

**Integrative Human Resilience: Infrastructure, Institutions,  
and Interspecies Relationships in Flood Adaptation  
Tacana TCO 1, Bolivia**

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## **Abstract**

This thesis explores flood adaptation and resilience in five fluvial communities located within the Tacana 1 TCO. It argues first that the ways by which these communities are addressing climate change and engaging in activities of adaptation need to be reviewed within the context of the history and policies that have had continued impacts on the communities in the region. Second this thesis will argue for the need to develop better understanding of local community needs and perspectives to better understand the processes by which adaptation is occurring and develop more accurate understanding of the needs and interests of the communities impacted by climate change. This thesis uses three aspects of resilience to explore historical, political and ecological factors that, while found in theories or empirical studies of resilience and adaptation, are not often enough integrated with one another: those of infrastructure, institutions, and interspecies relationships. This thesis will first describe the history of the region and argue of the importance of this history in understanding contemporary infrastructure and access. Second it will explore institutional relationships and development, through the policies that encouraged these collaborations and moving forward to investigate local perceptions of institutional impacts in comparison to local interests. Last in will review contemporary narratives of adaptation and vulnerability focusing on perceptions, risks, and access and interspecies relationships within these communities. At the end I will combine these narratives demonstrate how resilience is understood and the necessity of developing effective and accurate understandings of adaptation with these combined lenses.

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**Note: All names within this research with the exception of those in publicly held positions are fake. All names and quotes have been anonymized**

## **Introduction**

After Eight hours upriver with Carmen del Emero resident Santonio, my official guide Julio and I arrived in Carmen, tired and excited to begin our work. After weeks of organizing between the Wildlife Conservation Society and the Tacanan Indigenous Council and obtaining a boat and gas we were not expecting the scene that greeted us as we stepped onto the bank. I hastily found our forms, written and signed by CIPTA (the indigenous council) granting me permission to work with and be in the Tacana TCO1 territory and naively handed it to the mayor as I greeted him and explained my work. The corregidor (community leader) Walter, instead of smiling, was angry. He demanded to know why CIPTA hadn't contacted him, why his name wasn't on the note, and why he was continuously asked to assist foreigners who gave nothing back to the community. He added that this was especially egregious as he was trying to help the community recover from the 2014 flood that ran through the country.

A flood that by many accounts was the worst they had ever seen (Espinoza et al., 2014), when asked on about the flood, one respondent answered

*“50 years we have been here and look, never have we felt a flood like this. Yes, in Rurre there was one in '78, but it was a meter. In other places there have been floods, 100%, that's the punishment of God. Many villages near Rurre have gone extinct since '78. But this one no, (before) there was a height to support you, no? It was tall, but in 2014, it wasn't tall, it was nothing. We didn't think that it would affect us but it kept rising and rising, all day it was water.”*  
-F.Y., Carmen del Emero<sup>1</sup>

A phone call from the president of CIPTA to the corregidor and a few hours later, I was permitted to present to the community my project and petition for their permission to participate in my work. However Walter's response and his frustrations with the process of redevelopment stayed with me and was only one example of the communities building frustrations with exogenous groups as they continued the process of rebuilding after the 2014 flood.

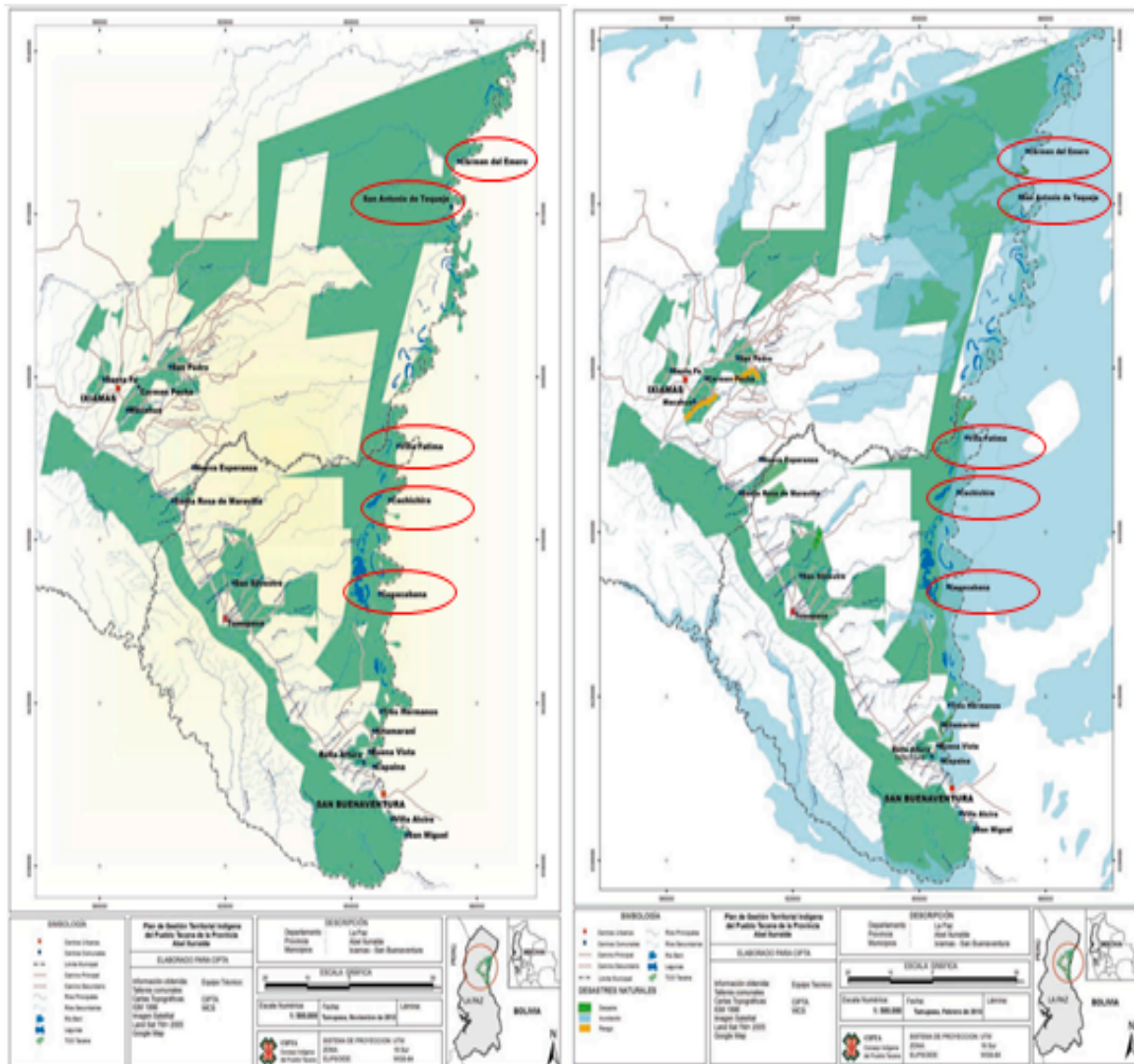
As weather variability is predicted to rise due to climate change, these communities are increasingly being forced to react and adapt more quickly than to events previously experienced. This has led to challenges and frustrations on the part of the local communities that are being focused on, the development of new frames of thought and a revising of their needs in the face of a changing climate.

This paper analyzes how fluvial communities within the Tacana territory (TCO) are adapting to climate change events in terms of infrastructures (and their histories), institutions (and the policy eras that have shaped them), and interspecies interactions (and the needs and adaptive capacities emerging from changes in this arena). I begin by exploring the historical literature of colonialism and subsequent land recognition experienced by the Tacanan people and the structural impacts those policies had on existing adaptation. Next I will explore contemporary narratives of adaptation and vulnerability focusing on perceptions of risks, access, and interspecies relationships within the Tacana communities. To conclude I will demonstrate how these combined narratives are crucial to developing effective understandings of Tacanan adaptation and needs as primary actors in their communities development.

### **Climate Change and Flooding in the Amazon Basin**

*“What is happening, particularly in Beni province, is something never before seen in the history of Bolivia,”* - Evo Morales, President of Bolivia

The Plurinational State of Bolivia is considered extremely vulnerable to climate change (Seiler, 2013, Ovando et al., 2016). The many riverine based ecosystems within Bolivia are ecosystems that are of particular concern, as being vulnerable to climate change because they have historically been highly transformed and degraded (Capon et al., 2013). The impacts of climate change in these small fluvial communities was visible in 2014, when unusually high levels of rain as part of irregular La Nina and El Nino weather events (Espinoza et al, 2014) led to the Beni River swelling and eventually flooding over its banks. The flood swamped an estimated 100,000 acres of land (nasa.org) and forced the Beni residents including those communities in this study to live 3 months in flooded waters (Map 1). Four years later these communities are still in the processes of reconstruction.



Map 1: Tacana TCO pre and post 2014 flood, circled areas indicate communities of the study (CIPTA, 2014)  
 Communities from top to bottom: Carmen del Emero, San Antonio de Tequeje, Villa Fatima, Cachichira, Copacabana

While flooding in these regions is seasonal, occurring in January through March, continuous large scale disruptions have the potential to disturb ecological systems leading to changes in wildlife availability, increased erosion, and reduced water quality (Capon et al., 2013). These processes can be exacerbated through human originated degradation such as pollution, deforestation, construction of dams and overharvesting, all of which which impact water quality (Castello et al, 2013).

Furthermore, human based degradation can be historical in nature with past events of deforestation, mining, and extraction having lasting impacts on contemporary ecosystems (Coe et al., 2009 and Decamps et al., 1988). It is therefore important to understand the histories that



contributed to the status of the riparian zones in this study in addition to exploring the social histories that impacted the communities themselves who live within them.

## **Research Site and Study Design**

### **Research Site**

For purposes of this study, five communities were selected along the Beni River in collaboration with the Wildlife Conservation Society (WCS) and the Consejo Indigena de Pueblo Tacana (CIPTA). These communities were considered largely isolated, with the only transport to them being by boat along the river. The furthest community from the port town of Rurrenabaque was Carmen del Emero located roughly 235 km down river. They ranged in size from 45 households at the largest to as small as 3 households and were all impacted by the 2014 flood.

The 2012 census in the region indicated a max population of roughly 228 people in Carmen del Emero and a minimum of 7 in Cachichira. Based on responses during the study it is possible that these numbers have changed since the 2014 flood.

The primary language of communication is Spanish and 93% of the communities within the TCO identity as Tacanan.

Spatially the communities are structured differently (Figure 1) with houses structures in rows or surrounding fields (which are predominantly used for sports). For many of the communities (Carmen del Emero, Tequeje, and Cachichira) sports (soccer, volleyball, and basketball) were played by both genders in the early evenings on most weekdays.






	<p><b>Carmen del Enero</b> Largest of the communities (45 households), houses are arranged in rows with a large sports field on each end. The largest field lays alongside the school and teacher dorms. houses are made of wood with thatch roofs</p>
<p><b>San Antonio de Tequje</b> One of the smaller communities, 5 houses. Houses are arranged in a semi circle around a field, water pump is centered and lays in front of the school. Cattle are grazed in the middle.</p>	
	<p><b>Villa Fatima</b> Houses arranged in a rectangle around a field, they are made of wood with metal roofs and have a cacao processing buildings alongside their brick school. All houses are raised a few feet off the ground.</p>
<p><b>Cachichirra</b> Set further off the riverbed, after a short walk into the forest you arrive at the community. It is laid out in a long line with the main sports field located behind the house of the towns founders. Community consists of multiple generations of one family.</p>	
	<p><b>Copacabana</b> Smallest town located off one of the oxbow lands along the Beni River. It is isolated during the dry season as its arroyo dries up. Currently consists of two household and a third in progress. They have a large</p>

Figure 1: Photos and short summary of communities, 2018

## Methods

I selected the Tacana TCO 1 due to their history with forest conservation and land ownership and I was initially introduced by the Wildlife Conservation Society (WCS) while the President of CIPTA was in La Paz. The questions addressed in this study of understanding adaptation and perceptions of climate change was one of interest to both CIPTA as part of their management plan for 2015-2025 and of interest to WCS in their long standing history with the communities.

I spent 2.5 months traveling along the river visiting each community. The sites were selected in collaboration with CIPTA and WCS who mentioned them as communities of interest given their relative remoteness and previous commentary from these communities that they were still experiencing the impacts of the 2014 flood. WCS assisted me in negotiating with CIPTA in gaining permission to work in the communities and CIPTA provided assistance in locating resources, a guide and loaned me the use of their boat in exchange for repair costs.

However while I did obtain permission from the larger body of CIPTA for my research it was apparent from my arrival that the communities themselves were not aware of the decision and this caused initial confusion as well as some anger toward myself but in particular CIPTA for not including them in this decision.

My fieldwork took place within the communities of Carmen del Emero, San Antonio de Tequeje, Cachichira, Copacabana and Villa Fátima, all communities located in the Tacana TCO1 (there are three Tacana TCOs) and all located along the Beni River downriver from the port town of Rurrenabaque.

Conversations and interviews were accompanied by ethnographic observations and were recorded both in written and electronic recordings with permission of the participant. Interviews were conducted in Spanish. Heads of households were selected for interviews, 80% of respondents were male and 20% female. Age of respondents ranged from 18-90 with the average age of respondents 36-54 years old.

When I returned to the United States all interviews were entered digitally and transcribed verbatim in their original language and coded using NVivo. Code themes were determined based on resilience framework research by Schipper and Langston (2015) and vulnerability research by Anderson and Woodrow (1998).

In addition the interviews collected during my field study, this research also includes secondary historical sources these come predominantly from literature produced by CIPTA, but also include histories produced by academic researchers.

It is important to note that my research is not intended to act as an all-encompassing understanding of the Tacana people and in fact with my brief observations in the community of

San Marco across the river in the Tacana TCO 2, there were visible differences in how they were adapting compared to those of my study. Even within the TCO 1, in my travels to Tumupasa and interactions with those in the other port town of San Buenaventura differences were visible from those within my study area. Additionally given the limitation of this study in time and scope I do not intend to provide a comprehensive view of the society, resources, and adaptive capacities of this region but instead focus on a few factors relevant to the question of this study and the interests of the communities.

## **Findings**

### **Infrastructure and the Colonial History of the Bolivian Lowlands**

*“Acknowledging and attending to colonial history and ongoing colonial effects..not only changes the ways in which social, cultural, political, and economic dynamics are assessed..but also changes the development of strategies and responses”- Emilie S. Cameron, 2011*

To arrive in the communities of the Tacana TCO, you must first pass through the town of Rurrenabaque, locally called “Rurre”. A large tourist town located off the Beni River and the capital of the Rurrenabaque municipality, it was originally located within the territory of the indigenous Tsimane and Tacana peoples but was established as a town by the Franciscan monks in 1844 .

Rurrenabaque provided an important role in the historical colonialism of the region acting as the main port for quinine and rubber extraction for transportation within the country and later to the Atlantic (Vallve, F., 2010). The participation in this activity placed the town as an economically important hub that continues to today. As of 2017 it is the only town accessible to the Beni River for outside visitors and travelers from the nation's capital, La Paz.

Rurre serves as an example of the importance history plays in situating communities within specific economic spheres and in the development of their infrastructure. Similarly to understand contemporary infrastructures and adaptive measures occurring within the Tacana communities it is necessary to understand the colonial and economic histories that impacted them.

In the next section I will provide a brief history of the region beginning with the arrival of Spanish Conquistadors and subsequent arrival of the Franciscan monks, then I will discuss the impact of the main economic booms of the regions from the 1880s to early 1990s. Afterward I will bring this into context when review contemporary infrastructures of the Tacana communities in the TCO.

## **Spanish Colonization and Economic Exploitation**

Though contemporary Tacanan's use the singular name to identify themselves historically the name was applied to a many different indigenous groups (Lehm, 2016). The various indigenous groups that today are referred to as solely Tacana, were believed to be present in the Bolivia foothills prior to the development of the Inca Empire (Townsend, 2015). The arrival of the Spanish Conquistadors and end of the Inca Empire in the 15th century would soon lead to massive changes for Tacana communities both in terms of their population and the structure of those communities (CIPTA, 2014).

The introduction of the Encomienda system in which Spanish citizens were granted land that included its indigenous inhabitants led to massive exploitation of the indigenous peoples for labor in plantations while at the same time extracting colonial tributes from indigenous subjects (Gigler, BS., 2009). The efforts of the Spanish to homogenize the indigenous peoples and include them in a labor force led to the fragmentation of territories and large reductions in populations as the indigenous peoples were exposed to diseases, warfare, massacre, and poverty level conditions in plantations by the colonizers (CIPTA, 2014 and Gigler, BS., 2009).

The inclusion of the Franciscan monks as part of the Spanish colonization further impacted the communities as some were forced into mission towns while others migrated for better opportunities and were required to convert and learn Spanish (Langer, 1987). The objective of these actions were described by one Franciscan in the 19th century Angelico Martarelli,

*“It is not sufficient to instruct the tender youth born of infidelity in the truths of the Faith and Christian morals; it is necessary that they forget everything related to their savage and superstitious state.”* (Langer, 1987).

In this way indigenous communities were further fractured and their culture was actively being extirpated from their youth and at the same time being integrated into a monetary economy (Langer, 1987). Also during this time indigenous peoples in many regions resisted the efforts to “civilize” them and hid their children, migrated to new areas outside of colonial control, or actively fought the colonizers within their regions (Lehm, 2014).

These activities and the tributes continued well into the 1800s and into the transition from Bolivia as a colony to a nation. In 1880 Bolivia would experience its Rubber Boom which would bring the end to the indigenous tributes and contribute to the exploitation of the lowland indigenous communities, the Tacana communities included, who were being used as a labor force for Quinine. Social scientist Zulema Lehm on her work with CIPTA and their history said this of the time,

*“If the missions had a significant impact on the configuration of the political organization of the current Tacana communities, the extractive booms had an especially strong impact on the population and culture. The depopulation and social fragmentation followed by the dispersal into the northern barracks (which were used for rubber work) diluted Tacana culture”* (Lehm, 2016).

The exploitation of lowland indigenous peoples in addition to African slaves would fuel the economy that led to Bolivia’s rubber entering into the global market. It led to the dispersion of historical Tacana communities into new areas, reduced their already fragmented territories and led to the forced labor of groups who had previously escaped many colonial attempts in integrating them into the labor force (Lehm, 2016). While resistance from the indigenous communities occurred throughout this time period, the exploitation and land grabbing by timber and rubber barons would set the stage for a growing resistance movement that would eventually mobilize to form the March for Territory and Dignity in 1990 as over 3000 people would march from the lowlands to the capital of La Paz to demand recognition of their territories (Lehm, 2016, Valle, 2010).

While other economic booms would continue to occur within the region in the following decade in sugar, natural gas, and soy, it was these historic booms and impacts that led to the fragmentation of territories, loss of culture and language, and processes of economic exclusion that are being felt by contemporary communities within the Tacana TCO today. (Gigler, BS., 2009).

### Contemporary Infrastructures

*“To live with some dignity, like humans. Basic sanitation, water, light. We need all of it to make our community better”* N.A., Carmen del Emereo2

The lack of and interest in water and light are evident in visiting many of the communities along the Beni River. Water is collected in large barrels outside during the rainy season and from the river during the dry season, it’s boiled, mixed with coffee or chocolate criollo for the main meals, sometimes they will mix powdered juice or drink it alone.

In Villa Fatima where solar panels are installed families return to their homes and converse over a single light bulb attached inside. One house in the community has a small electric generator, they go out to the shed and turn it on. The small television in the living space flashes on and the kids and adults gather round to watch one or two movies before retiring. We sit, myself and my guide perched on benches, while the kids and couples cuddle in the nearby bed. The patriarch of the house pulls out his bag of coca and places a wad in his mouth and settles in to watch.

Downriver in Tequeje as the sun falls below the horizon it marks an end to volleyball practice. Only one home has a small light, but the rest of us prepare for bed in the dusk. Mosquitos being to buzz around

town as some hurriedly bathe at the water pump. Afterwards we settle in our perspective houses, eat dinner in the kitchen alongside the fire and talk.

When I leave whether from cold or my own tiredness, I walk the path along the field, there are no lights outside, the towns dogs bark and jump to their feet to follow me. The one house with the generator acts as almost a beacon giving me directions for the school I was sleeping in.

The daily lives of these communities were greatly impacted by the loss of their main generators after the flood of 2014. The children can't study at night, sports can't be played, and domestic animals are left in the darkness longer making them more vulnerable to predators. As for water, they make do, but many fear that it is no longer as clean as it used to be.

### **Basic Services and Community Needs**

In an analytic study comparing unsatisfied basic needs (based on housing material, access to water and sanitation, access to energy, education and health care) from 1992-2001, it was determined that these unmet needs had decreased from 70.9% in 1992 to 58.6% in 2001. However a review of the spatiality of these decreases indicated that these improvements did not occur within areas that were largely rural indigenous (Gigler, 2009). This lack of prioritization of indigenous communities particularly in the lowland areas, who were historically heavily exploited is a point of consternation both within the local communities and on the larger political scale.

At a regional scale these basic needs are concerns within the Tacana TCO specifically, surveys conducted with the assistance of WCS indicated that of the 15 top priorities in the TCO 1, organization, health, education, basic services, and agriculture were ranked as the top 5 (CIPTA, 2014). These priorities were selected by CIPTA as characteristics to address in their 2015-2025 plan (CIPTA, 2014).

These priorities were also reflected within the interviews of the five communities as well, with a majority of respondents indicating that to make their communities better they wanted light (electricity), potable water, health, and education (Table 1).

Basic Services by Community						
Community	Electricity		Potable Water		Education	
	Type	Quantity	Type	Quality	Primary	Secondary
Carmen del Emero	Individual generators	Variable	Central Water pump	Poor, "feo"	Present	Present
San Antonio de Tequeje	Individual generators	Variable	Central Water pump	Good	Present	None
Villa Fatima	Solar panels	All	In Construction	N/A	Present	None
Cachichira	Individual generators	Variable	None	N/A	Present	None
Copacabana	None	No	None	N/A	None	None

Table 1: Basic Services within Community based on observation and interview data 2017

While currently these communities lack many of the basic services that are in need, many had developed infrastructures and access, to electricity in particular, prior to the 2014 flood.

### Perceived Risks and Adaptation

In understanding the infrastructures present in these communities and the actions that are occurring to develop adaptive infrastructure it is first important to understand that historical relationship with flooding in their area exists and adaptive strategies have previously been implemented to reduce damages, of which moving further in land or to higher locations was an option (all but Carmen having moved locations within the last 20 years).

*“Yes, we changed to here, we moved the community twice, when I arrived here in the community I was high up in the forest like always, and Tequeje was there lower, and the flood that...(flooded) more there, but all the same we had to change here.”* N.M, Tequeje<sup>3</sup>

*“This community changed 3 times, in 2000 it was lower, we lived 10 years it was all on course all of it, we had to move again in 2 years.”* L.D., Villa Fatima<sup>4</sup>

There was a belief that these modifications would weather the floods and when the 2014 flood came and destroyed much of the infrastructure many of the communities it was a surprise.



*“We thought it would be like in other years, but no, the river arrived up to the bank, and didn’t pass, but then days passed and by the dawn a large rain had passed. At dawn the water had entered on this side. Everyone was frightened, the other floods had not entered here, others said it would pass...”* - C.O., Carmen del Emero<sup>5</sup>

### Flood Reconstruction and Adaptive Behaviors

Based on observations it appeared as though many of the communities were and are in the process of recuperating and rebuilding infrastructure destroyed in the flood. Examples of damaged infrastructure that were observed included the large generators present in all of the communities with the exception of Copacabana that were flooded and destroyed. Villa Fatima was in the process of installing a water pump and tank at the time of this study and Cachichira prior to the 2014 flood had a water grid installed, one of the only ones of the study locations.

As a result of this rebuilding process the communities are also having to revise their strategies for adaptation to weather that is more extreme than they have traditionally dealt with. When asked about the likelihood of a recurrence of a large flood event over 90% of respondents believed it would occur, though they did not agree on when, with many citing anywhere between 2-3 years to 10-15.

In response to these perceptions, actions are being taken to address these risks even as the some communities express frustration at the lack of assistance they are getting in this process (particularly from the government).

*“What we want, is what we always apply for here, that is water, light, and health..we want those three things and communication.”* S.P., Copacabana<sup>6</sup>

*“We didn’t receive a lot of help, I was the president of the OTE, an organization here in the community and participated in a meeting at the summit in the government and so many times we asked for a health post and the same mayor who promised to help us return those things, he did nothing, he accepted the proposal but nothing.”* J.N., Villa Fatima<sup>7</sup>

In particular, many households when rebuilding made the choice to rebuild their homes raised off the ground. This conscious adaptation to flooding within their region is in part due to fears of another flood and in part concerns that they will soon have nowhere else to move to as many communities exist between the main Beni river, oxbow lakes, and smaller streams which create multiple points of entry for flooding events.

These bodies of water are valued in multiple ways as a source of transportation, a location of economic activity, their beds act as fertile soil for agriculture. They have been a part of the culture of these communities for generations, however they also pose a risk to their livelihoods

and homes. While this has traditionally been true for these communities in the past, increases in the frequency and strength of these floods are forcing riparian residents to reconsider their relationships to the water.

This is perhaps most clearly illustrated in Carmen del Enero. Carmen is the most distant community from the port town of Rurrenabaque, set on the river between Rurrenabaque and the next largest town downriver Riberalta where the Beni river meets the Madre de Dios river. It is the largest community with 45 households, its community is stable not moving locations and is located high off the banks of the river, however the 2014 flood arrived unexpectedly and for three months they were forced to live in flooded waters. Now they have been given a choice to perhaps avoid that in the future by moving to the plains (pampas).

#### Case Example: Carmen del Enero

The flood that hit Carmen in 2014, was particularly destructive, situated as they are, they received little aid post flood in terms of infrastructure and while some homes have rebuilt as raised houses, others remain in their old homes, often complaining of how 'short' their houses are now due to the mud that flowed into the town. For Carmen, there is another choice for adaptation one initiated in part by the local community, but also encouraged by CIPTA and the government of Ixiamas, a town further inland.

The option? To move to another location in the pampas (plains) and set up a new town (or vivienda) in land and near a proposed road from Ixiamas to Carmen del Enero. The benefits of this new location are obvious to the community, its location is higher, wasn't impacted by the last flood and further in land. The government has offered to help build it and if the road to Ixiamas is built it would open trade. However concerns remain over its location, their lack of history there, the different habitat (grassland vs forest). One informant put it this way.

*"Well, we were thinking to accommodate ourselves more, to raise our houses, if it (the flood) comes, no? That's what we were thinking, not...not to go further in.... to have somewhere safe to take refuge.....There are some who want to move to the Londrina (ranchland), I don't know if they have said to you...but in reality, its very far they want to go, there isn't anything, no trees, not even something planted, there are not fruit in the pampas. Imagine if we have to go at night, in the morning, what are we going to eat there? We don't have anything planted and that is there, everyone is thinking about here in your home, how can you make it better. And well, every once in awhile when will God give us another good rain?" – N.A., Carmen del Enero*

While others see the change as necessary, one woman when interviewed said,

*"I want to live in the vivienda, there is the future." C.Y., Carmen del Enero*

See Appendix 1, 8 & 9

The last aspect of infrastructure that was mentioned in the interviews and listed as priorities were those of education and health posts. While the communities are the primary actors in the redevelopment of their infrastructures, education and health posts are aspects of the communities that the regional and national governments retain control over and as such this lack of control hinders their efforts in obtaining them.

### Education and Health

Only one community reported having a history with a health post (Carmen) while all others expressed interests in having one and mentioned applying for them. At the same time while most communities have access to primary education, the quality of education their children are receiving and their ability to move beyond secondary school (or go to secondary school) are of concern.

Teachers in these communities are designated from the outside, and based on conversations with both the teachers in Carmen and community members, there appeared to be more concerns about the place of the teachers within the community, while the teachers that talked with me discussed their frustrations with housing and quality of supplies. In discussions with a few teachers, I found that they were generally younger (within their 20-30s) and for them this posting was a temporary one, often the first step in moving toward a larger town.

Within many of the communities there was a sense of disconnection from the teachers because they were not local or Tacanan, often they left for large periods of time during their vacation days instead of remaining in the community to support summer events such as soccer, and there was a concern that the teachers did not know or care about their charges and how they were teaching them. Furthermore there was a sense of frustration in the community members lack of ability to select teachers or to hold them accountable, this was perhaps most apparent in Villa Fatima, where the professor did not return from the weekend to teach for a whole week.

The lack of control over these decisions in placement, quality, and accountability was a result of government policies which maintained power of education with the state. The issue of education had been and continues to be a point of contention at the national level as well over power, culture, and resistance as what some view as rooted colonial racism (Gustafson, 2009).

## Infrastructure in the Fluvial Tacana Communities

Given the remote nature of these communities it was evident that in instances such as the flood and reconstruction many in the community felt forgotten by their government and the processes of reconstruction are hindered due to access to materials needed for large scale infrastructure development. Additionally there are aspects of improved basic needs that rely on outside power structures such as the assigning of teachers and doctors.

While all five communities are developing adaptive measures to reduce flooding, the process is slow and while some have found partnerships with exogenous institutions and in particular NGOs (ex. Villa Fatima), most are operating within the financial constraints of their community and CIPTA. Given these challenges it is impressive to see the work that has been accomplished in rebuilding raised homes, working to access potable water and renewed emphasis in demanding that their needs are considered in rebuilding after the flood, both with NGOs and with the larger indigenous government CIPTA.

Lastly in addition to these challenges many communities are being forced to reimagine what their community will look like in the face of extreme weather events both in terms of the structure and location of these communities. These new visions have the potential to change not only their livelihoods but also their culture.

## **Institutions**

Residents within the Tacana territory and other indigenous lowland groups have historically demonstrated great adaptive capacity in the face of political and economic changes to their areas. Within this next section I will explore the main policy eras that helped shape indigenous power and how these policies led to the development of collaborations with exogenous institutions, in particular NGOs with the governmental body of CIPTA other indigenous groups.

Then I will explore contemporary relationships with institutions touching briefly on CIPTA's long standing relationship with WCS and afterward discuss in depth the perceptions of institutions within the communities along the Beni River, the externally initiated projects in comparison to local needs and the development of endogenous institutions as methods by which these communities are gaining greater economic independence.

## Hybrid Neoliberalism and Rise of Indigenous Rights

In the 1980s projects sponsored by World Bank, IMF, and Inter-American Bank increased demand for land, while promoting extensive deforestation in the name of agricultural development. In 1982, indigenous organizations led by the Guarani formed the Central Indígena del Oriente Boliviano (CIDOB) (now Confederación de Pueblo Indígenas de Bolivia) (Behrendt, 2000). The formation of CIDOB in addition to the policies of large-scale agricultural development which were perceived as threats to the lowland indigenous (Fabricant and Postero, 2015) set the stage for the massive social movements that followed.

The extension of large agricultural development in the name of improving markets within these neoliberal policies led to increases in capital accumulation and resulted in loss land and increased anxieties of dispossession by indigenous peoples within the lowlands. These actions were met with resistance in 1990s as the indigenous people in the lowlands responded through massive organizing and pushed back at the landowners in the “Marcha por territorio y dignidad” (March for territory and dignity) (Postero, 2000). This march signaled a shift in relations between the state and the indigenous people of Bolivia, as they demanded recognition of their territories.

This action would be met with changes as the then President Gani immediately granted titles to 7 indigenous groups and began to increase policies within the government to facilitate better relations with indigenous groups through the development of an ethnic affairs department (Postero, 2000).

However the struggle for indigenous peoples in gaining recognition and political power was not over, the election of the National Revolutionary Party (MNR) saw the return of neoliberalism as a form of hybrid neoliberalism that promoted free markets and decentralization alongside that of indigenous acceptance and governance (Zimmerer, 2015).

The passing of the Law of Popular Participation (LPP) in 1994 as part of this hybrid neoliberalism would mark a change in relationships between the state and the indigenous peoples and between the indigenous people and the municipal governments that is still present today. The LPP had multiple effects, first it decentralized state power, moving 20% of the federal budget to municipal levels. This had two objectives, first to streamline the state and open markets but also to refocus indigenous communities to more local concerns and weakening the large national indigenous movements that the government was interacting with at that time (Postero, 2000 and Zimmerer, 2015). Additionally, the LPP broke away from previous policies promoting the concept of the model Spanish speaking citizen (“Idea of the Mestizaje”) in recognizing Bolivia as both multicultural and pluricultural, this opened new possibilities for social justice and inclusion (Albro, 2006).

While the LPP would begin the process of indigenous participation in the municipal government it largely led to increases in power to the municipal non indigenous elite. Thus in 1996 after daily protests staged by indigenous groups the Agrarian Reform Law (Ley INRA) was passed (Postero, 2000). While the titling process was slow and expensive, it was this process that would lead to the communities in this region , through CIPTA, petitioning for a land claim to their territory (TCO Tacana 1) which would be granted in the early 2000s (Lehm, 2016).

With the recognition of their land, the Tacana TCO would soon move on to petition for more land recognition which would later be granted. On a regional scale the communities within the Tacana TCO have continued to develop markets, build capital and invest in projects through the collaboration with a multitude of NGOs

It is important to note however that the struggle for indigenous power within the country and mobilizations against land grabbing and resource exploitation from within the state by the state and by external institutions has not ended and is demonstrated through the historic election of indigenous president and coca grower Evo Morales and by the mass resistance movements of the “Gas Wars” (2005), “Water Wars”(2006), and most recently in the massive march protesting the development of the TIPNIS highway project, proposed by Evo, which would have developed a highway through lowland indigenous territories (2011-2012) (Albro, 2006 and Fabricant and Postero, 2015)

#### NGOs and the process of development

Within these contexts of indigenous rights movements are the NGOs and exogenous institutions NGOs have a long history of working within Bolivia since prior to the 1980s, particularly with indigenous groups on issues of rights and empowerment (Chaplin, 2010). NGOs assisted in organization and supported indigenous resistance movements for their rights in the 90s, and after the passing of INRA, provided funding and capacity organizing to indigenous groups in order to secure their claims to their territories (Postero, 2000).

On a national scale NGOs interacted with indigenous and peasant institutions through direct capacity building and the construction of stronger organizational structures to strengthen these institutions in fighting for their rights (Behrendt, 2000). These relationships continue to evolve as the political climate that they inhabit continues to change.

The Wildlife Conservation Society was one such institution that became involved with the Tacana people. WCS supported the Tacana through recruitment of social researchers, they held workshops on community organization and conservation, as well as assisted in the funding and

development of management plans for the TCO (Brusle, 2017). WCS was one of many conservation NGOs who decided to collaborate with different indigenous communities with the goal of promoting sustainable activities and protections of the environment.

Within this context, external perceptions were utilized by different indigenous movements to garner alliances. The view of indigenous people as “ecological saviors”, “noble savages”, and connected to the earth was used by many indigenous communities within Bolivia to both garner attention and to argue for improved access to land and territory, however the use of this imagery has had and continues to have implications on how the indigenous communities across Bolivia are perceived, particularly as many move into more urban spaces (Behrendt, 2000 and Brusle, 2017).

### Motivations for Involvement - WCS

From the WCS report “Casting for Conservation Actors: People, Partnerships, and Wildlife”, WCS provides an interesting insight into their decisions to work with CIPTA and the Tacana TCO.

They begin in their report by describing their interest in increasing areas that could be utilized by the Jaguar and other wildlife species within the Madidi National Park (which was established on Tacana land prior to government approval of their claim). To do this they researched potential actors in the area and determined that the Tacana had the most potential.

*“Upon our arrival, the Tacana and representative organization CIPTA, did not have a clear title to land ownership, nor as such, management and authority but a legal process of ownership had begun”*

*“They (Tacana) had relatively low levels of formal management capacity, and little power in the conservation regime, but were relatively motivated toward conservation goals compared to other actors.”*

WCS then concluded that after their assistance through, financial and technical support to CIPTA, developed for CIPTA led strategy in sustainable management, and the creation of a management project, that CIPTA and the Tacana TCO had substantially increased their capacity for management and had obtained effective power in the system.

Castillo et al., 2006

While founded in primarily conservation interests the role of WCS in the development of the Tacana TCO facilitated a long term collaboration that continues to this day. Dr. Laetitia Perrier Brusle posited that while this relationship contributed many benefits to the Tacana communities it also acted as a simplification of their indigenous identity. She argued that this simplification was becoming more problematic as perceptions of how that identity was being used was changing in the political arena.

This was reflected in her respondents within the CIPTA administration,

*“We want to cut links with all NGOs and find our own strength”* - A.T., Tumupasa, 2013 (Brusle, 2017)

*“...The NGOs have to adapt to what the Tacana People decide.”*- N.C. Tumupasa, 2013 (Brusle, 2017).

Finally, Dr. Brusle states that “The rejection of the NGOs testifies as much to a desire for autonomy as to the refusal of a cultural recognition that does not bring justice, because imposed from outside standardized from the start, it eventually becomes frozen, like “an imagined bedrock of out-of-time stability” (Brusle, 2017).

While this tension was not evident during my time, I had limited interactions with CIPTA and WCS together, the statements given did reflect on a broad feeling within the communities of this study for demand of a recognition of their needs and a wish at least in some part for independence.

#### Contemporary Exogenous Institutional Relationships and Re-envisioning of Needs

*“As Bolivia has shifted its economic development pole to the Oriente, and focused its political economic strategies on participation and market efficiency it has allowed an articulation for indigenous demands”* - Postero, 2000

My first interaction with Walter while an experience that remained closely held in my memory was not the only time that I was confronted both as to my presence within the communities but also as a representative of an idea of exogenous intrusions into the communities that often did not actualize any projects even as they extracted time and information from them.

Another reaction was with Richard, Richard lived away from the central location of houses in Villa Fatima, we walked through part of the forest and past tilled fields and plantain plans before we reached his house, there just off the bank. He had not gone to my town hall, and when I arrived asked to see my permission forms, after our interview I asked if he had any other questions and this is an excerpt from that.



*“Well, I want to ask a question, respect this like a...I can I say, like a survey (inspection). Because (others) came, like you, they did surveys; what does your community need, your community, towards the community, what kind of life do you want, no? They come, engineer, technicians, they come. But of course...*

*Interviewer: Yes?*

*“Well, they will come at a time, then I would ask myself why they have come because surely after questioning everything, no? They will give something, they will help us.” - R.C., Villa Fatima<sup>10</sup>*

The respondent went on to continue that even my presence, as a researcher that was not officially affiliated with an NGO would be misconstrued as a potential ally to give aid, because I was from the United States. He continued to say NGOs mostly do not support their (local) institutions, that they come and make promises and do not deliver, that they came all the time but did not follow up on their promises only extracting information.

This response was interesting in two ways, first it mirrored many responses from the communities who wanted help from NGOs but often did not receive any promised aid, or projects. Or did participate in a project for example tree grafting but then were not trained and the trees died and no one returned to follow up. And second that this was a feeling that even in a community that had by physical appearances received the most infrastructure based aid of the five in the study.

Given the limited time of my study I cannot fully explore the complicated relationships that exist between and among the governmental body of CIPTA, the municipality, NGOs, and the local communities themselves. However I will explore the relationships between NGOs and the local communities in this study through their perceptions as an example of one aspect of the complex relationships that exist.

The experiences collected from the communities were divided into those of the time of the flood and those outside of that extreme event. At the time of the flood there was a consensus in all communities that there was little to no aid given and what aid was given was not enough for the months of inundation that the communities had lived through.

*“No one helped, we asked for food but no one had any to sell. A helicopter came and brought food, but it couldn't land so we had to take out boats to get it. The children cried and wanted to eat, but we didn't have firewood, we shared what fire we had between us, but no one helped. Twice in three months we received help, they said they would bring more, but no one remembered.” - A.Q. Carmen del Emero<sup>11</sup>*

Experiences and perceptions of exogenous institutions outside of the flood however varied. One aspect that became quickly evident from my interview were that these communities interacted with many different exogenous institutions with engagement occurring at differing levels. Within this study alone over eight different institutions were recorded as interacting with the community members. A majority of these projects were agricultural in theme, resulting in the donation of seed, cacao trees, plantains, and grafted fruit trees.

While these were often appreciated by the community members, many would comment on the trees dying from the mud, or not growing well and a lack of training on how to properly manage the grafted fruit trees. My guide, a local of San Miguel, a Tacana community near Madidi National Park was particularly anxious over the grafted trees as he saw many that were not being properly cared for and thus would result in the growth of non-utilized citrus trees that were used as the graft base.

The donation of cacao however was separate from these agricultural projects in that the institutions who collaborated with the communities were often longer-term partners and participated in the development and organization of market access from the communities to larger markets, particularly in Sucre and to the factory Chocolate Para Ti.

Community members who participated this were often very proud of their work and maintained responsibility for the overall product as being a result of their work and crops.

*“Yes, Chocolate para Ti, it's the most delicious (chocolate) in Bolivia. Better than Ceibol, better than bonbon, there are others. We collect it, I went with another from here to Ceibol, everything Ceibol produced I tasted, went to the bonbon factor and..visited Taguada, I tried it, went to Chocolate Para ti, where we sell and tasted it, and all of that, afterward I didn't remember any of it” \*smiles\* - O.C., Villa Fatima<sup>12</sup>*

Carmen del Emero and Villa Fatima were the two communities who most talked about their work with cacao, with Carmen having more negative outlooks on their crops and its impact on their market while Villa Fatima also was impacted they tended to believe their contracts were made well and would continue, even mentioning that they had started sales again of cacao in 2017.

Aside from Cacao when participants were asked about what resources or things they would like to see in the community to improve it agriculture was listed last. The top three resources listed by the communities were, health posts (include doctors, medicine, physical structure), luz (light/electricity), and potable water followed by education, economic infrastructure (predominantly Villa Fatima) and lastly agriculture (predominantly Carmen del Emero)

(Figure 2).

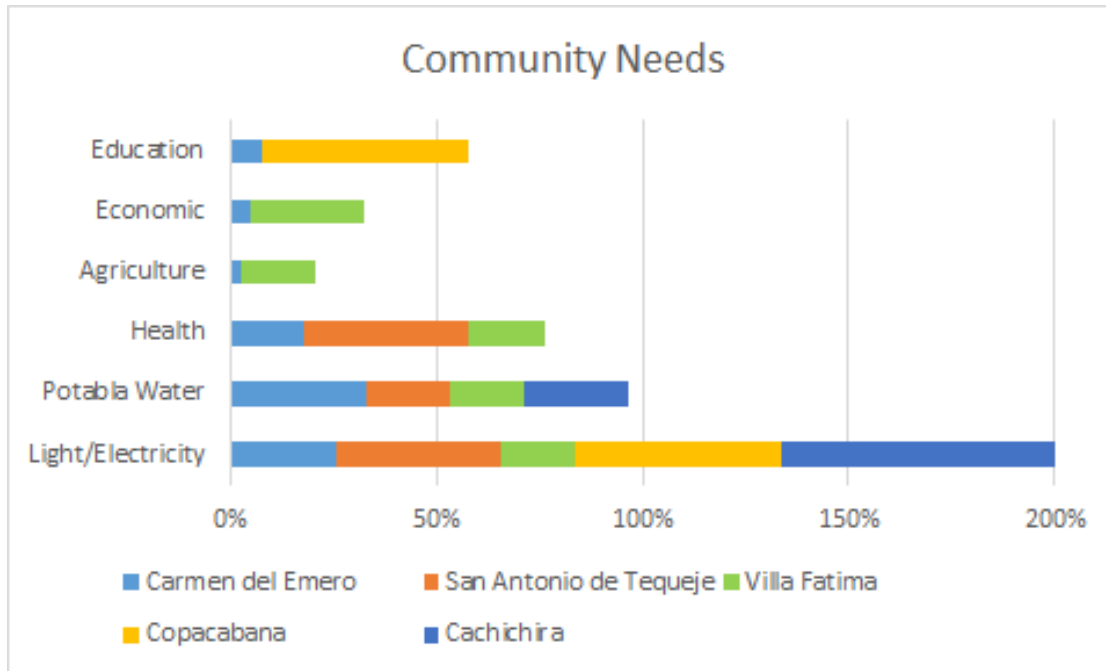


Figure 2: Stacked graph demonstrated percentage of responses within community and resources wanted to improve the community

The differences in projects introduced to the communities and their interests within the communities appears to indicate a lack of communication prior to the arrival of many of these NGOs or a cognizant choice on the part of the institutions to assist only in one sector, agriculture.

In addition to the types of projects not meeting the interests of the communities there differing opinions on finding projects and with the passive method by which NGOs and other institutions arrived and offered projects or aid in the communities.

For some communities, the use of CIPTA in locating NGOs for projects was considered valuable though sometimes slow. While others argued that CIPTA was too passive in its actions to locate partners of interest for the communities.

*“For example, CIPTA is a big organization for us, we belong to them but they never look for projects. They never look for project, they just wait for the projects to arrive so that they can open the doors for them, they never look for the community..” - A. Villa Fatima*

While I cannot speak for the NGOs and institutions involved with these communities, historical factors and preconceived images of indigeneity may play a part in how exogenous institutions are perceiving what these indigenous communities need or want.

The one exception to these communities was that of Villa Fatima, situated as it was between the other four communities it was not the closest to the port towns, it wasn't the largest or the smallest, and yet it was the only community to have direct investment into its infrastructure with an NGO Practical Solutions.

#### **Villa Fatima and Practical Solutions (Soluciones Practica)**

Soluciones Practica is a organization that was founded in Peru, but also has offices in Rurrenabaque, Bolivia. On it's website it say that it works in agroforestry, climate change, governance, disaster prevention, resilience, and information technology (soluciones practica, n.d.)

Since the flooding of 2014 Villa Fatima in collaboration with Soluciones Practica and other institutions have

- reconstructed their homes on raised foundations
- built a new brick school
- obtained metal roofing for all homes
- constructed a processing building for cacao
- installed individual solar panels in all of their homes.

In addition to infrastructure development they have also donated citrus trees, though like in the other communities interviewed many of those have died.

The community members mention how they work with all NGOs and when asked about how they contact them, they said it was all luck.

"We have a lot of luck, they come in and look for a community that wants to work, like here there isn't any work apart from fish, no other strong job, so we accept all the NGOs that bring work"- L.D. Villa Fatima

They also mention that they have a vision for their community they they are working toward and that they are working with Conservation International (CI) and Soluciones Practica to obtain it. When asked about what they want next they talk about a fish processor or fruit processing plant.

These differences seen in projects being developed within the community and aid given to the interests of the community indicate a need on both CIPTA's and WCS as its longest institutional partner to invest more directly in both understanding local interests and actively working to develop projects together or locate institutions that will provide the needs and services of interest within this region. As communities reaffirm their interests and realign their visions for their area, this relationship between the local communities and CIPTA, and CIPTA with its institutional allies has the potential to act as strong supporting force for these communities in the face of climate change.

## Endogenous Institution and Agency within the Beni River Communities of the Tacana TCO1

Exogenous institutions are not the only institutions present within the communities. Endogenous institutions both formal and informal serve many functions in reducing vulnerabilities and were present within all five communities. Informal social institutions such as friendships and family serve to offer support during times of need to each other in the forms of assistance, aid, and loans (Asian Disaster Preparedness Center, 2006). Each of the five communities had strong social institutions, with the communities consisting of multiple extended families both within the town and often within one of the nearby port towns of Rurrenabaque, Riberalta, or San Buenaventura. These institutions are important for community members in obtaining goods from the port towns, communication, and education. In regards to secondary schools, these institutions work to provide support to children by extended family members in terms of housing, food, and educational support. These institutions came into play after the flood in providing seeds from town or other food products to the families within the communities off the river, sharing of resources, and as actors of emotional support.

The Mayor of Cachichira provides one such example, in much of her interview she discussed her love of her parents and her sense of responsibility in ensuring they were cared for.

*“I fish and hunt with my husband, my brother, I do everything. I fish, hunt, work with men. At the least, I have my two elderly parents, I have to work for them.”* L.C. Cachichira<sup>13</sup>

*“My father founded this place, cachichira, 35-36 years ago. And for now he cannot work, now I work for them.”* L.C. Cachichira<sup>14</sup>

Formal endogenous institutions were present in all of the communities interviewed. There were 5 endogenous institutions mentioned during this study; fishermen associations, cacao associations (in collaboration with chocolate institutions), ranching communal groups, caiman hunters and church groups. While the church groups predominantly worked within the cultural and spiritual realm, organizing religious festivals, the others were all market oriented.

Participation in these institutions was variable both individually as members moved in and out of them depending on the advantages they provided and within the communities themselves. Fishing associations in particular offered substantial benefits to fishermen and were located either within the community or connected externally to one in Rurrenabaque, the Paiche association out of Rurrenabaque was the most commonly mentioned. Fishing institutions offered external markets to community fisherman, allowed for increased catch allowances, and permitted higher limits of gasoline which are highly regulated along the Beni River. These higher gasoline limits allow for more travel in along the river and could be used in the small generators to power freezers or electricity and so provided a tangible benefit to its participant, for a fee.

While cattle were not present in all communities (only three mentioned owning cattle), cattle institutions were mentioned as being communal with all participants of the community taking turns visiting the site, doing chores, and some participating in training on animal care. This was predominantly present in Carmen del Emero.

Institutions have historically served an important role in facilitating the development of greater organizational capacity and governance for indigenous Bolivians, they are now having to revise what their role is as the indigenous groups themselves are gaining greater political recognition, are redefining their image, and revising their needs in the face of a changing climate, both political and ecological. Within these communities there exist multiple institutions who interact with and touch on the lives of the community members, interviews have demonstrated that some of these are long term and assist in the development of infrastructure and in opening access to larger markets; while others operate on a short term basis in the form of pre-devised projects, often in the form of agriculture. At the same time the communities have strong endogenous institutions in the form of social alliances and form associations which allow for access to extra resources and in providing shared support.

While many forms of these institutions exist, communities continue to be frustrated by the lack of projects that accurately meet their needs in relation to health, water, and electricity and the empty promises of other visiting organizations. As the communities recognize the challenges facing them in the future in regards to climate change they are also redefining their needs in relation to those challenges and are no longer satisfied with the normative interactions that have encapsulated their past experiences with exogenous institutions as passive recipients (Leach, Mearns, and Scoones, 1999).

### **Interspecies Relationships**

Building adaptation is more than just the physical infrastructure and relationships formed with institutions and each other, integrated human resilience is the resilience of the whole system a holistic interconnected relationship. This relationship includes wildlife and the habitats that the Tacana live and interact with. These relationships are historical, intergenerational, and changing.

Adaptive capacity has been defined as the “ability of an individual to cope with, prepare for and adapt to disturbances and uncertain socio-ecological conditions” (Boillat and Berkes, 2013). In the case of these communities these disturbances include not only the impacts of the flood on their homes and each other but the spaces that they utilize and those they share them with.

Anthropologist Keith Basso argues that “the human existence is irrevocably situated in time and space, that social life is everywhere accomplished through an exchange of symbolic forms and that wisdom “sits in places”, if we agree with this then we must also acknowledge that climate change has the potential to change these spaces and to understand adaptation and build resilience, these changes are also important to explore” (Crate, 2007).

Given this understanding I will explore interspecies relationships that exist within these communities, situated as they are within the Tacana culture I will first explore the perceptions of changes that are occurring within the community and histories of adaptation, then I will discuss the impacts these perceptions are having on the utilization of resources and the subsequent changes in livelihoods that are occurring within the communities.

### TEK in the Tacana Communities and Perceptions of Risk

*“Way back before, there was less rain, during the rainy season, now in the dry season there is rain, yes. Sometimes (I) work in the chaco or take from the bush, and it is dry, the rain doesn't come... the time of rain for moistening the earth for the plants. Last year our maize didn't work..none worked, nothing worked if it was dry, three-four months no rain, the ground was dry, the plants, my maize all dry. The fruit were tiny, I took my plants, because there, they didn't work” -L.C., Cachichira15*

The riparian communities interviewed shared perceptions of climate change as circular around its impacts on their livelihoods. These circular relations are in part due to the seasonality of some of their activities including crops, fishing, hunting in relation to expected seasons (Figure 3). It is also important to note that while the calendar provides a context by which we can view seasonal activities in some of these communities, it is not fully representative of the ways by which farmers, hunters and fisherman adjust and change their activities

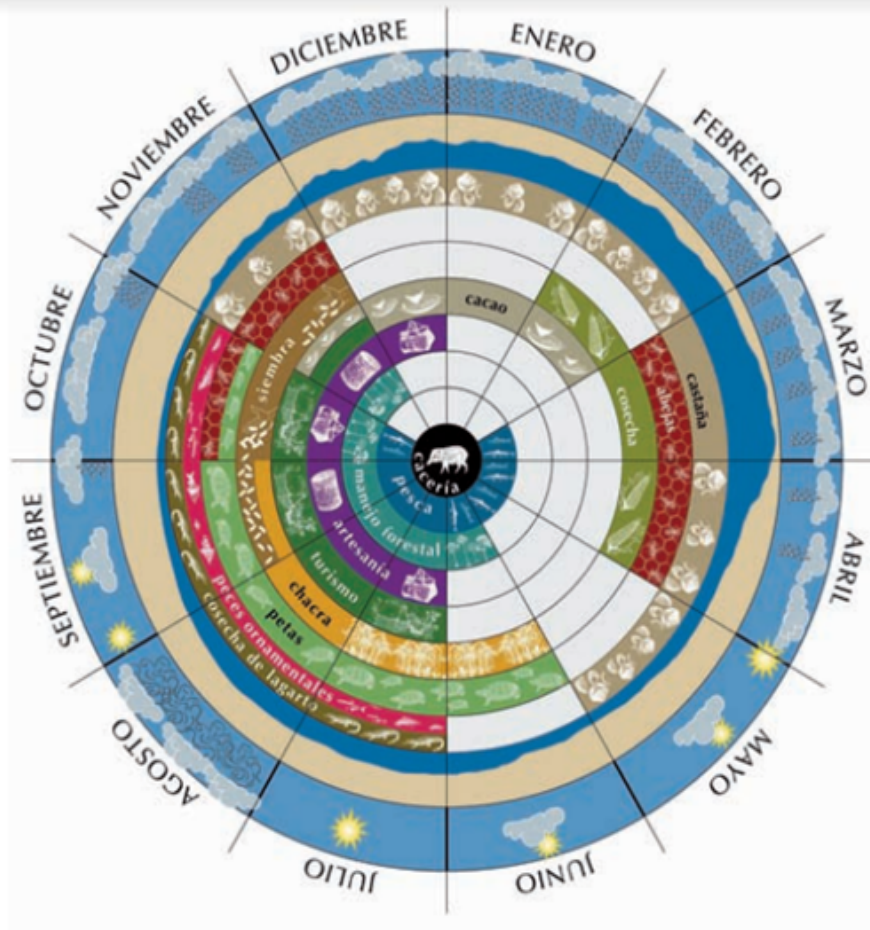


Figure 3: Annual Calendar of Natural Resource Use  
in the Indigenous Tacana Territory  
CIPTA, 2014

When discussing climate change responses tended to focus on hotter suns, longer rains, colder seasons when it was not supposed to be cold as stronger impacts of climate change than flooding. In a separate 2017 study of wildlife perceptions within inland and fluvial communities, these perceptions were corroborated within their top 10 impacts (Townsend, 2017). In relation to these perceptions adjustments are being made in activity times and livelihoods, and in some instances full transformations are occurring in relation to how community members are interacting with their environment and wildlife (Boillat and Berkes, 2013).

Traditional Ecological Knowledge (TEK) plays a part in these perceptions and recognitions of changes in expected weather patterns. These past histories and shared intergenerational stories provide a guide by which community members can in part interpret what is occurring within their communities and provide a base by which they can act and adapt. While efforts during the 1500s may have removed historic TEK from much of the region, the riparian communities within the TCO have a long history in adapting to flood prone habitats and variable changes in



their areas. These intergenerational histories are being drawn on in developing future adaptive capacities, this is evident in the reconstruction of their infrastructures and in their perceptions and actions towards wildlife.

Additionally, as efforts to revive Tacanan culture in terms of language and a renewal of oral histories occur within cultural hub towns such as Tumupasa, there are increased possibilities of expanding the TEK of the region and accessing historic adaptive capacities that can advise current communities on actions for climate change.

### Climate Change and Changing Relations with Wildlife

Fernando had arrived in Cachichira for a short visit to drop off supplies before his family was to transport materials for a water pump to Villa Fatima. A leak in a nearby canoe stalled the activity, as they brought down the chainsaw to level off the canoe and others finished unloading the supplies. I asked if Fernando would give me a moment for an interview.

He smiled and squatted down on the riverbank as I quickly got my supplies together, with the chainsaw roaring in the background, he patiently answered my questions as we waited for breaks in the noise so we could hear each other. I asked him how the fish and game meat in the area was, pausing he answered,

*“I can enter a forest where it's replete of animals. But I cannot not remove all of them, only what is sufficient, a desire, if there is a chancho [peccary], a taitettu, a hochi [paka], but always with caution to conserve it, right? .....Because I don't want to say..that this.. (my son) to only know in a drawing...but alive..” - F.B., Cachichira<sup>16</sup>*

They shortly called for him to join them, his children approached me and I handed over the baby howler monkey I had been tasked with temporarily caring for and they ran down to the boat, he smiled at his wife and grabbed a bag from her before descending the bank, boarding the boat and smiling at their family on shore continued their way downriver.

In Cachichira and Villa Fatima the concepts of protection were prevalent in many of their interviews. They believed that conservation was important, and that it was the reason that when other communities had so few animals theirs were recovering.

Traveling four hours downriver however you would get a different answer, in Carmen del Emero,

*“I (hunt) little in my house, before there were so many animals, monkey, turtle, all of it, \*waves in front of his house from side to side\* close! Now, I don’t find any, they all died. Sometimes we go hunt, but we don’t find anything.” A.D., Carmen del Emero17*

Perceptions of wildlife availability varied across the five communities, those communities that were smaller and closest to Madidi national park felt the wildlife would eventually return, if conserved, if protected from the *terceros* (outsiders) who would come and exploit them all (Figure 4). However as you traveled to more remote communities on the river, the perceptions were more negative, with some respondents saying that they believed the wildlife would never return back to the area.

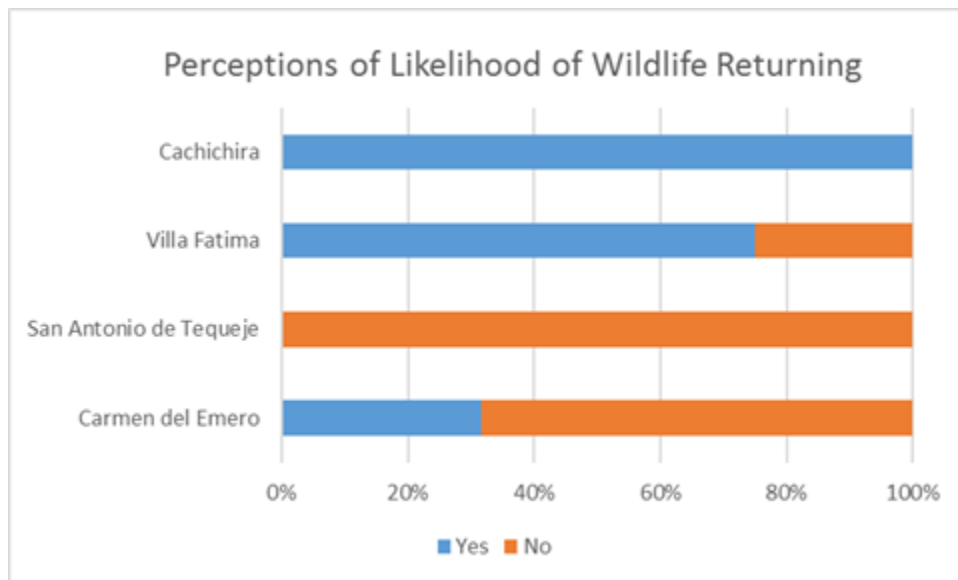


Figure 4: Likelihood of Wildlife Returning, based on proportional responses within the community  
\*Copacabana is absent from chart, while they did comment on disappearances, there were no comments on whether they would return, 2017

These perceptions have had the impact of changing behaviors of community members in many of the communities either due to a belief in the need to bide their time for recovery or that no recovery will occur. These behavioral changes are impacting livelihoods, household nutrition, and cultural activities within all five communities.

## Livelihoods and Adaptive Capacities

Many members within the community were not professionals of one specialty but of many, they were farmers, hunters, fishermen and lumberjacks combined. What they did varied as much on the seasonality of the activity as to their own preferences.

Orlan was a younger man, his wife even younger than he, sitting outside in his father's yard I asked about his job.

*“Here, we work in agriculture, we cut cacao..we work with this project with DECCA, cultivate plantains, citrus, pineapple, and some woody plants..afterward sometimes we work in fishing, and also timber, and we hunt but very little.”*

*Interviewer: “Well doing all of that how do you have time?”*

*“\*laughs\* That is all of the things we do, sometimes we are bored in the farm and we go fish, when fishing is boring we go hunt. We hunt a pig, monkey a guan on a rare occasion. Mostly we just fish.”* O.C., Villa Fatima18

However after the 2014 flood this lifestyle is changing for many residents of the communities. Unable to grow rice and corn, they have to buy them from the market, unable to hunt or find wildlife to hunt, they transition to fishing more or invest more in domestic stock. Timber which was typically considered a quick cash job was considered harder to find, placing more pressure on fruit such as cacao and plantains or fishing to bring in monetary incomes.

These transitions have contributed to the concerns community members have about their homes. Increases in fisherman have led to many complaints of smaller catches, longer hours and increased annoyances with terceros (outsiders) and in particular commercial terceros fishing along their rivers. And while some believed this was temporary others were concerned this will be permanent.

One hunter said he feared his son would never know the joy of hunting, a similar concern to the participant in Cachichira who feared his children would not know a real animal from anything other than a picture. There was a concern that their lifestyle was changing and their children

wouldn't live the way they lived. For others this anxiety increased interests in their children gaining better education so that they could go on and become professionals elsewhere.

While anxiety of future floods, and changes in wildlife, soil, and fish exist they exist within the determination of communities to build a better future for themselves, to adapt their homes, try new vegetables or grow new fruits, invest more in domestic stock or restrain from hunting wild animals for a while, and while sharing the support of their neighbors.

These concerns and fears are not ignored nor do they paralyze community action. But they are creating conversations within families and among communities on plans of action, whether it is their actions in collaborating with Conservation International to fund forest guards or within their decision to moving to a new area where there is the potential for new opportunities and increased safety.

## **Conclusions**

In review this study has demonstrated how histories of areas impact contemporary infrastructure and relationships that an understanding of these histories provides necessary contexts by which researchers and practitioners to better understand how communities operate uniquely to other regional and state powers.

It has also explored the role institutions have in both building capacity and in predefining identities of indigenous communities and how these dual actions have led to conflict that can be useful in understanding contemporary relationships. In particular how institutions are not adequately addressing local community needs and the necessity for better place-based understandings of communities beyond interactions with the larger governmental bodies. Additionally, it has demonstrated the need for CIPTA to become more active as the gatekeeper to the communities in locating and collaborating with NGOs and other institutions that will provide long term, local interest-based projects or assistance.

In combination with infrastructure and institutional relationships this paper then demonstrated the impacts flooding and climate change has had on the perceptions of the local environment and how these perceptions in addition to TEK have inspired changes to livelihoods and behaviors.

The communities within this study were shown to be to have been developing strong adaptive capacities such as improving flood prevention infrastructure, maintaining diversified livelihoods, acting proactively to conserve species for future use, and investing in market-based opportunities to grow their economies. At the same time, they are constrained by their location, access, and historical impacts from completely actualizing their visions. These constraints and frustrations in the face of dramatic losses has led to concern and conversations regarding their future, livelihoods, and the current status of their relationships with outside actors.

Overall the communities in this study were impacted by the flood of 2014, by the previous floods of the decade, by colonial history and exclusionary economic policies that relegated them to poverty. They are also actors in their own narratives, pushing for recognition from their central government, demanding that their needs are addressed properly from exogenous institutions, building networks and associations within their communities that will strengthen them in the future. This study has demonstrated the complex processes by which resilience is made and the necessity and importance of researchers and practitioners to address these changes and needs on a place based local level that includes and is led by the voices of the communities involved.

Lastly I will leave you with the last interaction I had with Walter and the community of Carmen del Emero;

My last day in Carmen del Emero was the opposite of my first. Walter had warmed to me as he watched me talk with his community, I would sit and listen to him talk and tell stories of his fishing as we ate together with his family. I played with his daughters and we drew parrots and bunny rabbits on tablecloths. As I left he smiled and I promised him I would return. Though this study has concluded for now, my relationship with the communities of Carmen, Tequeje, Cachi, Copa, and Villa Fatima are not over. I look forward to seeing them again and hope that we continue to do work that benefits them and their visions in the future.

## **References Cited**

- Albro, R. (2006). The Culture of Democracy and Bolivia's Indigenous Movements. *Critique of Anthropology*, 26(4), 387-410.
- Anderson, M., & Woodrow, P. (1998). *Rising from the ashes : development strategies in times of disaster*. Lynne Rienner Publishers.
- Asian Disaster Preparedness Center. (2006). *The role of local institutions in reducing vulnerability to recurrent natural disasters and in sustainable livelihoods development*. Food and Agriculture Organization of the United Nations, 1-72.
- Behrendt, A. (2000). Constructing Democratic Participation and Development: Donors, NGOs and Indigenous Organizations in Bolivia LASA 2000 Panel: Development or Discord: Examining the Changing Roles of Indigenous Organizations in Ecuador and Bolivia.
- Brusle, L. (2017). Land and indigenous territories in the Bolivian Amazon: full but imperfect spatial justice? *justice spatiale/spatial justice*, 11, 1-20.
- Boillat, S., & Berkes, F. (2013). Perception and Interpretation of Climate Change among Quechua Farmers of Bolivia: Indigenous Knowledge as a Resource for Adaptive Capacity. *Ecology and Society*, 18(4), art21.
- Cameron, E. (2012). Securing Indigenous politics: A critique of the vulnerability and adaptation approach to the human dimensions of climate change in the Canadian Arctic. *Global Environmental Change*, 22(1), 103-114.
- Capon, S., Chambers, L., Nally, R., Naiman, R., Davies, P., Marshall, N., . . . Williams, S. (2013). Riparian Ecosystems in the 21st Century: Hotspots for Climate Change Adaptation? *Ecosystems*, 16, 359-381. Springer.
- Castello, L., McGrath, D., Hess, L., Coe, M., Lefebvre, P., Petry, P., . . . Arantes, C. (2013, 7 1). The vulnerability of Amazon freshwater ecosystems. *Conservation Letters*, 6(4), 217-229.
- Castillo, O., Clar, C., Coppolillo, P., Krester, H., McNab, R., Noss, A., . . . Wilkie, D. (2006). *Casting for Conservation Actors: People, Partnerships, and Wildlife*. Wildlife Conservation Society, New York.

- Chaplin, A. (2010). Social movements in Bolivia: from strength to power. *Community Development Journal*, 45(3), 346-355.
- Coe, M., Costa, M., & Soares-Filho, B. (2009). The influence of historical and potential future deforestation on the stream flow of the Amazon River – Land surface processes and atmospheric feedbacks. *Journal of Hydrology*, 369(1-2), 165-174.
- Crate, S. (2008). Gone the Bull of Winter? *Current Anthropology*, 49(4), 569-595.
- Decamps, H., Fortun6, M., Gazelle, F., & Pautou, G. (1988). Historical influence of man on the riparian dynamics of a fluvial landscape. *Landscape Ecology*, 1(3), 63-173.
- Espinoza, J., Marengo, J., Ronchail, J., Carpio, J., Flores, L., & Guyot, J. (2014). The extreme 2014 flood in south-western Amazon basin: the role of tropical-subtropical South Atlantic SST gradient. *Environmental Research Letters*, 9(12), 124007.
- Fabricant, N., & Postero, N. (2015). Sacrificing Indigenous Bodies and Lands: The Political-Economic History of Lowland Bolivia in Light of the Recent TIPNIS Debate. *The Journal of Latin American and Caribbean Anthropology*, 20(3), 452-474.
- Gigler, B.S. (2009). Poverty, Inequality, and human development of Indigenous peoples in Bolivia. Working Paper Series No. 17. Georgetown: Georgetown University. 1-37
- Langer, E., (1987). Franciscan Missions and Chiriguano Workers: Colonization, Acculturation and Indian Labor in Southeastern Bolivia. *The Americas*, 43(3), 305-322
- Gustafson, B. (2009). New Languages of the State: Indigenous resurgence and the politics of knowledge in Bolivia (K. Lomawaima, F. Mallon, R. Ramos, Alcida, & J. Rappaport, Eds.) NC: Duke University Press.
- Kohl, B. (2002). Stabilizing neoliberalism in Bolivia: popular participation and privatization. *Political Geography*, 21, 449-472.
- Leach, M., Mearns, R., & Scoones, I. (1999). Environmental Entitlements: Dynamics and Institutions in Community-Based Natural Resource Management. *World Development*, 27(2), 225-247.

Ovando, A., Tomasella, J., Rodriguez, D., Martinez, J., Siqueira-Junior, J., Pinto, G., . . . von Randow, C. (2016). Extreme flood events in the Bolivian Amazon wetlands. *Journal of Hydrology: Regional Studies*, 5, 293-308.

Pila, E.L. (2014). Constructions of Tacana Indigeneity: Regionalism, Race and Indigenous Politics in Amazonian Bolivia. PhD Thesis, Sussex: University of Sussex. 1-250.

Seiler, C., Hutjes, R., & Kabat, P. (2013). Climate Variability and Trends in Bolivia. *American Meteorological Society*.

Lisa, E., Schipper, F., & Langston, L. (2015). A comparative overview of resilience measurement frameworks analysing indicators and approaches.

Soluciones Practica (n.d.). Región Amazonía y Tierras Bajas. Retrieved from <http://www.solucionespracticas.org.bo/regionamazonia>

Townsend, W. R. (2017). Tacana Perceptions of changes to their wildlife harvest after extreme flooding of their territory in northern Bolivia. In *Knowing our lands and resources: Indigenous and local knowledge of biodiversity and ecosystem services in the Americas* (pp. 125-141). UNESCO.

Vallvé, F. (2010). The Impact of the Rubber Book on the Indigenous Peoples of the Bolivian Lowlands (1850-1920). PhD Thesis, Georgetown: Georgetown University. 1-550.

Voiland, A. "Flooding in Bolivia : Image of the Day." (n.d.). Retrieved April 11, 2018, from <https://earthobservatory.nasa.gov/IOTD/view.php?id=83337>

Zimmerer, K. (2015). Environmental governance through "Speaking Like an Indigenous State" and respatializing resources: Ethical livelihood concepts in Bolivia as versatility or verisimilitude? *Geoforum*, 64, 314-324.



## Appendix 1 - Spanish Translations of Quotes

1. “ 50 años cumpliendo y mire, nunca hemos sentido asi inundaciones. Si en Rura esa vez en el '78 le inundó pero asi quedo, un metro. Los otros lugares han inundado pero estos de 100%. Es castigo de Dios. Varios pueblos aya cerca de Rure aya han desaparecido desde el '78. Pero este no, una altura que ha soportado no, era alto, pero el 2014 ya no hubo ni altura ni nada. No pues pensamos que no nos iba afectar pero se fue subiendo y subiendo todo el dia el agua.”
2. “Para vivir un poco con dignidad como personas humanas. Saneamiento básico. Agua, luz, todo, si mejorar viviendas todo eso “
3. “si, cambia aquí, hemos movilizar dos veces la comunidad, cuando yo llegué aquí en la comunidad era arriba en la embocada siempre, y tequeje allí bajito, y en la inundación eso q ...mas aca, pero igual e guardando igual cambiar aquí”
4. No esa comunidad cambió 3 veces, en 2000 era abajo, vivimos 10 años, se rumbo todingo, se rumbo todo..de hace otra vez en dos años
5. Pensábamos que iba ser pues como en otros años , así no, que el río llegaba hasta el rasa del banco y no pasaba, pero mientras más días ya, amaneció ya después de una larga lluvia. Amaneció ya los choritos de agua entrando así por este lado ya. Ya la gente más asustada, no va inundar otros dicen no asi nomas va a pasar eso
6. Lo que queremos ver es lo que siempre hemos soliiitado aquí, lo que es agua , luz...3 cosas hemos, y comunicación
7. No no se recibe mucha ayuda osea yo por ejemplo yo era presidente de la OTE, de la organización de aquí es la comunidad y es participaba en la reunión, de la cumbre, en la alcaldía , y la mas veces veces hemos solicitado lo que es pa un centro de salud otra vez , y la misma alcaldía no se la ha hecho de parecer de los vienes de la posta , siempre hemos reclamado eso de que la alcaldía nos haga un repun para que regrese esas cosas está el momento nada
8. Había un de este que quieren se trasladar a la Golondrina , no se si le han comentado ... pero viendo yo en realidad , es muy lejos donde quieren irse, no hay nada, ni un árbol , ni algo plantado ni una fruta todo es pampa imaginense pa irse de la noche a la mañana , que vamos a comer aya? No tenemos nada sembrado, y eso quedaba ahí nomás .todos piensan aqui nomas en su casa , como hace más mejor ,y bueno algún rato diosito nos manda otra lluvia buena?
9. Yo quiero vivir en la vivienda, alla es el futuro
10. Bueno yo quiero hacer una pregunta, respecto eso como una una..como puedo decir, como una inspección. Porque avenida también como usted, hacer no encuesta, cual era tu necesidad, tu comunitaria, hacia la comunidad, como qué vida, queremos nosotros. no? Avenida, ingeniero, licenciado, a venido. Pero claro asi.  
Bueno preguntarme  
Bueno van a venir en un tiempo, entonces yo me preguntaba porque a ven venido, porque

- seguramente después cuestionar todo, no va poner algo de..q ayuda nosotros.
11. Nadie ayudó, nosotros pedimos alimento pero nadie tiene para vender. Una helicóptero traje comida pero de arriba y cargar. La gente traje botas para sacar eso. Los chicos lloraban, quiere comer, no tuve lina, compartimos fuego entra de nosotros pero nadie ayuda. 2 veces en 3 meses recibimos ayuda, dice más pero nadie acuerdan.
  12. Si, chocolate para ti, es el mas rico en Bolivia. Mejor q 6 mejor q bonbon, hay otros. Hemos hecho el recorrido pue, yo fui con otro de aqui y moido a cebol, todo a produce cebol a probado emo a probado de fabrica de bonbon, emo..visitala a taguada, emo a probado, imo a chocolate para ti q nosotros vendemos emo a probado , y todo eso y despues los otros no acuerdo \*smiles\*
  13. Si, yo pesca y caza con mi esposo, mi cuñado, mi hermano, todo me hago yo. Yo pesco, cazar, trabajo con hombre. A menos q tengo mis dos padres viejos, tengo q trabajar para ellos.
  14. ...porque mi papa fundado, este lugar, cachichira, fundado mi papo, 35-36 años fue la comunidad. Y para ahora, no puede, ahora yo trabajo por ellos
  15. m, más antes.....más antes al menor tiempo de lluvia, era tiempo de lluvia, ahora en tiempo seco ya hay lluvia, si. A veces trabajar en los chacos o sacar en el monte y también hay sequía, no llueve como..tiempo de lluvia para mojar la tierra por las plantas. El año pasado nuestro maíz no paso, nadie pasó si era seco, tres quatro meses no lluvia SEco la tierra, la planta, mi maíz todo seco, chikitingo son los frutas. secia mi plantas, por alla no mas anda
  16. porque no digamo podemos entrar un monte donde sólo miramo repleto de animales. no podemos eliminar todo, solo suficiente para salsear, un deseo si hay un chanco un taitetú un hochi pero siempre con precaucion q conservarlo no?
  17. Poco en mi casa, antes había alto vicho hay mono, peta y todo de eso por aquí \*waves toward yard\* circa! Ahora no se consigue, todos son mueren son aborto. Y A Veces nosotros caza pero no encuentro nada.
  18. Aquí hacemos trabajo de agricultura, hacemos trabajo de cosecha de cacao, trabajamo con..estamo trabajamo con..ese proyecto q vienen..por ejemplo con DECCA cultivo de platano, cítrico, piña, y...algunas plantas maderables. De proyecto de cacao estamo haciendo aprovechamiento de cacao, y también cultivando cacao. después, a veces trabajo de la pesca..también madera y la caza muy poco de cacería  
Si pero, si haces todos los otros cosas como tienes tiempo  
\*laughs\* Osea todos los cosas hacemos..a veces aburrido de chaco no vamo a pescar, cuando aburrido de pescado nos vamos a cazar, cacería de un chanco..mono. una pava pero raro veces. Mayormente puro pescado

## Appendix 2 - Timeline of Events

### Major Events within Bolivia that impacted lowland indigenous communities

- 1527- Franciscan Monks accompanied Conquistador Pizarro in exploration of Bolivia
- 1538 - Spanish Colonise Bolivia
- 1780 - Failed Great Rebellion against Spanish
- 1824- Bolivia is liberated from Spanish Rule by Simon Bolivar
- 1850 - Bolivia is Major exporter of Quinine Bark (end 1870)
- 1880 - Bolivia's Rubber Boom (end 1920)
- 1982 - Central Indígena del Oriente Boliviano (CIDOB)
- 1990 - Marcha por territorio y dignidad (March for Territory and Dignity)
- 1993 - Sánchez de Lozada and Revolutionary Nationalist Movement Elected to Power
- 1994 - Law of Popular Participation (LPP) passed
- 1996 - Agrarian Reform Law (Ley INRA) passed
- 1997 - CIPTA submitted claim for their Indigenous Territory (TCO Tacana 1) to INRA
- 2000 - CIDOB renamed Confederación de Pueblo Indígenas de Bolivia
- 2001 - CIPTA submitted second claim for TCO Tacana 11