

Artisanal Fishing of the Kaqchikel and Tz'utujil Indigenous People in Lake Atitlán: An Approach to Tenure Rights for the Fishing Sector in San Juan la Laguna, Sololá

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Abstract

The first human settlements in Lake Atitlán date from pre-classical times. Although there are no records of fishing activities on the site, it is widely known that the inhabitants had a deep relationship with natural resources and therefore with the fish from Lake Atitlán. The Kaqchikeles and Tz'utujiles indigenous communities on the shores of the lake have developed fishing activities for hundreds or thousands of years. These activities have been important cultural pillars and sources of livelihoods and subsistence for inhabitants. The Mayan-Kaqchikel and Maya-Tz'utujil indigenous peoples of the shores of Lake Atitlán have customary/traditional rights in terms of access, utilization and exploitation of the area's fishing resources. With the arrival of the Spanish in the sixteenth century - which saw the imposition of Western organizational forms, new doctrines and the formation of the State of Guatemala in the nineteenth century - these customary/traditional rights are forced to evolve and adapt. Specifically, in the municipality of San Juan la Laguna, Mayan-Tz'utujil town, both characteristic elements of customary and legally recognized rights can be identified, thus demonstrating the combination of both cultures and forms of organization. The fishing activities, techniques and gear used in Lake Atitlán remained relatively unchanged until the last 50-60 years. Fish output has declined in recent years, caused mainly by anthropogenic effects (introduction of exotic invasive species and pollution) and natural disasters related to climate change (hurricanes and storms). The introduction of new fishing gears and new materials influenced the way fishermen carry out their activities; nevertheless, the fishermen of San Juan la Laguna still conserve traditional fishing methods, replicating the customs and traditions of their ancestors from generation to generation.

1. INTRODUCTION

1.1 Description of the fishery

Lake Atitlán is located in the department of Sololá, Guatemala (longitude West 91 ° 11, latitude North 14 ° 42). It covers approximately 125 km² and has 1 562 meters (m) above sea level. The maximum depth of the lake is approximately 318 m (PREPAC 2006). The activities of artisanal fishing are carried out at most shores of the lake (100-300 m from the coastline). The main fish species of commercial importance nowadays are: Mojarra (*Lepomis machrochirus*), White bass (*Micropterus dolomieu*), Black bass (*Micropterus salmoides*), Tilapia (*Oreochromis aureus*), Crappie (*Pomoxis nigromaculatus*) and Tigerfish or Carp (*Cyprinus carpio*); these are all exotic/introduced species (Barrientos and Quintana, 2012). Two different species of crab are also identified: Canchito (*Raddaus bocourti*) and Negrito (*Potamocarcinus magnus*) and some species of snails, both native organisms of the region.

The fishermen participating in this fishery come from 11 municipalities located on the shores of the lake: Panajachel, Santa Catarina Palopó, San Antonio Palopo, San Lucas Toliman, Santiago Atitlan, San Pedro la Laguna, San Juan la Laguna, San Pablo la Laguna, San Marcos la Laguna, Santa Cruz la Laguna and Sololá. According to Shook et al. (1979), one of the oldest sites of Lake Atitlán (Semetabaj) has occupational

sequences that begin in the Middle Preclassic period (1200 - 400 BC). There is no bibliographic information regarding the first people who carried out fishing activities, although it is widely known that the inhabitants had a close relationship with the lake and its resources. Artisanal fishing is carried out by boats or from the shores of the lake. The boats, locally known as "cayucos," are made mostly in the municipality of Santiago Atitlán; they are a piece of the region's millenarian ancestral craftsmanship. Boats do not use engines and measure approximately 3-4 meters. The fishing gears currently used are trammel, net, hook and harpoon. The use of trammel nets is prohibited only in the municipality of San Juan la Laguna. In most cases, fishermen own their boats and the fishing gear.

Men, women, young people, children and the elderly develop artisanal fishing activities. At present, there are some women who are engaged in fishing, using cayucos and hook, specifically in the municipalities of Santiago Atitlán and San Juan la Laguna. Most women, children and the elderly carry out fishing activities from the shore and/or from the docks using hooks. Particularly in the municipality of San Juan la Laguna, most of the people who are commercial fishers perform activities every day, with an approximate duration of 4-6 hours per day (depending on the season and fishing gear). The quantity of fish landed has declined significantly during the years, making fishing almost uneconomical. Most of these declines were caused by environmental phenomena such as Hurricane Stan (2005), tropical storm Agatha (2010) and blooming cyanobacteria (*Limnorphis robusta*) in 2009, events where the ecological processes of Lake Atitlán underwent significant changes.

1.2 Economic contribution and social implications of the fishing activity

The fishing activity developed by the communities of Lake Atitlán is a basic and essential way of life for hundreds of families that depend on this resource for income and food. Catches (all species of commercial importance) are for local consumption of the communities around the lake (fresh consumed product, little processing). Some species have great commercial importance in the domestic market, such as crab (*Raddaus bocourti*) and (*Potamocarcinus magnus*), which are sold to the capital city and the western region of the country.

There are approximately 30 fishermen who depend specifically on fishing activities as a means of livelihood in San Juan la Laguna. Currently, fishing activities are carried out partially and throughout the year (they dedicate at least 30 percent, but less than 90 percent, of their working time to participate in fisheries). Most fishermen mention that currently, fishing activities are not enough to support their families, so they are forced to develop other activities/jobs, like agriculture (mostly beans, coffee and corn), crafts, tourism, and holiday villa upkeep, amongst other things. The Association of artisanal fishermen "Chajil Ch'upup" has a fishing tour, an activity that supports the local economy of fishermen.

2. MANAGEMENT OF THE FISHERY AND RIGHTS-BASED APPROACH

2.1 Management of the fishery

The State of Guatemala has some institutions responsible for the management of the natural and fishery resources of Lake Atitlán. These include Dirección de Normatividad de la Pesca y Acuicultura (DIPESCA), the governmental institution in charge of the management and administration of the country's hydrobiological resources; Authority for the Sustainable Management of the Atitlán Lake Basin and Environment (AMSCLAE), a government institution to plan, coordinate and execute measures and actions to conserve the ecosystem of Lake Atitlán; and National Council of Protected Areas (CONAP), to guarantee the sustainable development and conservation of the country's natural resources. However, there is very little presence of these institutions, and there is a lack of support to the fishing sector. Thus, fisheries

management is delegated to the communities and/or committees – the associations of fishermen of the municipalities.

Most of the municipalities do not have a management plan of the fishing resource. Some have fishermen's committees, but mostly without any regulation of fishing activities. The municipality of San Juan la Laguna is the only one that has some regulations regarding the governance of fisheries resources. The Association of Artisanal Fishermen, "Chajil Ch'upup," has developed some management measures, such as regulation of fishing gear allowed (trammel net ban) and regulation of size and minimum catch maturity (catching female fish is forbidden when fishing with harpoons). The fishermen from the association have fishing licenses from DIPESCA with no tax or fee.

There are established formal limits in the lake where fishing with trammel nets are prohibited. These limits are given by the "monjones" (ancestral limits of the municipalities using geographical elements such as trees, rocks or wooden poles). In the specific case of San Juan la Laguna, the body responsible for monitoring to comply with the regulations is the Association of Artisanal Fishermen, Chajil Ch'upup. DIPESCA has provided logbooks for obtaining fishery records, where the species and the quantities in pounds obtained by species are recorded. Artisanal fishermen who are members of the association are aware of these regulations. There are fines and confiscations for prohibited gears, although the lack of presence of DIPESCA means that they are not implemented. The association of artisanal fishermen prefers to promote the dialogue between fishermen, to avoid major conflicts. Most of the times, fishermen have agreed not to continue with prohibited practices (use of trammel net and/or fish fishing female).

2.2 Rights-based approach: allocation and characteristics

The fishermen from the Mayan tribes Tz'utujil and Kaqchikel have customary and/or traditional rights to access the fishing resources of Lake Atitlán. Currently, all the municipalities with access to this resource belong to these two different tribes. They also maintain and preserve the right to use the fisheries resources. Most of the ancestral knowledge currently known - some regarding the management and use of natural resources - has been conserved through oral tradition. Previously, there was an intrinsic connection between the human being and nature, which was respected and used with a high degree of care; inhabitants considered all living beings to be sacred, and believed they should only be treated responsibly. The hierarchy and the division of political and social powers also existed. Some important figures that persist in the Mayan peoples are the Council of Elders and Ancestral Authorities, which have great political-social power in the indigenous communities still they make important decisions.

The ancestral organizational forms suffer a negative impact in the sixteenth century with the arrival of the Spanish to indigenous ancestral territories since they started to impose the western system of organization that resulted in a variety of conflicts and violations towards the forms ancestral organizations. At the beginning of the nineteenth century, the formation of the State of Guatemala began, with a centralized organization that did not represent the indigenous peoples. Up to now, new forms of Western organization have been imposed on indigenous territory, creating a great diversity of conflicts regarding tenure rights and the responsible governance of land, forests and fisheries.

The management and jurisdiction of the fishery in the Lake Atitlán is a combination of indigenous ancestral norms and western norms through the State of Guatemala. Regarding the legally recognized rights, only in the municipalities of Santiago Atitlán and San Juan la Laguna does DIPESCA issue fishing permits/licenses. Those permits were first given in 2008 in Santiago Atitlán and in 2012 in San Juan la Laguna. In the case of San Juan la Laguna, these permits were given directly to the members of the Chajil Ch'upup. The Chajil Ch'upup was the first association of artisanal fishermen of Lake Atitlán, founded in

2005. Most of the municipalities around the lake have committees of artisanal fishermen, and in the specific case of the municipalities of Santiago Atitlán and San Juan la Laguna there is a legally recognized association. Previously, the municipality of the people and the figure of 'mayor and judge of peace', which was assigned by the indigenous communities, was responsible for providing the permit/fishing license.

In the specific case of the municipality of San Juan La Laguna and the Chajil Ch'upup there are both customary/traditional and legally recognized fishing rights in the co-management of fishery resources. Previously, customary/traditional fishing rights were only provided to fishermen who use the harpoon and hook fishing gear and respect the reproductive stages and gender of the species (female fish catch is prohibited). With the initiative of the Chajil Ch'upup, around 2012, the legal fishing right is assigned by DIPESCA. The traditional regulations were considered and a ministerial agreement is created, currently renewed (Ministerial Agreement 208-2018), which prohibits fishing with trammel net in an area of 1km² in San Juan la Laguna. The customary fishing rights are renewed every year through the fishermen's association. Legally, recognized rights are given for 3 years; in both cases, these rights are non-transferable. The cases of noncompliance have decreased significantly since both rights (traditional and legal) were granted. Fishermen have a legal basis to act if they discover any user in violation of the rules/law. Most breaches are related to the use of trammel nets. In cases where fishermen encounter this non-compliance, traditional forms of dialogue are used to resolve the conflict. Violence or legal bases have not been used to solve any breach of this nature.

Since rights-based approaches have been maintained for hundreds of years through customary tenure rights, the number of users and fishing effort in the municipality has remained stable. The possibility of new users obtaining the right to fish with trammel nets was never viable since this practice was controlled by local fishermen, even though there was no legal regulation (ministerial agreement).

3. CONTRIBUTION OF THE RIGHTS-BASED APPROACH TO ACHIEVING SUSTAINABILITY

3.1 Sustainable use of the resources

Currently, the municipality of San Juan la Laguna and the Chajil Ch'upup represent the only organization with a system of regulations that allow for the responsible and sustainable use of resources. The regulations regarding the use of more specific fishing gear (hook-harpoon), the prohibition of non-selective fishing gear (trammel nets) and the regulation of sizes and gender (no female capture) are the only regulations present, applicable only to an area of 1 km² of the municipality. These practices were implemented thousands of years ago and have been transferred from generation to generation, by oral tradition and as part of the fishing culture of the Tz'utujil people of San Juan la Laguna.

Despite the regulations that exist in the area, fishermen have noticed a decrease in the abundance of native species of Lake Atitlán. This is more associated with the introduction of exotic species and their feeding on native species than with excessive fishing effort by local fishers. Most species of commercial importance and subsistence are exotic species, introduced into the body of water approximately 50 years ago. One of the native species that still shows presence and importance for artisanal fishing is the pepesca (*Astyanax aeneus*), although it is increasingly scarce in the capture. There are no assessments of the fish stocks of native and exotic species at Lake Atitlán, although some analyses were carried out regarding relative abundance, maximum sustainable yield and the level of catch-per-unit of effort, depending on the fishing gears used. However, changes in the average size of the species captured are evident.

In the case of the species with the most commercial and subsistence importance - mojarra (*Lepomis macrochirus*) - there has been a decrease in fish sizes and abundance. In the case of species such as bass

(*M. dolomieu and salmoides*), tilapia (*Oreochromis aureus*) and crappie (*Pomoxis nigromaculatus*), size and abundance are growing or without significant changes. Carp (*Cyprinus carpio*) shows an increasing size. Fishermen mentioned that most carp exceed the size available for harpoon fishing since the point of the harpoon bend or break when making contact with the scales of the fish at the moment of catch. In addition, the species does not have a significant economic value in the local market since consumers do not like carp due to too many bones.

3.2 Economic viability of the fishery

In the municipality of San Juan la Laguna, the number of active fishermen has decreased over time. Most fishermen in the area believe this happened due to the considerable decrease in fishery resources. The Chajil Ch'upup is now composed of approximately 25 active members, while there were 30 to 35 members some ten years ago. The sector of women fishing activities was most affected by the introduction of exotic species, though. Still, in the late 1970s, fishing activities were carried out on the shores of the lake with the use of ancestral fishing gear such as seaweed fences and glass jars with corn dough. Currently, most active fishermen catch approximately 2-3 lbs of fish per day, while some years ago, the daily catch was 30lbs. The economic gains range between Q40 - Q90 (USD 5-12) per day depending on the species caught. For this reason, some of the fishermen have focused on alternative livelihoods such as agriculture, crafts, tourism, among others.

3.3 Social equality

The customary/traditional fishing rights of the indigenous peoples around the lake have taken into account the social equality and human rights of the population to achieve the food security and sovereignty, by ensuring access to fishery resources for men, women, children, young and elder people. There is equality and gender equality in terms of fishing activities. Cecilia Sumoza, an artisanal fisherwoman, explained that "Men respect me and we respect each other. I like to be the only fisherwoman in San Juan, although I would like a partner to fish." Gender equality has been respected, giving permission/fishing license to the only artisanal fisherwoman who currently uses a vessel to carry out fisheries activities. Fishing done by children, youth and the elderly is not legally recognized or registered in national statistics. The combination of both traditional and legal rights-based approaches ensures access and possibility for new generations to carry out fishing activities in the area by providing and supporting a system of regulations for the sustainable use of fishery resources.

Bernardino Ixtamer, an artisanal fisherman, explained that "We all need to eat and bring food home, so everyone can fish, as long as we respect the lake and do not damage it."

4. MAIN CHALLENGES AND WAY FORWARD

4.1 Challenges for the fishery

The indigenous communities around the lake have faced a variety of challenges in recent years, some caused by environmental disasters and others by the anthropogenic effect and pressure on natural resources. A series of storms/hurricanes in 2005 and 2010 had a significant impact on the ecological processes of the trophic webs, the fish fauna of Lake Atitlán and on some plant species that are fundamental to the reproduction and recruitment of hydrobiological species, such as the Typha, locally known as "Tul." Increased pressure on natural resources due to population growth, the use of intensive agrochemical systems, the lack of wastewater treatment, pollution by solid waste, and atmospheric deposition – among others - are some of the factors that have a negative effect on the lake's ecological processes. They, therefore, constitute a problem that directly affects the livelihoods of artisanal fishermen and users of the natural resources of Lake Atitlán.

The absence of fisheries management constitutes one of the most complex challenges in the area, even though most municipalities have an organizational figure (committees and/or associations). There is no control and surveillance system for fishing activities in the different communities by the state and DIPESCA. Most municipalities, with the exception of Santiago Atitlán and San Juan la Laguna, do not have a fishing permit/license and only San Juan la Laguna has some regulations regarding their fishing activities. The lack of human and monetary resources of government institutions, which are responsible for the administration and management of hydrobiological resources in the country, has had a devastating effect on the fishing communities. This is why in most of the rivers, lakes and lagoons of the country, there is no type of regulation and management.

The lack of presence of governmental institutions responsible for the sustainable management of natural and fishery resources have led to conflicts between users. Some of the most frequent include use of fishing gear not permitted (trammel nets) and/or mesh size less than allowed, fishing gear was stolen by fishermen from different municipalities, crossing municipal boundaries/areas of fishing, and conflicts for fishing spaces between fishermen of the same municipality. Other points of conflict with fishing activities come from extensive agriculture and use of agrochemicals; tourism, population growth; lack of solid waste management and sewage treatment; and the water transport sector (which leads to the destruction of fishing gear, boats and pollution).

The allocation of rights (customary as legally recognized) in San Juan la Laguna has positively influenced the conflict resolution between the users of fisheries resources in the municipality. Most users say that the presence of users violating the regulations is minimal or nil due to the legally recognized permits and the creation of the ministerial agreement (2008-2018). This agreement was generated through the collaboration of the fishermen's association and DIPESCA.

4.2 Improving fishery sustainability in the future

The elaboration of diagnoses of fishing communities by municipality/community/village is essential to identify the key factors that can help to design a fisheries management plan, both at the local (municipality) and global (Department - Lake Atitlán) levels. Information that needs to be generated and/or updated includes: number of active fishers, fishing gear used, presence of committees and/or fishers' organizations, main needs of users, and type of conflicts related to the fishing sector. This type of diagnosis can be carried out through a series of methodologies such as participatory observation, work with decisive informants, interviews/structured and unstructured surveys, and various participatory approaches.

At the same time, in order to design any plan, it is necessary to ensure high participation and cooperation between government institutions and users of artisanal fisheries in each municipality (committees and associations). There must also be focused discussion on possible lines of action for the fishing ordering, and an awareness of the laws and norms of indigenous peoples, constituting knowledge that can be used as a basis for sector regulation. Throughout the government-fishery communication, transparency would help to build bonds of trust and respect. It is, moreover, essential to use an ecosystem approach for the evaluation and implementation of the fisheries management/ordinance plan. The approach must use previously generated knowledge regarding the management of fishery resources (especially inland), and then try to apply them in the context of the Lake Atitlán basin. Lastly, evaluating the best co-management strategy will enable both fishing institutions and users to ensure the fishery resource promotes the security and sovereignty of the following generations.

4.3 Lessons learned

The combination of western and traditional fishing rights works well when the fishers are organized into associations that acquire management rights from the national authorities and have sufficient enforcement capability. Clear formulated regulations reduce conflicts among fishers. The introduction of exotic species changes the environmental situation of a closed system entirely and leads to the disruption of traditional fishing methods. Thus, the introduction of exotic species into water bodies should be avoided. Limited human and financial resources result in the absence of the governmental agency in the Lake. This absence, in the case of Lake Atitlán, created the need among the fishers to take on the management function of the fishery resources.

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