



Mobile Hunter-Gatherers in Semi-Arid Lands: Toba Adaptations in the Bolivian Chaco

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Palabras clave:

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Tobas bolivianos;
Cazadores-recolectores
móviles;
Sabanas semiáridas.

RESÚMEN

Las llanuras aluviales del Chaco Boreal fueron habitadas por grupos humanos predadores desde el Holoceno tardío, sin embargo, se sabe muy poco acerca de los antiguos habitantes de la región. Se presenta información arqueológica y etnográfica sobre el área desde tiempos antiguos hasta el siglo XIX, enfocando particularmente grupos de cazadores-recolectores tobas bolivianos. Estos grupos habitaron el área del megafan del Alto Pilcomayo durante más de 600 años. Las bandas se desplazaban estacionalmente entre la pesca de invierno en el río y la caza-recolección en las llanuras alejadas del río, estableciendo campamentos y, a veces, plantando huertos cerca de pantanos, lagunas y cursos de agua temporales, con un modelo de explotación del ambiente que parece haber perdurado durante siglos. Estos grupos tobas desplazaron a otros grupos étnicos y ocuparon territorios en las orillas del Alto Pilcomayo, manteniendo alianzas inestables con los cazadores-recolectores y horticultores colindantes, intercambiando productos, visitándolos y luchando con ellos durante todo el período estudiado. También resistieron ferozmente el avance de los colonos bolivianos hasta finales del siglo XIX. Los territorios de los grupos toba bolivianos estaban separados de los de sus vecinos por zonas intermedias deshabitadas. Sus patrones de movilidad y organización social eran similares a los de otros cazadores-recolectores de lengua guaicurú descritos por los conquistadores españoles. El uso histórico del espacio aquí descrito podría usarse para modelar las adaptaciones de los primeros habitantes de las tierras semiáridas del Chaco Boreal, de quienes los tobas bolivianos aprendieron conocimientos útiles para establecerse en un bioma semiseco que requiere adaptaciones culturales específicas.

Key words:

Northern Gran Chaco Basin;
Bolivian Toba;
Mobile hunter-gatherers;
Semi-arid savannas.

ABSTRACT

Northern Gran Chaco was inhabited by human foragers since the Late Holocene but very little is known about the basin's ancient inhabitants. We review here archaeological and ethnographical information about the region and focus on understudied regional groups of Bolivian Toba hunter-gatherers. These mobile indigenous groups inhabited the Upper Pilcomayo megafan area for more than 600 years. The bands moved seasonally between winter fishing in the main river and foraging on the semi-arid plains away from the river, setting camps and sometimes gardens around marshes, lagoons and temporary water courses. Expansive Toba regional groups displaced neighboring hunter-gatherers and occupied territories along Upper Pilcomayo river banks; however, they sustained unstable alliances with neighboring hunter-gatherers and horticulturalists, trading, visiting and fighting with them throughout the period. They also fiercely resisted encroachment by Bolivian settlers until the late nineteenth century. Bolivian Toba's territories were separated from those of their neighbors by buffer zones. Their mobility patterns and social organization were like those of other Guaicurian-speaking foragers described by Spanish conquistadors in Northern Chaco. Bolivian Toba adaptations to the dry lands of Bolivian Chaco, as modeled using information from historical sources, could be used to begin modelling the adaptations of the earliest inhabitants of the northern basin, from whom the Bolivian Toba undoubtedly learned social knowledge that proved useful to thrive in a semi-dry biome requiring unique cultural adaptations.



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INTRODUCTION

Ancient hunter-gatherers began trekking the Northern Gran Chaco Basin tropical savannas (today Bolivia and Paraguay) as soon as the region became inhabitable for human groups—possibly around 6000 years BP, certainly after the Last Glacial Maximum (Gautney 2018). However, very little is known about the cultural adaptations of the ancestral human populations in Northern Gran Chaco (Capriles & Albarracín-Jordán 2013; Lamenza & Plischuk 2015; Myers & Esquerdo 2001).

During the Holocene Climate Optimum, estimated for this region between 8500 years and 3500 years BP (Iriondo 2006), fauna from the Matto Grosso and the Brazilian shield entered Northern Gran Chaco. Paleofauna survived in the Central Andes foothills between the Parapetí and Pilcomayo rivers, at least up to 5500 years BP (Coltorti *et al.* 2012). Human occupation on the sedimentary plain would have followed the fluvial fans of Grande, Parapetí, and Pilcomayo (Barboza *et al.* 200; Horton & DeCelles 2001; Myers & Esquerdo 2001). These rivers formed megafans that have

been compared to the Okavango fluvial fan in South-Central Africa (Horton & DeCelles 2001; Stanistreet & McCarthy 1993)-Pilcomayo being among the largest known megafans of the world (Hartley *et al.* 2010; May 2011). Pilcomayo would have been an important corridor and refuge for the early human foraging populations thriving in those complex alluvial ecosystems (Iriondo 2006).

Thus, the Pilcomayo megafan area was probably occupied by prehistoric hunter-gatherers but there are few archaeological or ethnohistorical models to interpret the lifeways of these ancient peoples (Myers & Esquerdo 2001:39; Lombardo *et al.* 2013).

I review here archaeological data available for the plains of Northern Chaco, and analyze historical and ethnographic data to sketch an ethnohistorical model of the adaptations of early hunter-gatherer peoples by focusing on little known Toba groups that, at least for the past 500 years, trekked the lands watered by the Pilcomayo megafan between parallels 20° and 23° south.

Several streams contributed to the Pilcomayo River megafan in this area. Those listed in the first statistical study of Bolivia (Dalence 1851:40) were Salado River of Tarija (21° 09' latitude south), Santa Rosa River, Tobas, Yoyvida, and two or three others, whose names had not yet been determined. The same author indicated that fish was thriving on many marshes and lagoons along the Upper Pilcomayo (see also Fuertes 2004).

Around 1000 years ago, different cultural groups of socially integrated hunter-gatherers and horticulturalists occupied this part of Northern Chaco (Arellano 2014). Later, Tupí-Guaraní-speaking horticulturalists migrated from the northeast into the Andean Cordillera, displacing peoples and upsetting existing relationships between Andean farmers, Arawak horticulturalists, and Chacoan hunter-gatherers (Iriarte *et al.* 2017; Melo dos Santos *et al.* 2015). The upheaval created new dynamics of cooperation and competition among the indigenous peoples. After 1530, European settlements on the western foothills and on the margins of Paraguay River on the eastern border of the region further intruded into such social dynamics.

Dense populations of foraging peoples were living on the megafan of Pilcomayo River. Ethnographer Erland Nordenskiöld (1910: 100) observed: "*The tribes have always fought for the possession of Rio Pilcomayo or Rio Parapetí; the strongest, in fact, managed to remain on the margins of the rivers, while the faintest were rejected to the inhospitable northern Chaco forests, which does not have much water.*" In another work, Nordenskiöld (1920: XV) added: "*Wherever water is available, there the country is inhabited. Indigenous people do not need a great supply of water to inhabit the country.*" Comparing Pilcomayo and Parapetí rivers, he said that the methods of fishing differed somewhat in the different river, while fish was plentiful only in Pilcomayo, where people always have found a good supply of food.

Emilio Boudin, a naturalist who explored Pilcomayo in 1906-1907, observed:

"Between parallel 24° and 21° south, Chaco forest is a very uniform bush, always presenting the same types [of vegetation] with smaller ... woodlands, interspersed by large fields covered with grasses ... The terrain is very dry and clayey, it has high fertility in the lower parts which are flooded in the rainy season, where the water stays for a long time because the soil is hard and not very permeable. ... Potable water can be found between 20 and 7 meters. In parts it is somewhat salty and bitter but in others it is quite potable" (Barquez 1997:59).

I analyzed published works from the colonial period to compose a preliminary model of historical adaptations of Toba peoples, whose presence on the Bolivian Chaco around Upper Pilcomayo River has been recorded since the 1500s. Colonial accounts contained just a few references to the lifeways of these hunter-gatherers. Published sources included more substantive information after Bolivia became an independent nation. Since the 1840s, Bolivian army officers, European scientific expeditions, travelers, and Franciscan missionaries provided thicker descriptions about the tribes living on the riverine areas. These were mostly mobile hunter-

gatherers impeding the ranchers' encroachment on tribal lands (Guzmán 1887).

During the nineteenth century, Toba warriors became known for their confrontational resistance to colonists and Bolivian settlers. These mobile hunter-gatherers were part of an earlier demographic expansion of Guaicuruan-speaking foragers over the Chaco Basin. Guaicuruan-speaking foragers would have entered Northern Chaco possibly after the expansion of the Tupí-Guaraní, shortly before the arrival of Spanish settlers (Mendoza 2019). To get a better understanding of the foragers' cultural adaptations on the semi-arid lands around Upper Pilcomayo, I extracted data from observations made by nineteenth century authors and contrasted such data with ethnographic information obtained at the end of the twentieth century among a closely related Toba people downriver. Toba lifeways were probably rooted in cultural knowledge also available to ancient indigenous peoples who inhabited the region before them. Overall, this study is a contribution to figuring out ethnohistorical adaptations of hunter-gatherers in the savannas watered by the Upper Pilcomayo megafan.

EARLY HUMAN OCCUPATIONS IN NORTHERN CHACO BASIN

The northern part of the Chaco basin spreads from Amazonia and Mato Grosso down to the left margin of Pilcomayo River; and from Guapay and Parapití rivers in Bolivia to the right margin of Paraguay River in Paraguay (Latrubesse *et al.* 2012). South of Pilcomayo River, two other distinctive parts of the basin are called Central and Southern Chaco in Argentina. Currently rainfall gradient in northern Chaco decreases from 1300 mm/year to the East to near 400 mm/year at the center of the region near the Paraguay-Bolivia Border, increasing once again to more than 1200 mm/year at the tropical Andean foothills (May 2013; May *et al.* 2008). The vegetation in Northern Chaco underwent important changes in the last three hundred years due to cattle grazing and agriculture, and more recently due to deforestation (Caballero *et al.* 2014; Medina Hoyos 2012).

Early human occupation in has been identified in a few places. The best known is Quebrada

Ñuagapua located between the Bolivian towns of Caraindaiti and Capirenda (lat. 20° 53' S, long. 63° 01' W in Coltorti *et al.* 2012; or lat. 20° 52' S, long. 63° 04' W in MacFadden & Wolff 1981). At Ñuagapua, humans coexisted with many species of paleofauna during the Mid-Holocene. Remains of this fauna contained both endemic and immigrant mammals, and a skeleton of *Homo*. The unusual late dates for paleofauna remains at Ñuagapua –including species living in aquatic, forest, prairie and savannah environments– were attributed by Coltorti *et al.* (2010, 2012) in part to human intervention, arguing that people opening the forests would have contributed to the dispersal of fauna that had previously survived on the southernmost part of the continent. Based on their findings, Coltorti *et al.* (2010:224) argued that patches of forest would have existed near savanna-like or mixed habitats, while woodlands occupied areas along main streams and abandoned channels. Wetland species would have thrived in lakes or abandoned channels on the alluvial plain.

According to MacFadden *et al.* (1994:262), “the age of this fauna is constrained by a 14C age determination (6600 ± 370 years B.P. in MacFadden and Wolff 1981) recalibrated to 5517 calendar years (Linick *et al.* 1986).” According to Coltorti *et al.* (2010:226), deposition of the oldest Ñuagapua Unit 1 began slightly before 6900 years BP and ended around 6000 years BP. Unit 1 contains lithic artefacts, small fragments of coarse pottery, hearths, and charcoal fragments (Arellano 2014). The technology used in the lithic material of Ñuagapua, said Arellano (2014) could have been transported from sites located in the Brazilian Pantanal. One of the pottery fragments recovered in Unit 1, said Coltorti *et al.* (2010:223) “is decorated with finger impressions of a type that have occurred commonly in the Amazonian basin since the Early Holocene and are therefore not a diagnostic element.” Coltorti *et al.* (2010, 2012) also found few pieces of pottery decorated with digital impressions that Arellano (2014) called Decorado Ungulado. Among the few fragments recovered in Ñuagapua Unit 2, Arellano distinguished three types of pottery (Pulido Tosco, Decorado Inciso, and Decorado Puntuado).

According to this author (Arellano 2014:157), punctuated and ungulate decorative varieties of pottery appeared much later in sites on the Ji-Paraná River, a tributary of the Madeira River in the Amazon Basin.

Two superficial sites of early human occupation from the Holocene were studied by Alimen & Karpoff (1967) in Ingavi and Cerro León, in Norwest Paraguay. Ingavi is located on the alluvial gravel of Rio Timané (lat. 20° S), a channel that during the rainy season receives water from Parapetí River (Iriondo 1993). Cerro León is situated south of Ingavi in a 52 km-wide area of hills that rise up-to 624 m, in the Department of Alto Paraguay. Ayoreo (Zamuco-speaking) hunter-gatherers inhabit the area today. Cerro León's lithic artifacts appeared to be much older than those in Ingavi. Alimen & Karpoff (1967) described the lithic artifacts in Ingavi and Cerro León as choppers, chopping tools, scrapers, and other forms. They found differences in the dimensions and dullness of lithic materials on the two sites. Larger, rounded shapes, and marks of violent shocks in Cerro León evoke wet conditions. Smaller, polyhedral shapes with blunt aretes, without marks of shock in Ingavi evoke semi-arid conditions. Arellano (2014) argued that –since various types of rocks are not available around the paleo-lagoon in Ñuagapua– quartzite artifacts found in Cerro Ñuagapua could have been obtained from the gray quartzite available in Cerro León.

Myers & Esquerdo (2001) reported on several archeological sites found on the Parapetí megafan and the Bañados de Izozog wetlands –swamps that were formed about 1000 years ago (Iriondo 1993; May 2011). The archaeological sites were discovered on a transect between lat. 18° y 19° S and long. 64° and 57° W during the 1997-1999 construction of a pipeline connecting Bolivia to Brazil. Although located outside the Pilcomayo megafan, the sites demonstrate early occupations in Northern Chaco. Colonial reports indicate that hunter-gatherers with territories on the Pilcomayo megafan trekked up to the Parapetí. Today, Guaraní Izoño people inhabit the Bañados de Izozog wetlands (Argollo 2006). They have lived in the area since at least the 15th century. Climatically,

the area is situated in a transitional setting between the tropical humid Amazon Basin and the semi-arid Chaco Basin, leading to strong hydroclimatic seasonality (May 2011). Most annual precipitation falls during the wet season from December to March. The archaeological information indicated that people were hunting, gathering, and practicing horticulture several hundred years earlier than expected.

The archaeological site GBB-2 (Myers & Esquerdo 2001:120-121) in Bañados de Izozog wetlands was a temporary settlement occupied by 10 to 20 individuals who possibly stayed on that place only during a few months and lived elsewhere during the rest of their annual cycle. People who lived in GBB-2 were hunting, gathering, and planting on the flooded plains. Ceramics found at the site do not resemble those associated with contemporary Tupí-Guaraní people but show similarities with the cultures of the Mamoré River on the Beni Basin, in northeastern Bolivia. The densely forested areas of Beni sustained demographically dense occupations during the mid-Holocene. These peoples made large-scale impacts on the natural environments that are well documented (Coltorti et al. 2010; Lombardo, Rodrigues, and Veit 2018). Archaeological site GBB-3 (Myers & Esquerdo 2001:124) in Bañados de Izozog had a hearth and a sleeping area. The site was probably the temporary camp for a small group of people, maybe 10 or less individuals with a mixed economy of hunting, gathering, and horticulture. Superficial ceramic findings suggest a late pre-Hispanic date.

Archaeological site GBB-6 (Myers & Esquerdo 2001:129-131) in Bañados de Izozog was situated next to the dry stream bed. It would have been a seasonal settlement for a small group of families practicing horticulture, hunting, and gathering. The settlement was situated to take advantage of resources in the ravine (flora, fauna, and surface water for planting). The inhabitants consumed wild grasses, wild or domesticated chili, and corn. They also consumed animals, fish, and mollusk shells. Ceramics found at the site show similarities with the cultures of the Mamoré River, in the Bolivian Amazon. GBB-6 has C14 dates 770-965 AD (1180 to 985 years ago).

Archaeological site GBB-7 (Myers & Esquerdo 2001:137-142) is located near the center of Bañados de Izozog, 1 km NW of the seasonal Parapetí River channel. C14 dates 1140-1205 DC, 1035-1250 DC, 1025-1155 DC were obtained for the same occupation. The inhabitants of GBB-7 would have placed their settlement to take advantage of the resources, including flora, fauna and surface water for planting. The large size of the site and the presence of graves suggest a more permanent presence, or perhaps a pattern of repeated visits by semi-mobile people with a diet of horticulture, hunting (deer, tapir, peccary), and gathering. They did not depend on domesticated corn. This site contains at least six graves, and probably more burials. Some human remains were dated C14 833-837 DC (about 1100 years ago); although, the human remains in burial B are much older, dated 2862-2599 AC (between 4860 and 4600 years ago). All dates for GBB-7 indicate an interval of almost 4000 years between the earlier and latest occupation of this site.

Generally, the archaeological record documents climatic fluctuations and discontinuous occupations. The sites in Bañados de Izozog are of uncertain filiation, although ceramic remains suggest connections to the Mamoré River cultures on the Beni basin, dated between 300 - 1100 AD (Myers & Esquerdo 2001:240). The interfluvial area of Parapetí-San Miguel cannot be positively related to any known archaeological culture. Sites GBB-2 and GBB-6 were occupied by ancient peoples who had small temporary camps near seasonal water sources. Other early peoples lived in GBB-3, a site still poorly defined. Sites GBB-4 and GBB-7 extended over several hectares; these appear to have been occupied year-round. Overall, the sites would have been occupied by different peoples when the water resources attracted prey animals and offered opportunities for horticulture and plant harvesting. Also, mobile hunter-gatherer who lived elsewhere during the rest of their annual cycle would have visited these seasonal water resources, discarding lithic artifacts on the ground. For the Bañados de Izozog wetlands, Myers & Esquerdo (2001:244) proposed a model of settlement driven by migration around 1000 years

ago. Agricultural societies previously settled in the Bolivian Amazon would have expanded to distant places on the Chaco Basin, following new opportunities created by the end of a relatively unfavorable period of low water (Iriondo 1993). The transect between lat. 18° and 19° S and long. 64° and 57° W would have been occupied at the end of the glacial reversion, around 600-100 AD. This climatic factor caused colder and drier conditions throughout the continent for a period of 1000 years. Thus, this semi-dry and hydrographically isolated area in Northern Chaco would have been occupied when demographic pressures motivated people to migrate. It could have been abandoned before the occupation by Tupí-Guaraní-speaking groups in recent pre-Hispanic times. The very old date of almost 5000 years in Burial B, however, added yet another dimension to the settlements described by Myers and Esquerdo, since there is a gap of almost 4000 years between this burial and evidence of a subsequent occupation in GBB-7, and elsewhere in the same area.

HUNTER-GATHERERS ON PILCOMAYO RIVER IN THE EARLY COLONIAL PERIOD

Navigating upriver the Paraguay waterway, Spanish explorers entered Northern Chaco in the 1530s. Conquistador Alvar Núñez Cabeza de Vaca provided descriptions about hunter-gatherer peoples he met in the 1540s. He described the Yapiques as “... *valiant men, warriors and terrific runners, and they neither farm nor raise livestock. They maintain themselves by hunting and fishing, and they are enemies of the Guarani and Guaycuru Indians*” (Núñez Cabeza de Vaca 2011 [1555]: 59). The same author said that Guaicurians

“...[are] maintaining themselves by deer hunting and on fat and honey. They also eat fish from the river and pigs they kill, and they and their women and children consume nothing else ... they never stay more than two days in one place. When the time comes, they pack up their homes, and go one legua or two away from the place they stayed before. They do this because the game animals run

away, and the Indians follow the animals, killing them as they go. This tribe and others make their living by fishing and from some carob beans [algarroba, Prosopis spp.] that grow in that land. These they search out all at one time in the forests where these trees grow, foraging for them like swine looking for acorns in the woods. This happens during the month of November and the early part of December, and from the carob they make a kind of meal as well as wine. The wine comes out so strong and hearty that they do get drunk on it” (Núñez Cabeza de Vaca 2011 [1555]: 41).

Legua or league is an old measurement of length roughly equivalent to five kilometers. Guaicurians set up fires “*where they were hunting*” (Núñez Cabeza de Vaca 2011 [1555]: 45). In one of their camps, the Spaniards counted twenty huts, “*all raised above the ground, and each one was some five hundred paces in length*” (Núñez Cabeza de Vaca [2011 [1555]: 56). Guaicurians traded game meat with the Spaniards in the town of Asunción, and they may have planted gardens on the wetlands. Núñez Cabeza de Vaca (2011 [1555]: 67) said that they had “*other foods that are still at their farms along another part of the river.*” Guaicurians were also bartering bows and arrows for “*a considerable amount of corn, manioc, and peanuts*” planted by the Guaraní. Jesuit Nicolás del Techo (1897[1673]:159) said about the Guaicurians: “*They know agriculture, but they hardly dedicate to it, their favorite foods being from fishing and hunting.*”

Thus, since we have information about them, hunter-gatherer peoples in Northern Chaco displayed a pattern of seasonal mobility that remained viable during the following centuries, alternating between fishing and planting on bottomlands and hunting and collecting on the scrubland. However, not all the family groups would have planted gardens. For example, an expedition led by Jesuit Agustín Castañares in 1738, across the semi-dry savannas of Northern Chaco encountered a band of Toba Frentones whose main camp was situated at the edge of a large forest, on the margins of Yabebiri,

a small river that flowed into Paraguay River. Yabebiri was later called as Río de los Fogones, meaning “*river of the fires*” perhaps a reference to the fires intentionally set by indigenous people (Vaudry 1933). These Toba Frentones were living in the outback. They traded bush foodstuff for cucurbits planted by other Tobas on the margins of Lower Pilcomayo River (Furlong 1964).

According to colonial reports, hunter-gatherers used fire not only for hunting but also to communicate among family groups and harass unwelcome intruders. For example, an expedition lead by Jesuit Ignacio Chomé across the savannas in 1738, “*suddenly, was surrounded by fires started at various distances by the infidels who lived in that place. The inhabitants of these lands communicate through fires, and these fires indicate the presence of enemy people in the surroundings*” (Furlong 1964: 88–89).

In 1546, Spanish explorers navigated Pilcomayo in canoes and encountered many hunter-gatherer peoples on its margins (Mujía 1914, vol. 1:41–42). The author of a letter written in the 1560s, attributed to Ruiz González Maldonado accurately described the course of the river from the source to its mouth, the immediate hinterland, and the rhythm of its seasonal floods. The author said:

“Coming out of the mountains, the waters of Pilcomayo River go through very flat plains, depopulated, with very large fields and forests, difficult to go through because of their harshness, then discharges at the River Araguay [Paraguay], ten leguas below Asunción ... In winter there is much water, but in summer there is very little, especially ... where the forests that I say are [found]; when going through the lowlands the river gets swampy and forms lagoons ... and channels, which can only be navigated with great travail in canoes. In these plains ... there are many nations of people who sustain themselves from hunting and fisheries that they know, who fight often, but those who take the fisheries keep them that year because they can defend themselves well inside, until ... they go to eat other foods. The Spaniards

in Paraguay wished to open this road to communicate with those in Perú, but each time they tried it, they returned, due to the floods or the very great droughts and lack of water. [...] On this part of the forests that I have said, there are other plains with more forests, although the plains have many thorny scrubs, rough and difficult to traverse; but the soil is different because the ground in the interior is so hard that the Indian hunters make mortars of it to grind the algarroba [Prosopis spp.]; these places are almost sand dunes with little water, and less hunting” (Mujía 1914, vol. 1:521-522).

This description was probably communicated by a Spaniard who traversed the region from Paraguay, and it may have included information provided by the first explorers. The author of the letter added that scrubs and bad passages made the route through Pilcomayo so difficult to travel, that

“... it seems that nature endeavored to make it all very bad. Because there are open [dry] areas like those I have described, inhabited by hunters, people who cannot be conquered ... they drink from some swampy lagoons where the water remains and from wells that are about fifty or sixty brazas [83 to 100 meters] deep, because they soil is sandy ... This road from Parapetí and downriver Pilcomayo, it seems that [Spanish] soldiers could pass throughout if they knew the season of flooding, because we know some names of [indigenous] people living nearby, as they are: from this part [the Andean foothills] the Tobas, who are said to plant some food; Comoguaques, hunters; Nocegue, also hunters, who live near Asunción on the banks of the Pilcomayo” (Mujía 1914, vol. 1:527).

In 1566, Licenciado Pedro Ramírez described those peoples as “... a great number of warlike Indians ... very poor and lacking in food, they do not plant or eat anything other than fish and what they hunt on the plains ...” (Oropeza 1892:198). In another 1566 letter, Ramírez described the plains

as “*land desperate and sick, and where there is no water, where they drink juice from cardones [cactus-like plants]*” (Maurtua 1906 :89).

Thus, according to sixteenth century descriptions by Spanish explorers, hunter-gatherers were well adapted to the semi-dry savannas of Northern Chaco. They were accessing Pilcomayo River during the winter season for fishing and hunting and moving away during the spring and summer to collect fruits, honey, and hunt, while also fishing in marshes and lagoons. Some family groups but not all would have planted small gardens on bottomlands (Arenas 2003; Kamienkowski & Arenas 2017). Occasionally, they used fire for collective hunting. Fishing on the riverbanks was done mainly with nets, and on the lagoons with spears, bows and arrows, and by hand (Gudger 1948). Different tribes were competing to access the best winter fishing spots, a dynamic that persisted until the late nineteenth century. By then, different tribes held territories along the riverbanks, separated by no-man’s lands or buffer zones (Trigo 1914 [1906]).

In 1609, referring to information provided by Spanish explorers, a Jesuit chronicler said that the Tobas were found on the Manso plains north of the town of Tarija. The Spaniards assessed their fighting strength in about 2000 warriors (found in a 1609 *Carta Annu*a, this information was cited by Castilhos de Araujo Cypriano 2000:81, and also cited from the same source by Susnik 1978:30). To the best of my knowledge, this information—which could amount up to 10000 people—is the first estimate about the size of the Toba population in Upper Pilcomayo. Presumably, the Tobas were already divided in regional groups of colligated bands—which the chroniclers later described as “*confederated*.” Since then, colonial maps situated Tobas on the Manso plains, near Upper Pilcomayo River. They occupied the semi-dry savannas between the villages of Chiriguano and Chané horticulturalists and the camps of Mbayá-Eyiguayegui hunter-gatherers.

In mid-1700s, an anonymous Jesuit chronicler listed the following tribes in northern Chaco: Chiriguano, Mataguayos, Tobas, Lengua, Zamucos, Guanás, Guaicurú-Mbayás, and Payaguás. He purposely omitted a few

peoples formerly found in the region, who had “disappeared, either because epidemics, or wars with the Spaniards, or because different tribes incorporated them, or the Spaniards have driven them out of their country after their submission” (Huonder 1902:388).

Jesuit José Jolis (1972[1789]:301-302), writing in the late 1700s, said that the Guaicurians “... are still wandering and live like almost all the savage Chacoan: fishing, hunting, collecting fruits, and roots”. Each band, said Jolis, had a certain territory sternly guarded, but their folks could sometimes trespass the borders, entering one another’s district to hunt and fish, a freedom that was not granted to neighboring nations. When food is scarce in one place, said Jesuit Domingo Muriel (1919 [1747-67]:78), “*They move to another place, and they usually do several movements in one year carrying all their stuff with the house, that is also movable.*” Guido Boggiani (1899), ethnographer of the Caduveo-Mbayá, indicated that those Guaicurians moved camps (a) according to the time of year, (b) to avoid floods or droughts, or (c) for any other cause. Generally, people avoided intruding into the territory of neighboring groups, said Boggiani (1899:110), not so much to show respect for a cultural norm but because they were fearful of one another.

Naturalist Tadeo Haenke (1943[1794]:57) observed the following about hunter-gatherers in northern Chaco savannas: “*They wander ... with a mat that they plant when wind or water comes, and thus they form their camps until they consume the provisions of that place. They live hunting, fishing, collecting fruits and roots. [...] There are among them a great number of languages and superstitious customs. Formerly they walked, but they have already obtained horses and are very skilled riders; they usually ride without saddle, with a leather halter ...*”

Guaicurians were divided into regional groups. Each regional group was composed by autonomous clusters of related extended family groups, sometimes called *parcialidades*— “*a parzialita as they say here,*” commented Giovanni Pelleschi (1886:10)—also referring to families or bands that moved around overlapping seasonal ranges,

usually with access to a riverine area (winter fishing spots were either included in their habitual trekking ranges or granted occasional access by alliance). The family groups lived together in *tolderías* or family camps. They trekked ranges that interlocked in all directions within the territory occupied by a regional group. The family groups visited often, married one another’s members, and generally displayed strong solidarity.

A careful reading of historical sources supports the notion that in the nineteenth century the Tobas were divided into at least three regional groups, each consisting of a certain number of bands identified in the texts by their leaders’ names and/or by their campsites:

- (a) The northern group (called “the Eastern Tobas” by Franciscan Doroteo Giannecchini). They trekked the plains north of Tarija, from Caiza to Macharetí, also on Tarairí valley, reaching Parapetí River. Their highest demographic concentration was on the left bank of the river near Angostura, the place where Pilcomayo discharged its waters into the Chaco plains. These Tobas occupied the south and east of Tarairí valley (Cardús 1886). Following the ethnonyms given by contemporary authors, their territory was “immediate and in front” of that of the Chiriguano (Avá-Guaraní), and their trekking ranges bordered with Chané and Mataco-Noctén (Weenhayek) peoples. In their travels towards the Parapetí, the Toba would have met some Sirionó bands (D’Orbigny 1845).
- (b) The southern group (called “Eastern Tobas downriver Pilcomayo” by Giannecchini). They trekked approximately between the parallels 21° and 22° south, downriver from Angostura to Cabayurepotí (Thouar 1891), extending about 25 leagues [125 km] on both margins of the river. Their highest population density was around Teyú. The bands trekking mostly on the right bank were few but more treatable, said Arthur Thouar. Overall, they were situated between the territories of Mataco-Noctén and Mataco-Guisnai bands (Cardús 1886). Some bands in this regional group also had campsites away from the river,

near the territories of the Tapiete, and Zamuco-speaking peoples. Towards the east, this group bordered the territories of Chorote and Nivaclé bands.

- (c) The southernmost group (called “Western Tobas” in Argentina). They occupied both banks of Pilcomayo between parallels 23° and 23° 30’ south (Herrmann 1908). Their territory stretched downstream over some 20 leagues [100 km]. It was situated about 15 leagues downriver from the Mataco-Guisnai camp in Piquirenda, after a 5 to 7 leagues-long [25 km to 35 km] buffer zone described as “a deserted and isolated area that both tribes respect, and that only exceptionally and with great precautions they enter to fish and hunt” (Trigo 1914 [1906]: 402). Another neutral zone separated the territory of these Tobas from that of the Pilagás in Laguna de los Pájaros (Barquez 1997). They also bordered with Mataco-Lhuku’tas, and Nivaclés. Some of these Toba bands would have reached the territory of Lengua bands (Grubb 1911). Their presence as a distinctive regional group in the Bolivian frontier was not registered until the 1880s.

Thus, colonial and early republican authors were aware that the sector of Pilcomayo megafan that is the focus of this study (between parallels 20° and 23° south) was inhabited by speakers of Guaicuruan, Mataco-Mataguayo, and Zamuco languages. Accumulated knowledge about Pilcomayo River and the Chaco plains included lengthy entries in an eighteenth-century Spanish encyclopedia of the Americas (Alcedo 1788, vol. 2). The interior northern Chaco plains, however, where “unknown” territory, not yet intruded by Bolivian settlers, where indigenous peoples maintained some measure of autonomy.

TOBA HUNTER-GATHERERS IN UPPER PILCOMAYO IN THE 1800s.

In the late nineteenth century, Toba camps were situated along the riverbanks of Upper Pilcomayo, between roughly parallels 21 ° 15 ‘and 23 ° 30’ south. Riverine areas were densely populated, and

trespassing intertribal boundaries was a punishable offense (Trigo 2005[1905]:59). “*Each Indian nation has its own territory, and they will fight for a foot of land just like we do, observed Giovanni Pelleschi, ... each tribe [has] ... a certain portion of land beyond which they cannot trespass without provoking war,*” adding, “*For a long time ago, fortune has favored the Toba, who occupy the best lands*” (Pelleschi 1886:27).

The tribes were threatened by settlers’ encroachment, but ranchers and traders also supplied new resources to supplement their diets (Calzavarini 2009). Some Toba bands appear to have remained closer to riverine areas during most of the annual cycle, while others approached those areas to fish in winter (June-August), going away in late spring before the rainy season, when algarroba (*Prosopis* spp.) fruits were ripe (D’Orbigny 1835). The dry winter season was also the preferred season to conduct raids and play competitive hockey games between bands (Chervin 1908). After moving to other places, avoiding the river flooding and searching for game or fish, said Chervin (1908:107), each family group returned to kind of center where they would set their huts.

Each Toba band was formed by a variable number of extended families led by a chief who was *primus inter pares*. The bands set their camps (*tolderías* or *rancherías*) in places that they considered as their own, nonetheless trekking habitual routes that overlapped in all directions with those of other Toba bands. They maintained a high degree of interconnection, not only among regional groups but also with neighboring ethnic groups. Considering historical evidence about their trekking ranges, Julian Steward (1949:685) described the bands of the Toba and neighboring tribes as “land-owning bands of 50 to 200 persons.” In the 1828, D’Orbigny (1835:299) indicated that the Toba people on the banks of Upper Pilcomayo River were probably very numerous, since they sometimes intimidated the Chiriguano of the south of the Andean foothills in Bolivia, which numbered in the thousands. Based on such reasoning, D’Orbigny (1839:94) suggested that the Toba population near the cordillera could amount close to 6000 people.

In the second half of the nineteenth century, Franciscan José Cardús (1886:265) estimated that the Tobas amounted 3000 to 4000 people. About twenty years later, Franciscan Sebastian Pifferi (1895:24) estimated that their population would not exceed 4000 people. In 1912, ethnographer Karsten (1970 [1923]) estimated the Toba population in Bolivia at 1500; and in 1906 Bolivian officer Trigo (1914 [1906]: 408) assessed the number of the southernmost Toba people in 2000. Table 1 below shows population estimates for the Upper Pilcomayo Toba regional groups in the mid-to-late 1800s. These estimates were obtained extracting data from multiple published sources. To estimate the number of Bolivian Toba bands

I extrapolated from the names of all the caciques or band leaders mentioned in the Peace Treaty signed in 1859 (Langer & Bass Werner de Ruiz 1988), and the caciques named by two Franciscan missionaries who were well acquainted with the Tobas between 1859 and 1863 (Corrado 1861, 1884; Giannelli 1988[1863]). These calculations are based on two assumptions: (a) each cacique was the head of a group of co-residential families, something well-documented elsewhere; and (b) the caciques named between 1859 and 1863 were contemporaneous, providing an approximation to the number of Bolivian Toba people living in the Upper Pilcomayo during those five years.

Population	Tobas in Bolivia in mid-1800s situated between 21°15' and 22°4' LS (Trigo 1914 [1906]).	Tobas in Argentina in late 1800 to early 1900s, situated at about 23°26' LS (Trigo 1914 [1906]).
Number of bands	50+ Estimated from Corrado 1861, 1884; Giannelli 1988 [1863]; Langer & Bass Werner de Ruiz 1988.	14+ Estimated during field interviews. (Possibly 7 more bands in 1906, Robertson Trigo & Robertson Orozco 2005:104).
Number of huts per band	Average: 10 (range: between 5 and 14 huts per band) Estimated from Combès 2017:163-164; Giannecchini 1896:279-283; Giannelli 1988[1863], Trigo 2005 [1905]:94; Wavrin 1926:37; Weddell 1851:304	Average: 6 (range: between 2 and 15 huts per band) Estimated during field interviews.
Number of people per hut	5 individuals. Estimated by Palavecino 1935:375.	5 to 7 individuals. Estimated during field interviews.
Number of people per band	Minimum: 20 Maximum: 100 Average: 50 Estimated from Combès 2017:163-164; Giannecchini 1896:279-283; Trigo 2005 [1905]:94.	Minimum: 14 Maximum: 105 Average: 47 Estimated during field interviews.
Number of campsites frequented by each band during an annual cycle	8+ in a six-month period Average: 16+ (number: 1) Estimated from Oviedo 1884.	Minimum: 3 Maximum: 97 Average: 27 (number: 12) Estimated during field interviews.
Number of Toba people in the area	2550+ Estimated at 50 individuals per band.	658+ Estimated at 47 individuals per band (possibly 987+ in 1906).

Table 1. Estimated composition of Upper Pilcomayo Toba population in the mid-to-late 1800s.

UPPER PILCOMAYO BOLIVIAN TOBA CAMPSITES IN THE LATE 1800s.

Ethnographic information indicates that Toba hunter-gatherers occupied woodlands (trees, shrubs, and their undergrowth), fields (savannas, steppes, and palm forests), and marshes (areas subjected to temporary floods), terrestrial and aquatic environments classified by their visibility, accessibility and yield (Mendoza 2002; Scarpa & Arenas 2004). Reportedly, Tobas and other Guaicuruan preferred placing their temporary settlements on the boundaries between open fields and scrub woodland, as to have safe escape routes during surprise attacks (Núñez Cabeza de Vaca 2011 [1555]).

Based on historical sources, I composed a listing of Bolivian Toba campsites that were identified by contemporary observers during the second half of 1800s. This listing of mostly riverine campsites supports the model of woodlands, fields, and flooded patches occupation described before. The place names were mostly provided in Guaraní language, with a few names in Toba. Some were described by Franciscan missionaries: (a) José Giannelli traveled in 1863 along both margins of Pilcomayo from the Bolivian Fort Bella Esperanza, passing through campsites of Chorotes and Mataco-Guisnais; (b) Doroteo Giannecchini traveled with the Bolivian expedition of 1882, and again during the winter fishing season of 1887; (c) Sebastián Pifferi and Zacarías Ducci visited Toba camps in 1893. Other campsites listed here were occupied in 1859, when some Toba leaders participated in a peace treaty signed that year (Langer & Bass Werner de Ruiz 1988). A few sites appeared on a map drawn by Juan B. Vaudry in 1903-1907 (Chervin 1908: 109, Fig. 67). Others were mentioned by explorers. Overall, the references extend over a period of more than five decades. They offer an approximation to the type of sites used by Toba bands, and the areas they trekked during that period.

(a) Yumapuntanaca or Yaguapintañaca, a campsite frequented between 1843 and 1846 by the band led by Yumbai, situated about 10 *leguas* [50 km] from Villa Rodrigo, on the right bank of

the Pilcomayo (Corrado 1884, Weddell 1851). In 1884, this site was occupied by the band led by Tancana.

- (b) Carandaiti-guazú, a campsite in the Tarairí Valley inhabited by the northern group. The band led by Imacu camped there in 1859, when it was attacked by a Bolivian militia from Villa Rodrigo (Corrado 1861). In 1884 the band led by Hoya camped in that place. Warriors from allied bands would often find refuge in the area of Carandaiti-guazú, said Giannecchini, to rest and plan raids targeting Bolivian settlements and Franciscan missions.
- (c) Çaadisatti, a site on the left bank of the river that in Toba means *pedregal* (place with small loose stones), “because there the river drains its waters through many thick stones” (Corrado 1884: 410, note 1). This was the place where San Francisco Solano Mission was built (lat. 21° 16 ‘ south, and long. 64° 40’ 17 ‘ ‘ west).
- (d) Urokée, a site south of Angostura, on the left bank, used by bands of the northern group.
- (e) Uopeite or Iguopeite, a site south of Urokée on the left bank, used by bands from the northern group. This name means *algarrobal* (place with many algarroba trees). Iguopeite was located at one *legua* [5km] from San Francisco Solano Mission.
- (f) Imbochí, a site south of Uopeite on the left bank, used by bands of the northern group, located about seven-and-a-half *leguas* [37.5 km] from San Francisco Solano Mission. The band led by Antagaicoloqué camped there in 1884.
- (g) Lagarikagattañi, a site on the left bank of Pilcomayo. The Toba place name means *cardizal* (a place with many thistles, also called Taringuiti in Guaraní). This site was almost opposite to Fort Bella Esperanza, at a short distance from the place where Franciscan Giannelli built the first Mission San Antonio de Padua, which was then moved upriver. In Lagarikagattañi or Taringuiti the band led by Pelocolique-guazú camped in 1882 (Campos 1898, Giannecchini 1883). It is possible that Pelocolique-guazú was the same leader named Pelocolic by Giannelli in the winter of 1863,

- since older surviving leaders were often called *grande* or Big-Pelocolique by indigenous peoples in the region. Giannelli found this family group fishing in the vicinity of Teyú along with other allied bands (their “satellites”, said the Franciscan missionary). The band led by Chocorií camped at Lagarikagattañi in 1884. The place was uninhabited in 1887.
- (h) Asitene near a boulder on the left bank of Pilcomayo situated a few hours north of Caritatí. In 1887, it was occupied by the band led by Tassicae. This band was composed by about 50 individuals.
- (i) Caritatí or Simbolar (field with *simbol*, a grass plant identified as *Pennisetum frutescens*). The band led by Pellocoriki camped there in 1887. In 1893, the campsite had been recently abandoned because the Toba were worried about the presence of Bolivian ranchers in Imbochí (Nusser-Asport 1897).
- (j) Yuarenda, a site on the left bank of Pilcomayo, situated south of Imbochí.
- (k) Yuquirenda or Yuquirendita, a site on the left bank of Pilcomayo. The place name means *salitral* (saline soil). It was situated south of Yuarenda and about 5 *leguas* from Igüivovo. The band led by Leannagodi camped there in 1884. The site was uninhabited in 1887.
- (l) Igüivovo, a site situated on the left bank, south of Yuquirenda. The place name means split or cracked land, “The river flooding creates immense mudflats that after a time and under the sun would split and crack in a thousand directions, to the point that it becomes difficult for the animals to pass through those wide and deep cracks in the ground. This circumstance gave the place its name,” said Giannecchini (1896: 281), adding that the Andean foothills were visible from Igüivovo. The band led by Niri camped there in 1863. The bands led by Chiquiraiqui and Miria camped in that place in 1884. The site was uninhabited in 1887. On that year, the band led by Odiá, made up of about 70 people, was camped between Igüivovo and Cabayunambi. They had planted small orchards with corn, squash, beans, and watermelons. The orchards were protected by fences, probably to keep out cattle, sheep, and goats.
- (m) Yaguahompe, a site near Igüivovo whose name means “*tiger with broken bones*.” Bolivian settlers used the word “tiger” to denote jaguars, pumas and other felines. This site was uninhabited in 1893.
- (n) Cabayunambi, a campsite south of Igüivovo on the right bank of Pilcomayo. This place name means “*horse’s ear*”. It was situated in front of a rock called La Purísima by the Bolivians. The fluvial expedition of General Magariños shipwrecked on this place in 1843. In 1863, a Mataco-Noctén band was encamped there. “At this point, said Giannecchini (1896: 280), *Gianelli’s 1863 expedition crossed from the right bank to the left bank*.” The 1867 Bolivian expedition headed by Cainzo also crossed the river at Cabayunambi. In 1887, the band led by Coicachigui had a campsite in this area. The site was uninhabited in 1893.
- (o) Tayasunanca or Tayasuñanca, a site on the right bank of Pilcomayo about 7 *leguas* [35 km] south of Igüivovo. The place name means “*boar’s head*.” In 1863, several families had camps there. The families led by Yacuachí burned their camp (a warning signal) and fled when they saw approaching the expedition led by Franciscan Giannelli. Other Toba bands also burned their huts and fled. The band led by Comallaqui camped there in 1884. The band led by Yagaikate inhabited the site in 1887. This band was composed of six huts, one of those was built like the Chiriguanos used to build their houses. The band led by Cototo lived there in 1893.
- (p) Yanduñanca or Nanduñanca, a site on the left bank of Pilcomayo. The place name means “*head of suri*” (*Rhea americana*). The band led by Ambiaki camped there in 1887. Ambiaki was an allied of the Bolivian military, said Giannecchini. This band was made up of about 60 people. When Giannecchini visited the place, some Tapietes and Chorotes were there visiting relatives. In 1893, Nanduñanca was a multiethnic camp inhabited by Tobas, Tapietes, Chorotes and Chiriguanos. The Bolivian Fort Murillo was later built in this place. Some Toba still lived in Nanduñanca in 1904. When they left, Tapietes occupied the place.

- (q) Samurenda, a Toba site on the left bank of Pilcomayo, south of Nanduanca and north of Teyú, recorded by Vaudry in 1904.
- (r) Yruas, a site situated by Giannelli on the right bank of Pilcomayo, about 6 *leguas* [30 km] south of Teyú. The families led by Sandatí were there in 1863. That same year, more than eight bands were encamped in the area, including the band led by Yumbai, a cacique who had participated in the 1844 fluvial expedition commanded by Van Nivel. Yruas was inhabited by a Toba band in 1882, said Giannecchini. However, Giannecchini located this place at a day's walk [5-7 *leguas*] from Bella Esperanza, that is north of Teyú. Mataco-Noctén family groups camped in this area as well.
- (s) Iguopeiti, an *algarrobal* [grove of algarroba trees] on the right bank of Pilcomayo. Bolivians called this place as Santa Bárbara de Teyú. Toba bands camped there in 1882. The Argentine Rudencindo Ibazeta (1883) said that this place was “full of tolderías.” When they saw Ibazeta's military expedition approaching the area, Tobas burned some camps, and abandoned others.
- (t) Palmar Grande, a site with many palm trees situated further inland on the right margin of Pilcomayo, about 45km northeast of Fort Bella Esperanza. The band led by Chocoriqui camped there in 1846. From this campsite, Chocoriqui and other men visited the Bolivian settlers in Puerto Magariños. This could have been the same large cluster of palms where the band led by Holaiqui camped in 1884.
- (u) Teyú, a site on the left bank of Pilcomayo. The place name means lizard (*Trapidurus spinulosus*). It was located 8 *leguas* [35 km] south of Tayasunanca. The bands led by Pelocolic, Aziyaiqui, Cutí, and five other leaders inhabited this area at the beginning of 1860. Teyú was situated approximately one *legua* [5 km] south of Colonia Crevaux. In 1884, Caligagae was mentioned as “big captain” of the bands that were camped in Teyú, including the band led by Tomas Siqui. In 1887, Giannecchini observed an abandoned camp with the remains of six huts. In 1893, the site was inhabited by Tobas and Chorotes. From 1903 to 1907, Tobas and Matacos were living in the area.
- (v) Cabayurepotí, a site on the left bank of Pilcomayo situated about 7 *leguas* [35 km] south of Yruas. The fluvial expedition of Van Nivel shipwrecked here in 1844. Several bands met in this place during the winter fishing. “Here the territory of the Toba nation ends,” said Giannelli. More than five bands inhabited the area, including the one led by Peloco. The bands led by Pelocorí and Guatirí had their customary trekking ranges in this area as well.

CONCLUSION

Ancient hunter-gatherers trekked on the alluvial plains of Northern Chaco since the region became inhabitable, probably 6000 years ago. During such a long period, multiple human groups would have developed patterns of seasonal mobility across those semi-arid lands, taking advantage of the prey, fish, mollusks, and availability of plant resources on various river channels and in-land lagoons. Overall, the sites would have been occupied by different peoples when the water resources attracted prey animals and offered opportunities for horticulture and plant harvesting (Myers & Esquerdo 2001). Also, mobile hunter-gatherer who lived elsewhere during the rest of their annual cycle would have visited these seasonal water resources, discarding lithic artifacts on the ground. A few superficial archaeological remains in northwest Paraguay could indicate their presence there (Alimen & Karpoff 1967). Also, an intriguing finding of human remains dated between 4860 and 4600 years ago on the Parapetí megafan (Myers & Esquerdo 2001) provides evidence of ancient occupation. The fertile Andean foothills amid the Parapetí and Pilcomayo megafans were certainly occupied by human groups around 6000 years ago in Quebrada Ñuagapua (Arellano 2014; Coltorti *et al.* 2010, 2012; MacFadden & Wolff 1981). The megafan of Pilcomayo River between parallels 20° and 23° south that is the focus of this study was densely populated by foraging peoples in historical times. The micro-environments, the group-size,

and the bands' mobility patterns described here are important elements to understand their lifeways. Away from the river and its marshes, xerophytic plants receiving less than 500 mm of rainfall per year predominated on the plains. Thus, the annual variation in the availability of plants was more important to the foragers' subsistence than the variation in game and fish. The scattered and unpredictable occurrence of natural resources required that the areas exploited by the different groups not only changed from season to season but also overlapped. Overlapping range boundaries along Pilcomayo have been reported among various hunter-gatherer groups. Through birth, marriage, or residence, Chacoan hunter-gatherers strengthened a sense of territoriality—confronting encroachment for centuries. Although tribal groups claimed exclusive rights to some areas of land, they did not alienate its use by neighboring allied groups.

Nineteenth century hunter-gatherers in the savannas of Northern Chaco trekked the land divided in bands of similar size (estimated range between twenty to fifty people, no more than one hundred). The family groups practiced different strategies to deal with the unpredictable occurrence of valuable fruit-gathering localities, fishing spots, and hunting grounds. In early winter (late May-June-July), the bands met for collective fishing by the riverbank. Fish runs were a highly predictable resource that supported those aggregations. During the lean season (late winter to early spring), some bands remained by the riverbank, implementing a riverine strategy that combined hunting and planting on bottomlands. They lived off the storage of smoked fish, fish flour, fish fat, and dry fruits, practicing logistical mobility. Depending on the size of the bands, dried food could last several months in storage. During the lean season, also called “the season of hunger,” other bands foraged the outback, practicing mostly residential mobility. These bands trekked larger ranges through residential moves and kept less food in storage. During the hungry season, the Toba traded dried food, crafts, and other goods among themselves and with neighboring tribal groups. They also organized surprise attacks to raid other peoples. In late spring and early summer,

bands that found abundant patches of fruit-bearing trees would call upon others to forage there. They would also join others to catch an unexpected abundance of fish in seasonal lagoons, to hunt profitable colonies of *ocultos* (a kind of prairie dog) or harvest a good return from a garden. The bands called upon to take advantage of abundant resources were expected to reciprocate the next time they had the chance. During the rainy summer season (December to March), when plant food was plentiful, the bands got together in large gatherings. They exchanged information, found marriageable partners, celebrated the initiation of youth and adult warriors, overall strengthening group solidarity (Mendoza 2002).

Published sources indicate that hunter-gatherers on the Pilcomayo megafan asserted their rights to exploit certain ranges. Historically, resource density and predictability were valuable enough to justify territorial defense. However, the advance of Bolivian, Argentine, and Paraguayan ranchers and settlers gradually depleted the natural resources and dispossessed the bands of their hunting grounds. Toba bands gradually increased their sedentism because maintaining the previous mobility patterns became too costly—that is relatively unproductive, troublesome, or dangerous. The risks and costs of defending their former hunting grounds exceeded the risks and costs of exploiting smaller ranges more intensively. They supplemented a less mobile lifestyle with husbandry, trade, and wage labor. Thus, the ethnohistorical data analyzed here about the Bolivian Tobas could be useful to outline new models describing the ancient adaptations of hunter-gatherer peoples in the semi-arid lands of Northern Chaco.

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