

Musicultural Metabolism and the Bamboo Rift: Extractivist Realities in Changing Musical Bamboo Economies in the Bolivian Andes

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Abstract: Andean highland flute making depends on native woody bamboos sourced from tropical montane forests on the eastern slopes of the Bolivian Andes. Historically, Aymara flute makers travelled themselves from the Altiplano into these sourcing regions, where bamboo collection was embedded in localized musical demands, ecological knowledge, seasonalities, and relationships with high and lowland environments. During the second half of the twentieth century, urbanization, expanding markets, increasing artisanal specialization, and the growing production of professional and tourism-targeted flutes transformed both the material demands of highland flute making and the organization of bamboo sourcing.

Drawing on long-term ethnographic and interdisciplinary research with flute makers, intermediary traders, and local bamboo collectors, this paper examines these transformations through the concept of musicultural metabolism, understood as the material exchanges through which musical cultures sustain and reproduce themselves. Changing economic structures have increasingly externalized musical bamboo collection from highland flute makers to networks of intermediaries and lowland collectors, enabling larger quantities of musical bamboo to circulate while spatially separating those who collect the plants from those who process them into musical instruments. I conceptualize this growing spatial and epistemic separation as a bamboo rift. Rather than implying disconnection, this rift describes a reorganization of continuing material relations between forests and urban workshops, through which changing material demands directly affect bamboo collection practices.

Against this background, I explore the extractivist realities of contemporary musical bamboo sourcing through commodification, intensified harvesting, unequal relations within musical bamboo value chains, and the increasing orientation of collection toward market demands, particularly those generated by tourism-targeted flute production. Rather than locating extractivism in bamboo cutting itself or attributing responsibility to individual collectors, I approach it relationally across forests, collectors, intermediaries, workshops, and markets. The paper thus asks how the economic reproduction of a musical culture can become entangled with extractivist structures that distance material consumption from its ecological conditions and the labor and knowledge involved in sourcing.

Manuscript:

The landlocked country of Bolivia is characterized by enormous ecological diversity, ranging from the Andean highlands at around 4,000 meters above sea level to the Andean-Amazonian foothills, highly biodiverse Yungas cloud forests, and dry inter-Andean valleys. This ecological diversity is important for understanding Andean flute making. While many flutes are made and played in the highlands, the musical bamboos from which they are made grow primarily in subtropical Yungas cloud forests and the Andean-Amazonian foothills.

Within local Aymara organology, flute makers distinguish between six main flute families, which are siku raft panpipes, qina notched flutes, phala horizontal flutes, as well as the duct flute families of pinkillu, musíñu, and tarqa (which is made of wood and not central to this discussion here). Their production depends on native woody bamboos that do not grow on the Altiplano, where many of these instruments are made and performed, but primarily in tropical montane forests on the eastern slopes of the Bolivian Andes. Flute makers commonly distinguish two broad categories: *chhalla*, used primarily for panpipes, and *tuquru*, used for vertical and side-blown flutes. These bamboos are not cultivated but grow naturally in their native habitats. Both categories encompass considerable biological and material diversity, with different variants possessing specific characteristics and being associated with recognized sourcing regions after which they are called, corresponding to their ecological niches and geographical distributions.

My concern here is less with this diversity itself than with the material and economic relations through which these musical bamboos move from tropical forests into highland flute-making workshops. More specifically, I ask: What happens to the environmental relations of a musical culture when the economic structures through which it reproduces itself change? I approach this question through two concepts: musicultural metabolism and the bamboo rift.

Before considering these concepts, however, the scale and ecological conditions of musical bamboo sourcing need to be put into perspective. Compared with timber trade, mining, or agricultural commodity production in Bolivia, musical bamboo sourcing is a small-scale and largely informal extractive activity. Economically, it is relatively marginal. Musicurally, however, these are highly specific and important materials. Their availability is shaped by several interconnected factors. Native woody bamboos have particular ecological requirements and limited geographical distributions, which restrict their accessibility, while growth, maturation, flowering, and die-off create temporal fluctuations in availability. These biological and geographical conditions intersect with deforestation and habitat destruction, while climate change may further alter the environments and distributions in which particular musical bamboo populations can grow. Musical bamboo availability or non-availability can therefore not simply be attributed to sourcing practices and bamboo demand alone. The focus here is one dimension within this broader situation: how changing material demands and economic relations within flute making interact with these ecological conditions of availability.

I use musicultural metabolism to describe the material exchanges through which a musical culture, or in this case an instrument-making culture, sustains and reproduces itself. Andean flute making depends on material flows such as musical bamboo. These musical bamboos

grow in tropical forests, where they are selected and cut before being dried and transported, traded, transformed into flutes, and ultimately sounded. This metabolism, however, is not historically static. During the second half of the twentieth century, Andean highland flute making expanded from more localized production connected primarily to rural Andean musical life into three overlapping spheres: autochthonous, professional, and tourism-targeted flute making. By *autóctono*, a locally used term, makers refer broadly to collective Andean wind instruments, while *profesional* generally refers to flutes adapted to Western tonalities and standard equal temperament, particularly modern *zampoñas* and *quena* notched flutes. These are generally individually crafted instruments, whereas tourism-targeted production became oriented toward larger quantities of standardized and affordable instruments, while mechanization increased production capacities. These spheres are not mutually exclusive categories but distinct and overlapping economic, technological, and musicultural orientations within contemporary highland flute-making culture. The metabolism of flute making therefore changed.

This transformation also changed relationships between flute making and the environments providing its materials. Formerly, highland flute makers themselves travelled from the highlands into the Yungas to collect musical bamboos, in a kind of Andean ecological verticality. They thereby combined two forms of knowledge that today are increasingly separated: knowing how a bamboo would become a flute, and knowing how and where that bamboo should be collected. Self-sourcing was constrained by distance, physical effort, and transport capacities. Flute makers sourced musical bamboos on journeys involving several days of hiking, often with pack-animal caravans until around the middle of the twentieth century. Flute making and musical bamboo sourcing were also economically embedded in musical seasonality, according to which different musics and instruments were played during particular climatic and festive seasons, including distinctions between dry- and rainy-season instruments. As flute-making activities intensified and became increasingly disembedded from these seasonal musical demands during the second half of the twentieth century, sourcing was increasingly externalized to local collectors and intermediary traders. Roads, lorries, and commercial networks simultaneously allowed musical bamboo to circulate over much greater distances and in larger quantities. What changed, therefore, was not merely who collected musical bamboo, but the scale and social organization of its circulation.

Externalization also changed the social and economic life of musical bamboos themselves. This was not a simple transition from non-commercial provisioning to commodity exchange: former makers also negotiated access with landowners and participated in economic exchanges. Rather, the degree and organization of economic exchange shifted. Commodified musical bamboos increasingly became something collected by one actor, transported by another, and transformed into a musical instrument by yet another.

These changes also affected the distribution of knowledge. Many younger makers have less direct experience of musical bamboo environments, while local collectors develop their own situated understandings through encounters with bamboo and the environments in which it grows, decoupled from flute making. Knowledge has therefore not simply disappeared. It has become fragmented and redistributed among differently situated actors, while some forms of former gathering knowledge are increasingly no longer transmitted.

I conceptualize this historical transformation as a bamboo rift, drawing on environmental sociologist John Bellamy Foster's theorization of the Marxian concept of the metabolic rift. In simplified terms, metabolic rift describes how capitalist production can create increasing spatial distance between sites of production and consumption while disrupting the socio-ecological relations connecting them. The bamboo rift describes a related but more specific process: the growing spatial and epistemic separation between musical bamboo collection in tropical forests and the urban craft economy in which musical bamboos are processed and exchanged.

Crucially, rift does not mean disconnection. Forests and workshops remain materially and economically connected through traders, sourcing networks, and bamboo circulation. Indeed, larger quantities can now circulate over greater distances. Spatial and epistemic distance can therefore increase while material circulation continues, and in some respects intensifies. What has changed is not the existence of the connection between forest and workshop, but the social organization of that connection. The bamboo rift is therefore spatial and epistemic, while material flows between forests and workshops continue, and sometimes even intensify.

This becomes particularly significant with tourism-targeted flute production. Souvenir production requires relatively large and continuous supplies of standardized material. Some panpipe makers prepare large quantities of pre-cut panpipe tubes for instruments entering commodity chains that extend into national and international tourism markets. Demand travels backwards through this material chain: market demand → flute order → bamboo demand → trader → collector → forest. An urban order thus eventually becomes an act of bamboo collection.

Flute makers repeatedly complained about increasing quantities of green and immature bamboo arriving in La Paz and El Alto. In some cases, culms are harvested once their internodes have reached suitable dimensions for souvenir flutes rather than being allowed to reach full maturity. Identifying the collector cutting bamboo as the source of the problem, however, would obscure the metabolism producing that demand. Extraction happens in the forest, but its drivers extend far beyond it.

These relations become particularly visible in the Andean-Amazonian foothills of Alto Beni, where musical bamboo sourcing takes place within a landscape shaped by longer histories of extractive economies, migration, agricultural expansion, deforestation, and unequal access to land and markets. Musical bamboo extraction remains economically marginal compared with larger extractive activities, yet this small and largely informal resource economy is embedded within some of the same environmental and socioeconomic relations.

One striking example concerns bamboo's contrasting value. For highland flute makers, suitable *chhalla* panpipe bamboo is a valuable and sometimes scarce material. Locally, however, among rural peasants, these bamboos may have little use-value and can even be used as fire accelerants during agricultural clearing and slash-and-burn practices. The same plant that becomes a scarce musical resource within one economy can therefore become combustible biomass within another.

There is also an economic dimension to these relations. Intermediary traders occupy strategic positions between collectors and urban makers through their access to transport, commercial contacts, information about demand, and knowledge of urban prices. On the one hand, relations between collectors and intermediaries show parallels with the regional debt peonage or slavery system called the *habilito* known from other extractive economies: advances of money or goods can create obligations to supply materials, while unequal access to transport, buyers, and market information strengthens intermediaries' positions. Makers and intermediaries, on the other hand, often enter practices of social and ritual bonding.

This does not mean that musical bamboo trade simply reproduces larger extractive economies. Transport involves labor, costs, risks, storage, and commercial knowledge, and unequal exchanges also existed under former self-sourcing arrangements. Musical bamboo sourcing has rather become incorporated into a landscape in which resource extraction, intermediation, informality, unequal market access, and livelihood dependence have much longer histories.

If we follow musical bamboos from forests to flutes, extraction initially appears geographically straightforward: someone enters a forest and cuts a plant. But if we trace demand in the opposite direction, from markets to workshops, workshops to traders, traders to collectors, and finally to bamboo populations, the geography of extraction becomes less straightforward. The machete may be in the forest, but the economic forces shaping its movement extend far beyond it.

This is what the bamboo rift makes visible, and spatial separation also fragments responsibility. No individual actor controls the whole process, while consumers encounter finished flutes largely detached from the ecological and labor relations through which their materials became available. The extractivist reality therefore lies not simply in musical bamboo extraction, but in the changing musicultural metabolism that organizes bamboo use.

These extractivist realities are fundamentally relational. They concern not only how much bamboo is harvested, but how relationships among makers, traders, collectors, bamboo populations, and sourcing environments have been reorganized. Former flute-maker sourcing journeys were embedded in agricultural and musicultural seasonalities and in an Andean relational landscape. Accounts describe makers making ritual offerings and asking permission from mountain and forest beings before collecting bamboo. Taking bamboo was therefore not simply an act of resource extraction but formed part of relationships of reciprocity and acknowledgement within a more-than-human world.

These accounts point to forms of ecological and relational knowledge that connected makers more directly with sourcing environments. This does not mean that these former relations were necessarily more materially sustainable. Resource dilemmas also existed in the past, including competition and considerable secrecy surrounding sourcing sites and practices.

The contemporary organization of sourcing has nevertheless transformed these relations. This is another dimension of the bamboo rift: not a disappearance of relationality, but its reorganization and partial distancing. Relational sustainability therefore does not imply returning to former sourcing practices. It asks how ecological knowledge, responsibility,

reciprocity, and respect might be rearticulated within contemporary musical bamboo economies.

Rather than asking only how musical bamboo can be sourced more sustainably, we might therefore also ask: What kinds of relationships need to be sustained or rearticulated within contemporary musical bamboo economies? This shifts attention from the isolated act of harvesting toward the relationships through which bamboo is collected, exchanged, transformed, and ultimately sounded.

Three broader conclusions emerge from this perspective. First, musical cultures have material metabolisms. In the Andean musicultural case, these operate within ecological conditions shaped by bamboo biology, geographical distribution, deforestation, habitat loss, and climate change. Second, the bamboo rift describes a historical reorganization of this metabolism. Forests and workshops remain materially connected, but this circulation has been accompanied by increasing spatial and epistemic separation and, in part, relational distancing. Third, thinking through extractivism in this way moves attention away from identifying a single extractor. Musical bamboo sourcing is small-scale and informal, but ecological pressures can originate in material demands generated far from bamboo-growing environments. Responsibility is distributed across relationships connecting forests, collectors, traders, workshops, markets, musicians, and consumers.

At the same time, bamboo availability and sustainability cannot simply be attributed to sourcing practices and demand. Bamboo biology, habitat destruction, geographical limitations, and broader environmental change are also important. The extractivist reality lies not simply in bamboo extraction, but in the changing musicultural metabolism that organizes bamboo use.

An Andean relational perspective pushes this argument even further. Sustainability cannot concern only the regulation of extraction. It also concerns the relationships through which musical bamboos become music-making materials. The case of musical bamboos therefore suggests that when music becomes entangled with extractivist economic structures, we need to listen not only to the sounds produced by musical instruments, but also to the material and relational worlds that make those sounds possible.



Musicultural Metabolism and the Bamboo Rift:

Extractivist Realities of Musical Bamboo Sourcing in the Bolivian Andes

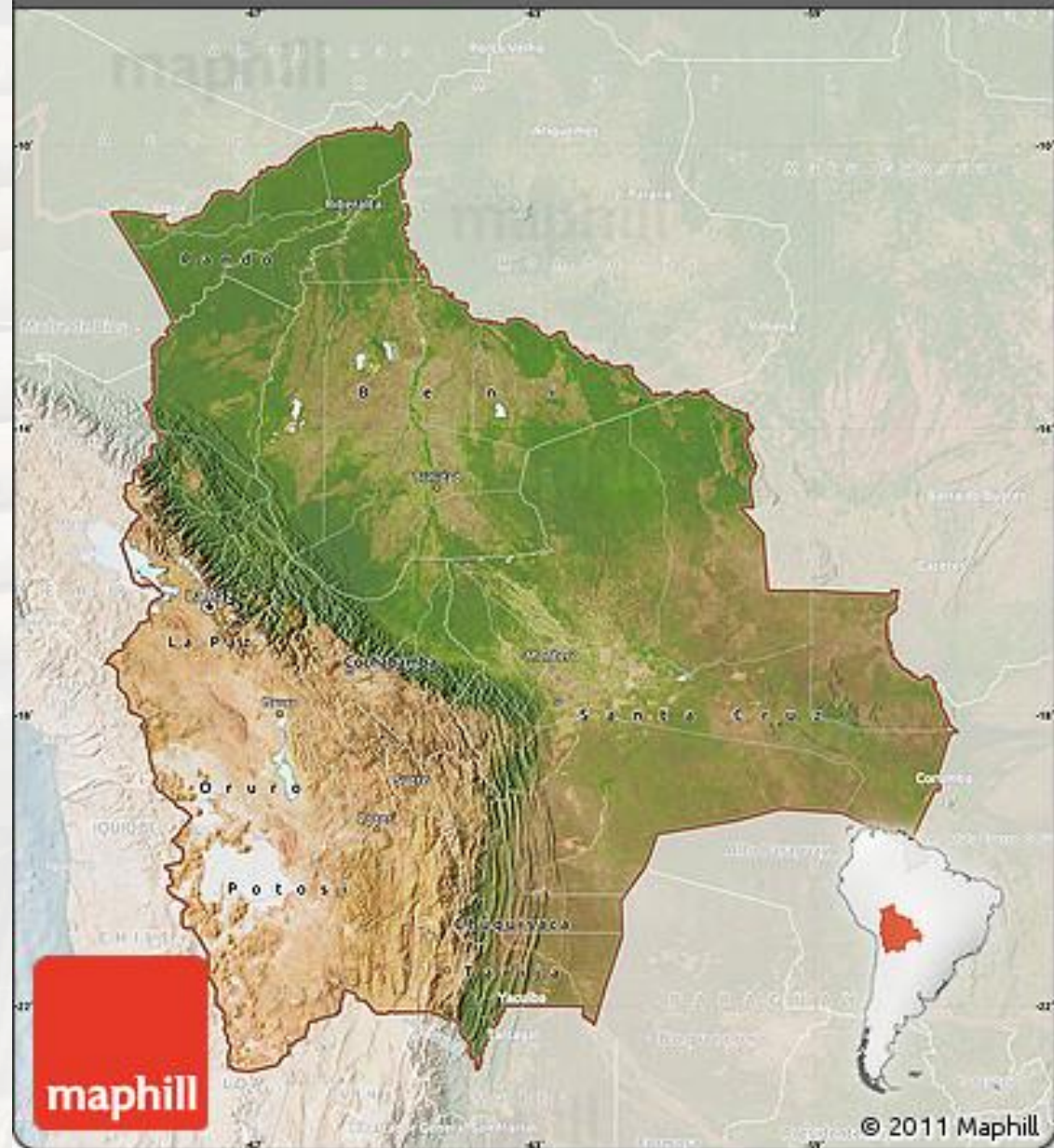
Dr. Sebastian Hachmeyer
Center for World Music, University of Hildesheim

GfM Annual Conference, Frankfurt/Main, 01.10.2026

South America



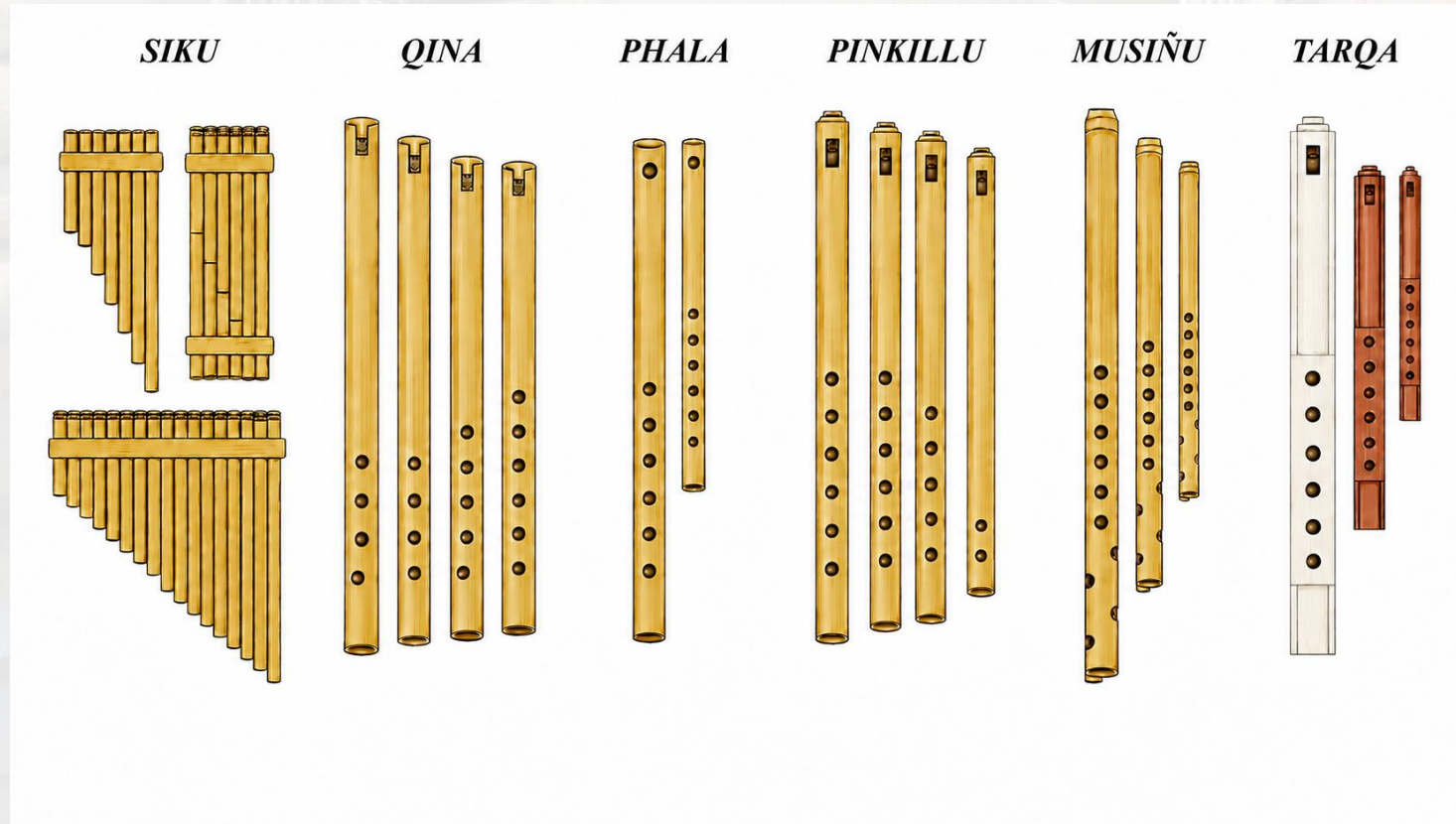
Bolivia





6 FAMILIES – AYMARA ORGANOLOGY

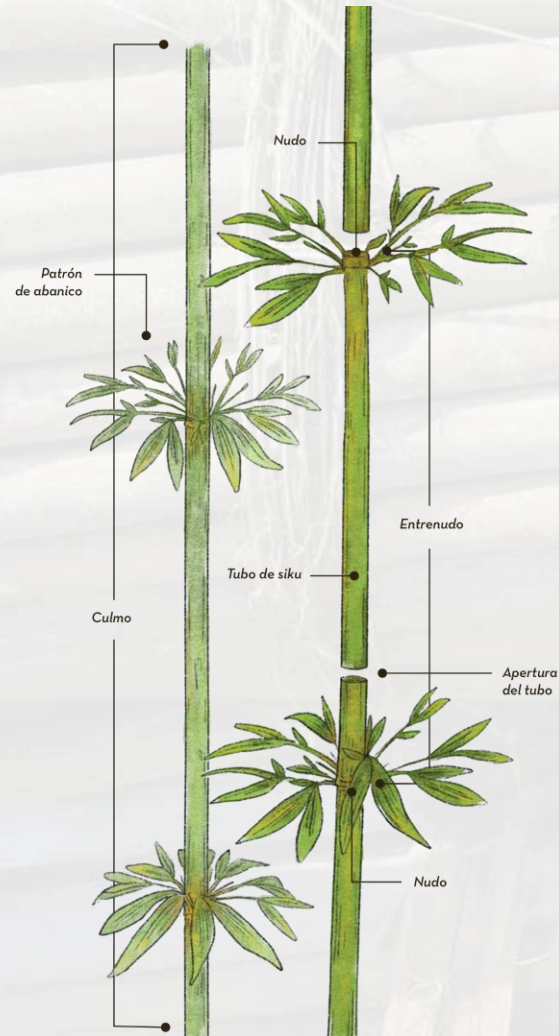
Non-Duct Flutes (ay. <i>q'asa</i>)			Duct Flutes (ay. <i>tapani</i>)		
Siku	Qina	Phala	Pinkillu	Musiñu	Tarqa
Raft Panpipes	Notched Flutes	Transverse Flutes	Duct Flutes	Duct Flutes	Duct Flutes



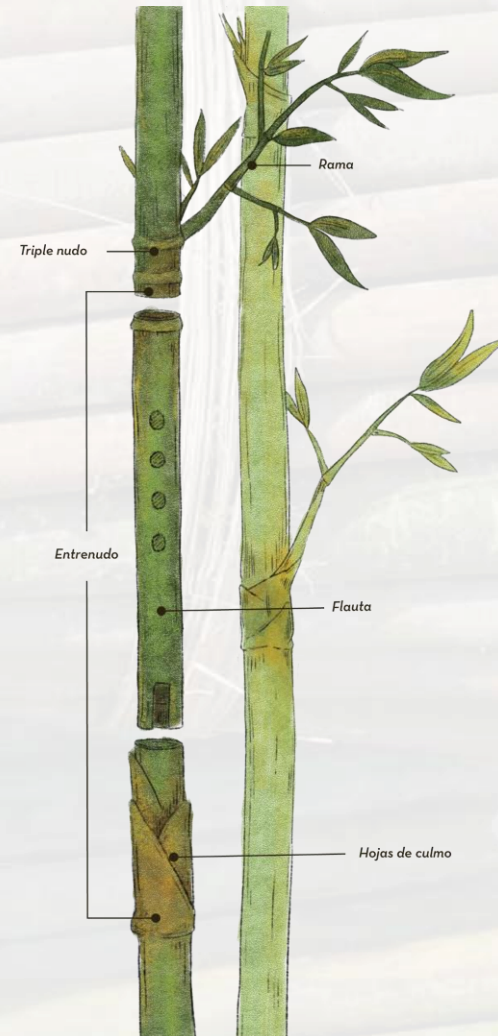


Musical Bamboos

Chhalla



Tuquru







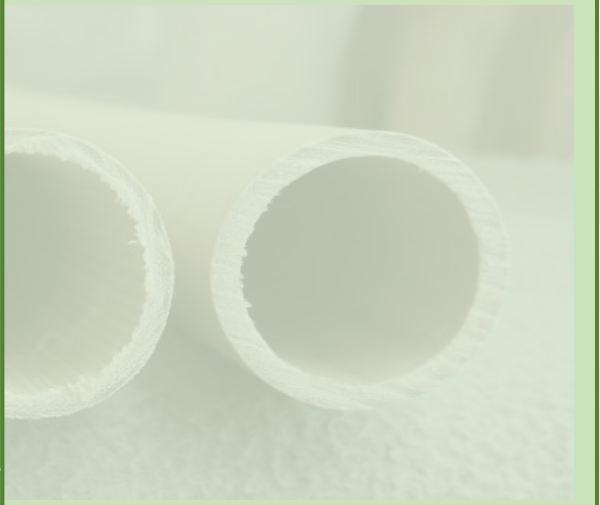
Zongo, Quime, Alto Beni (lluq'a), Alto Beni (qipu), Kjirki, Bermejo



lluq'a paceño (Norte, Centro, Sur); kjirki; lluq'a cochabamba

Tipo Chhalla		Longitud	Diámetro	Paredes (Grosor)	Consistencia
Zongo		variado-largo	variado	muy delgado	Muy frágil
Quime		variado-largo	variado-pequeño	delgado-mediano	frágil
<i>kjirki</i>		muy largo	mediano	mediano	robusto
Alto Beni	<i>lluq'a</i>	pequeño/curvado	mediano-grande	grueso	robusto
	<i>qipu</i>	pequeño/recto	mediano-grande	grueso	robusto
Bermejo		pequeño	mediano-grande	muy grueso	muy robusto

Superficie	
Capa Exterior	Textura
raspable	liza
raspable	liza
raspable	liza
---	áspera
no raspable	liza



De derecha a izquierda: ‘Zongo’, ‘Quime’, ‘*kjirki*’, ‘Alto Beni (*qipu*)’, ‘Alto Beni (*lluq'a*)’, ‘Bermejo’

De izquierda a derecha: *lluq'a* paceno (norte, central, sur); *kjirki*; *lluq'a* cochabamba (Fotografía del autor)

Tipo Chhalla		Lo
Zongo		varia
Quime		varia
<i>kjirki</i>		mu
Alto Beni	<i>lluq'a</i>	peque
	<i>qipu</i>	pequ
Bermejo		pe

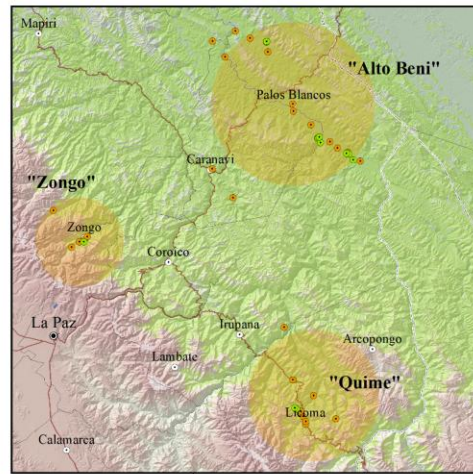


De derecha a izquierda: 'Zongo

Tipo Tuquru	Subtipo	Paredes		Superficie	
		Cavidad	Grosor	Capa Exterior	Textura
<i>lluq'a paceño</i>	norte	más esponjosa	variado	raspable	liza
	central	muy esponjosa	grueso	raspable	liza
	sur	ranurada	variado	raspable	liza
<i>kjirki</i>		ranurada	(más) delgado	---	áspera
<i>lluq'a cochabamba</i>		liza	delgado	no raspable	liza



De izquierda a derecha: *lluq'a paceño* (norte, central, sur); *kjirki*; *lluq'a cochabamba*



- References**
- Departmental Capital
 - Municipal Capital
 - Provincial Border
 - Departmental Border
 - National Border
 - Main Road

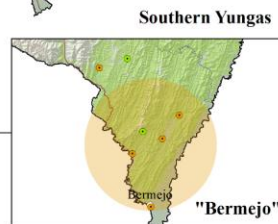
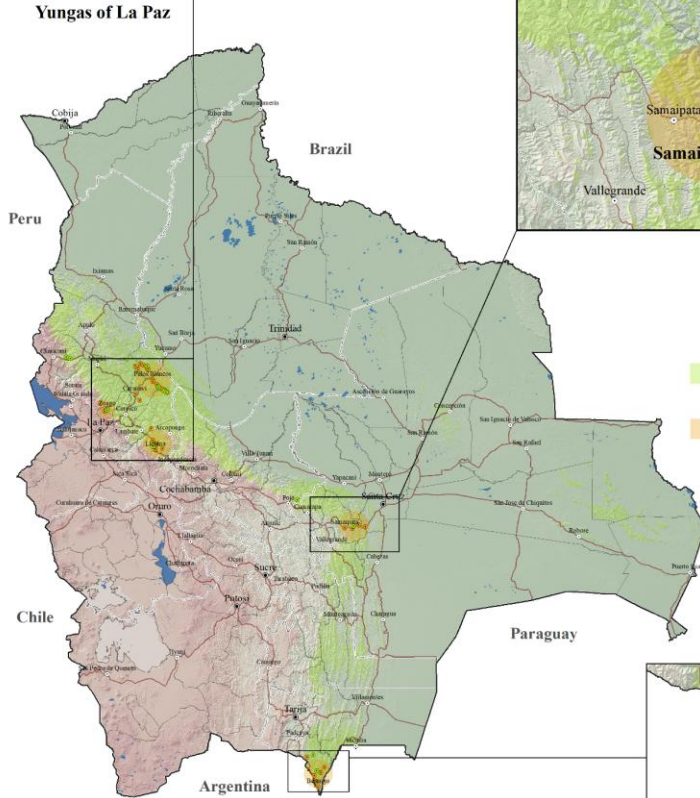


Bolivia

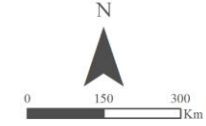
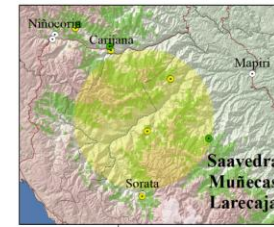
Elbow of the Andes



- Chhalla Sample Location
- Chhalla Potential Distribution
- Chhalla Sourcing Site
- Chhalla Sourcing Region



"Bermejo"



Bolivia

Northern La Paz

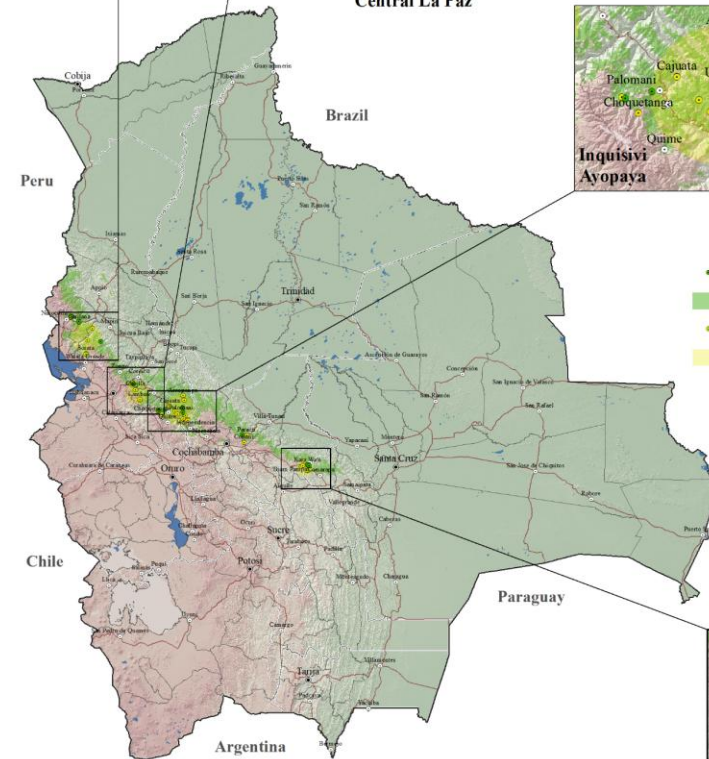
- References**
- Departmental Capital
 - Municipal Capital
 - Provincial Border
 - Departmental Border
 - National Border
 - Main Road



Central La Paz



Southern La Paz



- Tuquru Sample Location
- Tuquru Potential Distribution
- Tuquru Sourcing Site
- Tuquru Sourcing Region



Pojo
Comarapa

Contextualising Musical Bamboo Sourcing



Geographic Limitations
and Accessibility



Deforestation and
Habitat Loss



Bamboo Biology and
Life Cycles

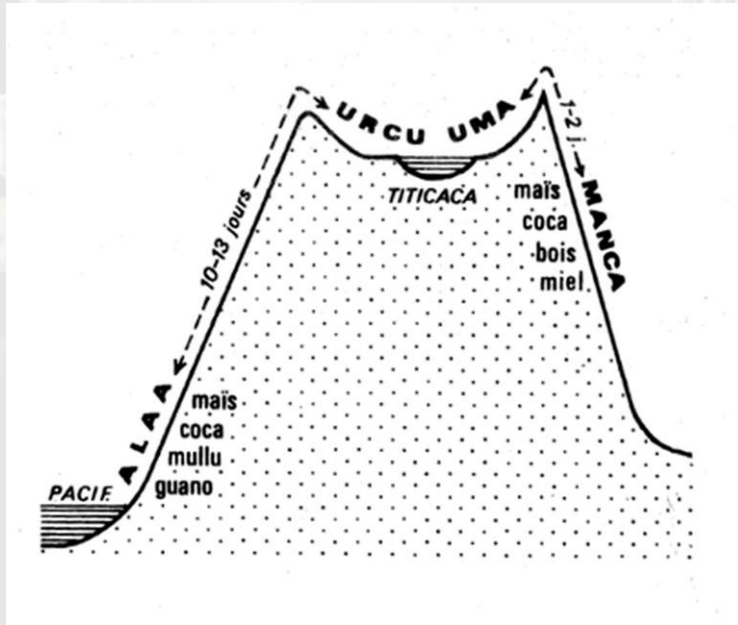


Musicultural Metabolism
and Bamboo Demands

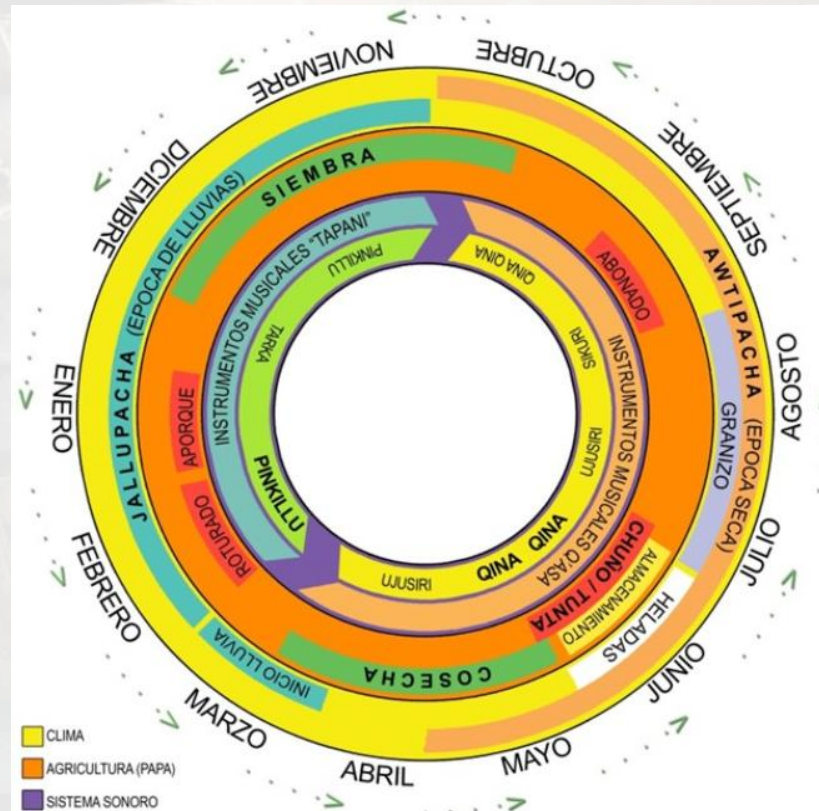
Spheres of Flute Making

	Autochthonous Sphere	Professional Sphere	Tourism-targeted Sphere
			
Musical orientation	Collective Andean flute music in rural and urban contexts; emphasizes local sound aesthetics, collective participation, and social belonging	Adapted to Andean popular music contexts; emphasizes individual performance, melodic expression, pitches, keys, and scales	Flutes produced primarily as tourism art and souvenirs; visual representation becomes more important than musical function
Mode of production	Individually crafted instruments based on specialized local knowledge, skills, and embodied craftsmanship	Individually crafted instruments requiring knowledge of Western tonal systems, acoustics, and tuning practices	Semi-industrial production oriented toward higher volumes, standardization, and market demands
Relationship to musical bamboos	Bamboo valued for specific sonic qualities and embedded in localized relationships	Bamboo selected and modified according to acoustic requirements, tonal systems, and standardized pitches	Same musical bamboos are used, but acoustic qualities become secondary to availability and production efficiency

From Self-Sourcing to Externalisation



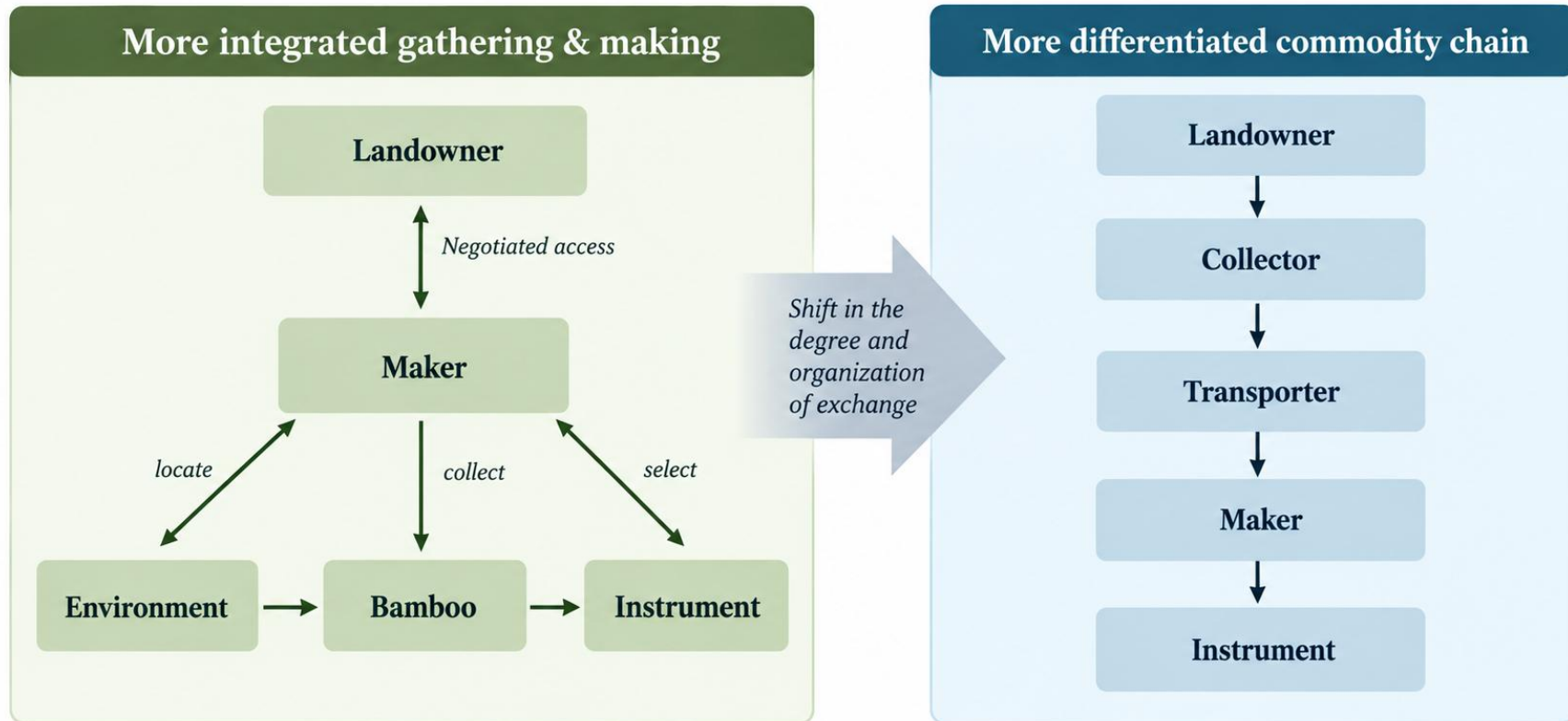
Andean Ecological Verticality



Andean Musical Calendar



Commodification and Knowledge



The Bamboo Rift

Metabolic Rift (John Bellamy Foster 1999): Explains how capitalist production creates spatial distance and disrupts socio-ecological relations between sites of production and consumption as well as humans and nature.

Bamboo Rift: The growing spatial and epistemic separation between bamboo collection in tropical forests and the urban craft economy in which bamboo is processed and exchanged. It explains how growing spatial and epistemic distance separates forest-based bamboo collection from urban craft production, even as material flows continue.

Rift ≠ Disconnection: Spatial distance ↑ · Epistemic distance ↑ · Material flows ↑

Intensified Material Flows



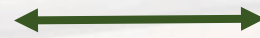
Extractivist Landscapes: Alto Beni



Intermediation and Extractivist Relations



The Site of Extraction?



Relational Sustainability



What needs to be sustained?

How can musical bamboos be sourced more sustainably?

→ Gathering Ecology

What kinds of relationships need to be sustained, or rearticulated, within contemporary musical bamboo sourcing economies and value chain?

→ Vertical Ecology

Conclusions: Sounds like Extractivism?



Musical cultures have material metabolisms



The bamboo rift describes a historical reorganization of this metabolism



Thinking through extractivism in this way moves us away from identifying a single extractor