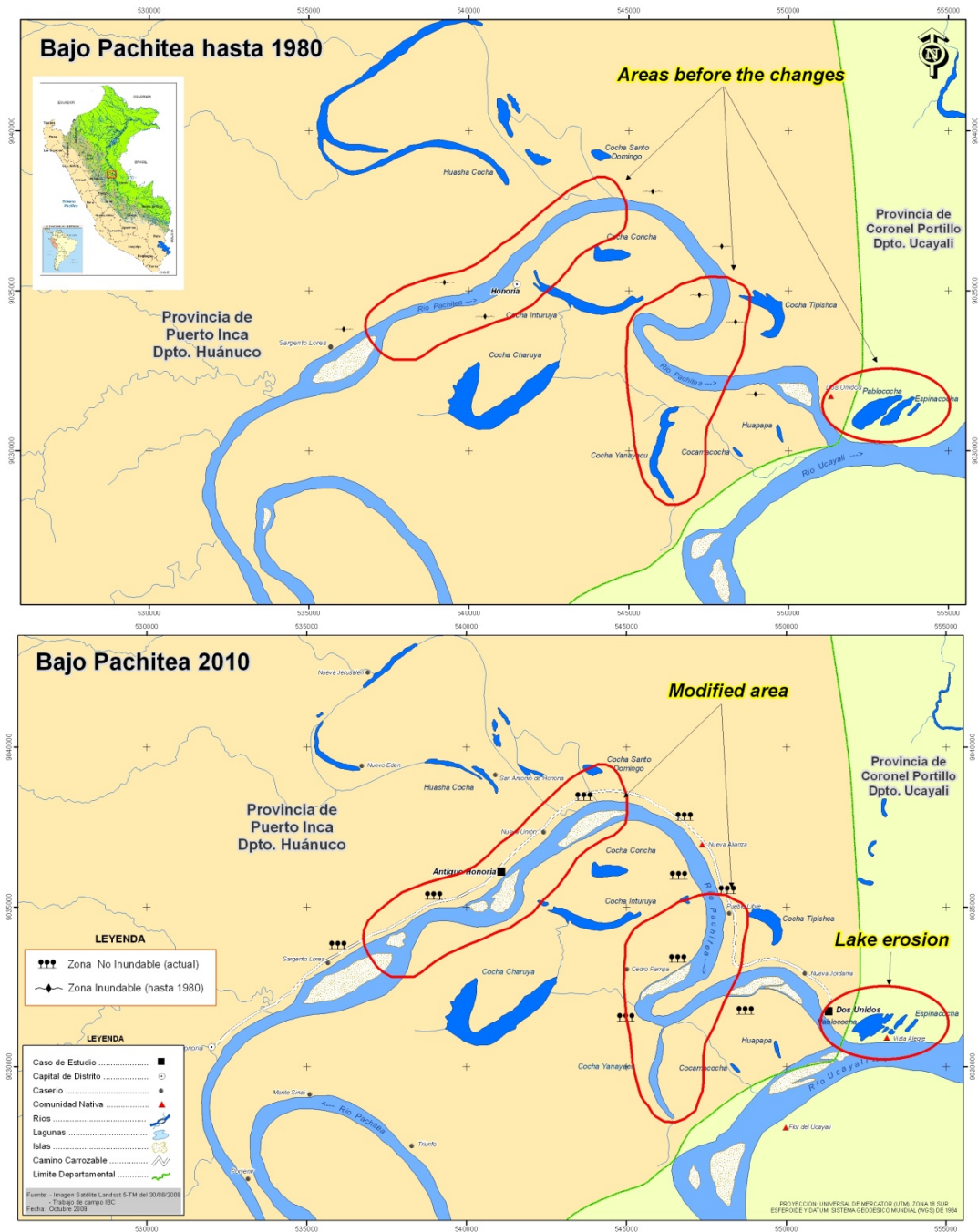
Many communities located in the riverside in the low Amazonian area have changed their location more than twice because of the increased erosion that takes place in the Riverside , and have lost hectares of permanent crops (banana) have lost the installed infrastructures (households, schools, health posts, water wells, churches, etc.), and in some cases the populated centers are left far away from the main riversides, and in other cases they are closer to them, a fact that give way to a permanent high risk uncertainty for the people living in these riverside areas that are vulnerable to these changes that may take place in a period of 10 years or less, depending of the strength of the river flow and where the changes may take place.

In the sub river basins located in the study area, such as the case of the Ampiyacu-Apayacu rivers in the low Amazonian area there have not been significant changes , they are solid earth areas that have still riverside forests that in one way or another maintain the rivers flow. However, in the area of the Low Pachitea river, in the decade of the eighties there have been changes in the flow of the Pachitea river, and new larger size islands have appeared that affect the capital of the district of Honoria that has disappeared from its place and all the families have migrated and organized new populated centers in the other riverside. The same river, is now changing its flow towards the Inturuya lagoon, and in other sector its is filling with sand the Pablococha lagoon that is losing depth, and apparently it is deemed to disappear soon because of the continued erosion of the riversides due to the pressure of the Ucayali river. This will affect the people living in the community as they will lose its nearest fishing source (Picture 2).

One of the most known changes in the flow of the Ucayali river was the one that took place in area of Masisea, which according to the studies made was caused by human action and has generated ecological and economic changes in the area (Abizaid, 2007 and Coomes, et. al. 2009); and this change affected also the river basin of the Low Pachitea river, that is near to the place where the change took place. In the Low Pachitea river, before the change, the area was floodable for a three- month period of time, the whole Winter season, and no permanent crops could be made and the lagoons appeared to be very productive and were crowded with foreign commercial fishermen.

Later on, after the changes in the ecosystem in the Low Pachitea river that stopped it from being floodable, new populated centers were set up and earth roads were built to connect the communities with the capital district and with the city of Pucallpa, also permanent crops were planted (Banana and Papaya); and at that time also the production of fishes had began to be reduced in the area, and it might be possible that those changes might have affected the biological dynamics of the fishes or it could have been also a number of combined factors such as a larger number of commercial fishermen coming to the area because it was located closer to Pucallpa, as an outcome of the change. However, there are still uncertainties with regard to other changes that might be provoked by the Pachitea river and the Ucayali river in the lagoons located in this sector.

Picture 2. Changes in the river Pachitea, lower Amazon, Peru.



5.6 Climatic changes, community perception

Through their local knowledge the indigenous people were able to predict the weather conditions and to prepare according to that the schedule for their productive activities (planting, harvesting, fishing, hunting, etc); currently, they state that the climate is not the same as it was in the past, because the rainfall appears out of the season and in certain areas it may fall only in a reduced proportion, the summer season is for a longer period of time and even with some rainfall, and all those phenomena are related with the climatic change that is going on in the whole planet.

These climatic changes affect mainly their crops as during the long summer seasons they lose them, the production goes drastically down or the crops are lost together with the seeds for the forthcoming campaigns, and all these issues affect in some way their food security. They cannot perceive if these changes affect fishing directly, but some specialists state that the climatic changes are affecting the reproduction and biological dynamics of the fishes, but there is not yet enough information to determine these statements. However, the local population can see that the longer summer season affects the small lagoons because the water is overheated and remain in a lower level, and that gives way to fish mortality.

In the study area an analysis was made of the heat and raining behavior based on a ten-year data (2000 to 2010) provided by the National Meteorology and Hydrology Service (SENAMHI) that has meteorological stations installed in locations that are near the study area such as in Tournavista for the case of the basin of the Low Pachitea river, the one in Pebas for the basins of the Ampiyacu-Apayacu rivers, and the other one in Pozuzo for the basin of the Zungaruyacu river. With regard to temperature it can be seen that in the case of the Low Amazonian area the temperature since year 2000 to this date has gone up in an average of two centigrade degrees, from 25 to 27°C in the Low Pachitea river, and from 26 to 28°C in the Ampiyacu-Apayacu rivers, but the situation is different in the basin of the Zungaroyacu river in the interfluvial Amazonian area where during the last ten years the temperature remains in 23 °C.

With regard to the accrued annual rainfall, it has an erratic behavior during the analyzed period of time. However, it can be seen that from January to March that are months with more rainfall there are great variations from year to year, with more rainfall in some areas and not in the others.

5.7 The formal legal framework and the customary legal framework

In Peru the formal legal framework with regard to natural resources is established according to the Political Constitution, that in its Article 66 considers the natural resources as a patrimony of the Nation, and also the Organic Law for the Use of the Natural Resources (Law 26821) refers to the local people as the farmers and native people communities that can use in a preferential way the natural resources of free access located in the areas surrounding their lands in order to satisfy their subsistence needs and ritual uses, and with regard to the Water Resources the Law 29338 considers that the sea waters, superficial and atmospheric belong to the State and at the same time it permits the integrated, modern and efficient management of our national water resources, the General Law for Fisheries (Law 25977) establishes

that the hydro biological resources that exist in the jurisdictional waters are property of the State, the use of these resources requires the granting of temporary rights through concessions, authorizations, permits and license to fish provided by the Government , and also, the communities living in the shores of lagoons and lakes have a preferential access right for the exploitation of the hydro biological resources for subsistence as mentioned in the Rules for Orderly Fishing in the Peruvian Amazonian Area modified with the Supreme Decree 015 in year 2009. In general, the communities in the Amazonian area are not fully aware of the entire current formal legal framework.

The sector that is dealing directly with the fisheries issues are the Regional Directorates for Production through the Directorate for Fisheries, that among other functions establishes the regulatory framework for the development of extractive, productive and transformation activities of the fisheries industry, as well as monitoring and supervising its fulfillment according to the legal framework of the General Law for Fisheries and the Fisheries Orderly Regulations for the Amazonian Area. In order to be able to have fishing regulated and in order, the law stipulates as a procedure to have the fishermen formally organized in Social Organizations of Artisan Fishermen (OSPA for the acronym in Spanish). However, to achieve this aim, several requirements must be met, that include costs and bureaucratic paperwork in order to be legally recognized and this may take up to six months, and therefore, many communities because of the lack of guidance and economic capacity are not able to be organized and to have access to this option. Those who by all means must be organized are the commercial fishermen, and as an incentive they receive permits to fish in all the areas in the jurisdiction, and also to finance projects through credits in order to upgrade the fishermen's capture capacity, with credits to buy more nets, improved equipment and training, without considering at all of the overexploitation of the fishing resource and generating conflicts with the communities and the fishermen dedicated to subsistence fishing activities.

In some cases the organization of the OSPA is being adequate in the communities or villages of the Amazonian area to include commercial and subsistence fishermen due to the fact that the OSPA is a requirement for the establishment of a Local Committee for Fishing Surveillance (COLOVIPE for the acronym in Spanish) that is support group for the fisheries sector with regard to the control and surveillance of the fisheries resources in the area. This model is being implemented as a community effort to set up control mechanisms for the fisheries resources , but it requires incentives for its sustainability such as training, implementation, follow up, self-management, effective support of the sector in the interventions, conflict solutions, and to ensure that the use of the resources is for the benefit of the community. When one of these incentive elements is missing, it gives way to discouragement and flexibility in the control and surveillance by the group, as could be seen in some experiences in communities that followed that way.

Apparently, this OSPAS-COLOVIPE model is not working properly in the legal framework created for the communities, and there are wrong issues that must be corrected, as for instance that through the OSPAS and COLOVIPES, permits are being granted to foreign commercial fishermen, and that does not contribute to ensure the self-control issue, because the commercial fishermen are identified to be one of the facts that give way to the over exploitation of the fisheries resource. This

can be ascertained also by the high percentage of informal fishermen (almost 65%) with regard to the formal ones. Also, the Fisheries sector that is the one that have the capabilities with regard to the resource, does not have the proper financing resources for a modern and adequate implementation in the area, as well as a limited number of specialists for the periodic control and surveillance in situ in particular during the periods of time when fishing is forbidden and during the time of spawning of the species. Some officers are most willing to do this, but the system brings them to a condition of conformism and submission.

The limited financial and human resources is also the reason for a lack of presence of the Fisheries sector in most of the province and district jurisdictions of the Peruvian Amazonian area. For instance, in the study area in the Low Pachitea river, there are not Fisheries offices, despite the fact that it is an area with important biological systems and aquatic ecosystems, and the same happens in the basin of the Zungaruyacu river and the Pichis river. Only in the basin of the Ampiyacu-Apayacu rivers there is an office of the Fisheries sector with only one officer that monitors the activities in the port of the district capital because the required equipment and transportation means are not available.

The customary legal framework is implemented in the communities with various views and adaptations that are existing since the past decades in some communities because of the increased extractive activities performed by foreigners in the forest, rivers and lagoons, and its implementation is made in spaces considered to be in the community jurisdiction such as the lagoons, with a great deal of dynamism and flexibility as is usual in all the organizations. These community management initiatives have been supported many times by non governmental organizations, or they may have been part of the components of a program for the mitigation areas in the national reserve or park areas with relative success.

An option to care for the conservation of the hydro biological resources in a private aquatic ecosystem are the Management Plans, with a legal base, that requires of important scientific information, that involves a high cost to be prepared; accompaniment and monitoring, that requires to prepare specific financing projects and that in most cases does not include the local knowledge about fishing, nor the customary framework, but given the current situation and, with the proper adaptations and adjusted to the formal legal frame it may permit the communities to preserve, surveil and monitor the hydro biological resources under the fisheries sector.

With regard to the customary framework and the agreements or rules prevailing in the community to monitor and surveil the entrance of foreign commercial fishermen, there are also food taboos among some community members and the prohibition for the consumption of some type of fish linked sometimes to religious or mystic beliefs, or restrictions used among the communities that benefit indirectly the control of overexploitation, as for instance the agreements between the community and cattle breeding settlers, for the rational use of biocides of vegetal origin in order to avoid the pollution of the water drinking places for the cattle (Pinedo, 2008 y Soria & Rodríguez, 2008). The most frequent situation when there is a customary framework in the communities are those relevant to the control of the entrance of foreign commercial fishermen. It is important to remark this because there is no regulation

and control among the community members, and even if there is some type of agreement, sometimes it is not possible to have control among the community members because in general they are family relatives.

There are successful, and almost successful experiences as an outcome of these models with its reasonable unlined events given the changeable conditions prevailing in the area (Pinedo, et. al. 2002). Among the successful ones, after more than one decade of community management, are the benefits obtained from the recovery of the fishing stocks and food security maintenance. However, up to now, the formal sector does not recognize or incorporate these models into the formal framework. Instead, they consider the models to be illegal and improper activities, even pertaining that they are in guilt, according to the currently valid legal framework, and that gives way to confusion and despair among the communities and leaves the fishing resources in an orphan condition. Finally, the legal framework cannot apply or enforce the legal base because of its various limitations, and at the same time it hinders the regulation through the customary legal framework. In this regard, it is sometimes better if the Government continues to be absent in many of the Amazonian areas.

6. CONCLUSIONS

The Amazonian area in Peru has an important cultural diversity, a large hydro biological wealth and an important number of aquatic ecosystems that move together with the local population as well as the use or over use of these resources. However, very often this diversity and heterogeneity might appear to be a difficulty together with an increased complexity to understand how the system works, and this argument is due to the fact that it can be seen that there have been unfruitful attempts to take care or to implement development programs in that context. The Amazonian area is a location that is fragile for the unmeasured over exploiting use of its natural resources and the negative impacts of the human activities that put in risk the conservation of the species, the ecosystems and the relevant food security and good living conditions of the indigenous communities.

In that regard, the Amazonian area is a complex space because of the combined social, cultural, economic, biological, ecological and institutional features that appear in different intensities and scales according to the target area. For the community management of fishing it is necessary to identify the most significant values in the specific area and, as far as possible, they must be the adequate ones. At the same time it will be necessary to reduce the uncertainties and to create awareness as well as to provide training and planning activities that may help to mitigate the situation and make possible to implement community management patterns for the management of fishing by the community. There are biological, ecological and environmental factors that because of their nature and intensity make difficult to have them mitigated in a short time and some of the issues might even be irreversible ones.

The most neuralgic and sensitive issues are the social and cultural factors, and it will be necessary to have the community strengthened within the organization, to have respect for the authorities leadership, to have awareness, information and training with regard to the various issues related with the fisheries formal framework; and it is

important also to reevaluate the traditional knowledge in order to strengthen their cultural identity. On the other hand, it is also necessary to have incidence on the political decision-makers, the local government authorities and to create awareness among the society in general.

Despite the complexities of the Amazonian area, there are opportunities to implement collaborative governance models to take care of the fishing resources. These opportunities are the existing legal framework (Fishing Orderly Rules for the Amazonian area and the Local System for Environmental Management), the need for conservation of the natural resources and decentralization in Peru, together with the increasing conviction of the users of the fishing resources to have rules, order and management for a sustainable use of the fishing resources in the Peruvian Amazonian area.

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