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**THE SUSTAINABILITY OF COMMERCIAL WOODCRAFT  
PRODUCTION IN MISION CHAQUENA, ARGENTINA: A  
PRELIMINARY ASSESSMENT**

by

**Thaden Brient**

**B.S. Tufts University, 1993**

**M.S. Tufts University, 1999**

**Presented in partial fulfillment of the requirements**

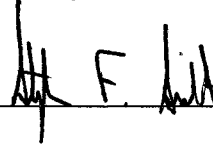
**for the degree of**

**Master of Science**

**The University of Montana**

**May 2006**

**Approved by:**



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**Chairperson**



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**Dean, Graduate School**

5-10-06

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The sustainability of commercial woodcraft production in the community of Misión Chaqueña, Argentina: A preliminary assessment.

Chairperson: Dr. Stephen Siebert SFS

Woodcraft production is the principal economic activity in Misión Chaqueña, Argentina and is based on the use of dead wood from nearby forests, primarily from the tree *Bulnesia sarmientoi*. During a 15-month study period, I examined biophysical, socioeconomic, and political criteria to assess the sustainability of the local woodcraft industry. I estimated gathering-site densities of *Bulnesia sarmientoi*, characterized market demand and trade infrastructure, and identified major constraints and opportunities to craft production. I randomly selected three forest sampling units at each of five gathering sites and measured the abundance and diameter at breast height of *Bulnesia sarmientoi*. I also randomly selected 20 producer workshops to estimate income levels over 12 months. Market demand and trade infrastructure are considered stable and well-established, with an upward trend in market demand over the past five years. Trade infrastructure is characterized by producer dependency on middlemen. Ecological effects of harvesting are largely undetermined, but current harvesting practices do not directly affect tree mortality and are unlikely to remove significant amounts of nutrients from the ecosystem. However, dead wood resources are reported by survey respondents to be diminishing in quantity and quality, and the number of woodcraft producers is increasing. No forest management plan currently exists to deal with wood scarcity. Access to wood resources is uncertain due to insecure tenure or rights to wood resources: all wood harvesting occurs on private lands without formal agreements or contracts. This represents the single greatest threat to the local industry's long-term sustainability. The political power of collectors and their capacity to effectively collaborate with local institutions represent major challenges to the success of this community's woodcraft industry, and, currently, neither shows signs of organizing or developing.

## **Acknowledgements**

This project would not have been possible without the support of my parents, Charles and Harolyn, who have always empowered me wherever I am.

I am also grateful to Steve Siebert, my advisor, not only for his expertise, of which he gave freely, but his skillful guidance. I feel blessed to have had such a true teacher as Steve involved in this project.

Thanks also to Andrew Leake and Alejandro Deane of ASOCIANA in Argentina. Andrew's help was critical in establishing a viable project, and he gave me considerable flexibility to do so. Alejandro contributed important insights into the woodcraft industry and was very open in the process. Thank you both.

## Preface

I was already in Argentina looking for a resource management project when my companion pointed out a vendor selling woodcrafts to our fellow tourists. Finely finished and attractively displayed, there were animal figures of all types, picture frames, decorative salad servers, and small inlaid boxes—all hand made, or so they were described, and without the use of nasty paints, dyes, or finishing products. Naturally perfumed by resins found in the wood, the crafts were very appealing—all natural. The accompanying literature described these crafts as products of an indigenous group, The Wichí, that use only downed, dead wood that they gather from the Chaco forests. Craft-making was promoted as a “wise use of the forest resources” that simultaneously preserved the cultural values of this group while providing a source of rural employment.

I interpreted these assertions as employing ecological and social sustainability principles in community economic development strategies, as well as in the management of forest resources. As such, I thought this a logical candidate for a project. But the topic of woodcrafts also extended into areas of personal interest of woodworking, particularly bird carving. A large proportion of these crafts are realistic bird representations, some highly skilled, and so my interest in learning the craft methods was an added incentive to pursue a woodcraft project.

Another factor in the decision to develop this project idea was the receptivity of both the Anglican organization most intimately involved with indigenous groups in the Chaco and the community members where I eventually visited during the preliminary stages of investigating the project. I was received enthusiastically by both parties and encouraged to continue developing ideas for a project in Mision Chaquena, the community with the most developed and oldest Wichí commercial craft industry. The Anglican organization offered me logistical support during my study period and effectively allowed me to pursue a project of my choosing.

And with the support of my parents, along with academic guidance from my advisor and resources from the University of Montana, the pieces were in place to begin an investigation of this community’s handicraft industry. When I arrived at my study site, there was much concern and many unanswered questions about a different, yet related issue: the logging of a valuable tree called Algarrobo on private lands. The Anglican organization was, and still is, attempting to address the alleged theft of trees from nearby private forests. It became apparent to me that the Anglicans were intensely interested in developing sustainable use strategies like the craft trade that could be applied throughout their constituency of indigenous communities living in the Chaco of Northern Argentina in order to provide employment and conserve forest resources (and reduce the amount of illegal logging). It appeared that my research interests were well aligned with the interests of all parties I met during that early stage.



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## Introduction

The sustainability of extractive activities in the world's forests is a topic of much discussion and often enters into debates surrounding socioeconomic development, forest management policy, biodiversity conservation, and global climate change, among others. Since the inception of professional forestry in the late 19<sup>th</sup> century, a multitude of ideas, definitions, criteria and indicator sets, and "barometers" have been proposed that attempt to characterize or standardize the meaning of, and even the process for determining, *what is sustainable* in regards to timber or non-timber forest product extraction (Gustavson, et al. 1999, McDonald & Lane 2004, Mendoza & Prabhu 2003, U.N. World Commission 1987).

It is, therefore, not surprising that the concept of sustainability has been applied to forest product extraction in a variety of ways, from focusing on the short-term yield of a single product, i.e. annual volume of timber, to incorporating a more comprehensive, ecological perspective involving multiple biological interactions over wide temporal and spatial scales (Boot & Gullison 1995, Kennedy et al. 2001, Putz et al. 2001, Ticktin 2004). Many ideas and models of sustainability also include a variety of political, economic, and social factors interacting at local, national, and international levels (Baker & Kusel 2003, Bennett 2002, MacKaye 1918, Salafsky et al. 1993, Salwasser 1991). While there remains great emphasis on including sustainability principles when referring to or managing for the extraction of forest products, few documented examples adequately demonstrate long-term sustainability (Bennett 2002, Struhsaker 1998). Whether this is due to the complexity of defining and interpreting the concept of sustainability, as Kennedy et al. (2001) imply, or the difficulty in applying appropriate

methods or time-scales to demonstrate sustainability of extraction, as Ticktin (2004) argues, or simply due to the fact that, as Boot and Gullison (1995) propose, true examples of sustainable extraction practices are rare, it is clear that proving the sustainability of forest extraction activities remains problematic.

Despite these difficulties, however, there is growing recognition that the multi-dimensional nature of forest use and management cannot be ignored. According to Berkes et al. (2003), any meaningful planning for sustainable extraction must consider locally-relevant ecological, social, and economic factors, each of which may interact with the others in complex ways. Without addressing these interactions, humans will likely continue to drive environmental change at an ever-increasing rate, outpacing our ability to plan and manage resource use.

According to Ludwig et al. (1993), scientific consensus regarding the sustainability of forest extraction activities may be impossible because the systems involved, i.e. ecological, political, social, are too complex and dynamic and therefore, unpredictable. Others, perhaps in agreement with this, have proposed that despite this lack of consensus, better alternatives can be chosen over extraction activities that are obviously *not* sustainable (Anderson, 1990). And as Struhsaker (1998) implies, the practice of incorporating sustainability principles into forest management projects is not likely to be abandoned due to its continued emphasis within development circles and potential for international development funding.

As an alternative to proving the sustainability of forest extraction practices, and as a method to simplify their approach, many researchers attempt to assess practices or model their effects based on a subset of locally relevant criteria. For the purposes of this

study, I have adapted the framework set out by Salafsky et al. (1993), in order to preliminarily assess the sustainability of woodcraft production by a community of indigenous artisans in Argentina. I have applied the term sustainability to the activity of woodcraft production itself and have assumed that production is directly dependent on raw materials derived locally. The following criteria, then, were applied to my study of the local woodcraft industry:

1. Density of exploited species
2. Seasonal constraints on production
3. Tree species sustainability
4. Ecosystem sustainability
5. Conservation initiatives
6. Market demand for crafts
7. Craft trade infrastructure
8. Resource tenure and Property rights
9. Pressure for alternative land use
10. Political power of collectors
11. Institutional opportunities and constraints

Craft production is an economically and socially important industry for many indigenous groups throughout the world (FAO 1995). Current economic value of indigenous crafts worldwide is difficult to estimate. For example, in Argentina, most artisans' sales do not appear in the national tax or retirement benefits databases and no form of nationally centralized data appears to exist for indigenous arts and craft production. However, indigenous crafts can be found in every major city in Argentina, often in various retail categories. Furthermore, indigenous crafts production is credited for promoting social and cultural values by providing a source of rural community development that incorporates traditional values and practices (Kerr 1990, from Kerr No publication date; Siwok 2004). In addition, indigenous communities' traditional and non-traditional use of forest resources, including forest-resource use for the purpose of craft

production, has supported the political process for procuring land and resource rights for indigenous peoples in Argentina (Clarín 2005, WRM 2003).

### **Misión Chaqueña and the Wichí woodcrafts:**

Commercial production of woodcrafts began in this area in 1982 with the Wichí indigenous community of Misión Chaqueña, representing the longest-standing woodcraft industry in the region. The industry started with only a few artisans and has expanded to approximately 350-400, or about 80% of the adult male population. A large proportion of women also produce handicrafts derived from a different medium (bromeliad plant fiber, locally called chaguar), but this study only addresses woodcrafts (for information on chaguar handicrafts in Misión Chaqueña, see Van Dam 2001).

The idea for producing woodcrafts began in 1980, shortly after a major agricultural project organized by the Anglican Church of England collapsed and left many local residents without a source of employment. Around that time, and possibly contributing to the project's failure, the Anglican presence was interrupted by the Argentine-British war over the Falkland/Malvinas Islands. A former agronomist with the agricultural project remained in the area after its collapse and is credited with initiating and developing the woodcrafts industry. After the war, the Anglicans resumed their activities in the region and have remained to this day, acting as the "social branch" of the Anglican Church of England intimately involved with indigenous communities throughout the Argentine Chaco.

Woodcraft production is promoted by the Anglican organization as a means of creating employment at home in family workshops, conserving forest resources by utilizing only dead wood, and preserving the Wichí culture by discouraging out-migration

from the village (Siwok 2004). Woodcraft artisans are able to work close to home with a relatively small investment in capital and training. Skills are acquired from family members, by observation of other artisans' work, or through formalized curriculum beginning in the village primary school. Artisans generally sell their crafts directly from their home workshop or at buyer stations in the village, eliminating the need to export or transport crafts far from home in order to reach consumers.

The Anglican organization has described the economic and social life in Misión Chaqueña as a success story compared to other indigenous communities in the area. It is claimed that artisans can earn US\$5 a day selling crafts (Leake 2004), although my data indicate that average earnings are less than US\$2.50 per day on an annual basis. In addition, it is recognized by the Anglican organization that artisan families don't have to migrate to the cities where they inevitably "get into trouble," and "lose their culture." Nor do they have to work long hours in agricultural fields. Misión Chaqueña differs from many other indigenous communities in the region in other ways: there is a primary and secondary school, most households have access to electricity and clean water, and there is a small medical facility. These factors have been correlated with a relatively low infant mortality rate in Misión Chaqueña (Siwok 2004).

One of the originators of the local woodcraft industry from the Anglican organization continues to buy and export crafts to countries in Western Europe, Great Britain, Canada, and the U.S. (Deane 2004). This provides craft producers with international market access to religious organizations, "fair trade" importers, and a small premium market for the highest quality crafts. Recent competition from additional craft



buyers arriving in the village has increased in the past few years, mostly supplying domestic tourist markets.

Craft wood is mostly derived from a single species, *Bulnesia sarmientoi*, locally called Palo Santo, and is collected from surrounding privately-owned forests. The artisans have no legal right to control the resource and no formal agreements currently exist for local use of forest resources in general or craft wood in particular. Entering private forests for the collection of wood resources appear to be tolerated in some areas, while in other areas landowners actively discourage entry by local residents. In addition, it seems that craft wood resources are being depleted (i.e. seasoned, dead wood of suitable size and quality), although at an undetermined rate, and that producer numbers are increasing, placing growing demand on declining wood resources.

The purpose of this study is *not* to determine whether or not the local craft industry is sustainable. This question must be answered by monitoring population dynamics (e.g. growth, survival, reproduction, and structure) over long time periods (years to decades) and spatial scales (e.g. community, landscape, and ecosystem) (Putz et al. 2001). In addition, unpredictable social and political dynamics (e.g. community demographic shifts, land tenure changes, and institutional activities) interact to both facilitate and complicate efforts to achieve sustainability. Furthermore, sustainability is arguably a process, not a fixed point that can be achieved.

This study provides the first step in identifying important aspects of the community craft industry in the context of the above mentioned sustainability criteria (see list pg. 3). The study also attempts to answer the questions of which criteria and key management changes are critical to gain more control over forest resources and to

influence the future trajectory of the local woodcraft industry in the form of organized economic and political cooperation.

This study documents that the local woodcraft industry provides a stable source of employment while having relatively benign effects on forest health. The study argues that insecure property rights over forest wood sources is a major threat to the sustainability of the local woodcraft industry and is discouraging political organizing of craft producers. I argue in the discussion section that despite a number of motivations *for* organizing of producers, insecure resource access, lack of institutional capacity, and weak political power of artisans severely diminish the motivation and capacity to organize efforts to manage forest resources. Additionally, I postulate that economic and cultural barriers to organizing politically and economically are faced by the artisans (see final section, pg. 52).

This case study highlights important strengths and weaknesses of what is considered by some to be a successful woodcraft industry and provides detailed information, such as community member perceptions, that could be used in developing forest management strategies and economic cooperatives. For example, I will postulate that although craft wood supplies appear to be diminishing, the most common attitude among artisans towards resource scarcity is complacency and that this attitude complicates efforts to organize and defend forest and wood resources. On the other hand, there is a long history of forest use and intimate knowledge of surrounding forests that could prove valuable for developing resource management strategies if the opportunity should arise.

This study also provides documentation that could serve to legitimize, if not

legalize, the occupation of woodcraft producer. Locally, the woodcraft artisan is not recognized within the national economy and, therefore, does not receive any pension or worker's compensation benefits, not does the artisan possess any legal worker's rights that may afford them more political maneuverability. This study documents producer incomes, typical working hours, and general working conditions with associated problems. This type of information highlights the economic importance, resource needs, and associated use of specific forest properties by artisans for the purpose of craft production, which may be critical for future political movements by artisans to secure claims to those forest resources.

#### **Study Site-**

This study was conducted in northern Argentina's Salta province in the community of Misión Chaqueña (23°15' S, 63°44' W, 300 m elevation) (Google 2005). Situated near the western edge of the Semi-Arid Chaco, this site is adjacent to privately-owned, forested lands considered by some to be primary forests, although some evidence suggests they may have been commercially logged in the mid-to-late 1800's and utilized for commercial cattle grazing since 1895 (Adámoli et al. 2004, Minetti 2001). Today, small-scale, selective logging, open-range cattle ranching, and goat rearing are commonly practiced in the area, and traditional disturbance regimes, particularly fire, have recently been interrupted (Adámoli et al. 1990, Barchuk & Diaz 1999). Flooding disturbances, however, continue in this area due to its proximity to a major river (5 km), low elevation, and generally flat topography (personal assessment).

Precipitation averages 450-600 mm annually, with a rainy season occurring in summer, and a long, dry season lasting between 6-8 months (May-Nov.) (Bravo et al.

2001). Soils are derived from Andean sediments and are generally characterized as deep, highly compacted, fine to coarse alluvium and loess (Bravo et al. 2001, Pennington et al. 2000). Soils are generally low in organic content, high in minerals, and susceptible to erosion (Bravo et al. 2001).

Local forests are classified as subtropical, semi-arid, and semi-deciduous, and contain upper canopy tree species that reach 20-25 m in height (Pennington et al. 2000). Among the more prominent are *Schinopsis quebracho-colorado*, *Aspidosperma quebracho-blanco*, *Bulnesia sarmentoi*, *Prosopis alba*, and *Prosopis nigra* (Dimitri et al. 2000). The forest canopy averages 12-15 m in height with variable tree species dominance (i.e. many sites lack dominance by any one species), while others are clearly dominated by one or two species (personal observation).

Craft producers have collected wood for the purpose of craft production from the same private woodlots since the inception of the local woodcraft industry 24 years ago. The most important craft wood sites are contained within a contiguous area of *Bulnesia sarmientoi* stands, and most sites lie within the boundary of a single landowner's property, but likely extending into several individual properties. For the purposes of this study, I conducted forest measurements and made observations in those important craft wood gathering areas (see next section on Methods).

Many landowners in the immediate vicinity of Misión Chaqueña are absentees, including those owners of the most important *Bulnesia sarmientoi* areas, and most have not intensified their land use beyond extensive cattle-raising under intact forest. In effect, all local residents are allowed to extract at least household fuel (e.g. cooking and heating), if not construction materials (e.g. poles, posts, and beams), and some food (e.g.

wild meat, fruits, nuts, and honey) from surrounding forests. Additionally, some local residents participate in the selective logging of private forests for a commercially-valuable timber species (*Prosopis alba*) used in carpentry. This is considered an illegal activity and has sparked conflicts in this area between local residents, landowners, and the Anglican organization's representatives. I will discuss this further in the sections on Results and Discussion of Results below.

## Methods

### **Selection of field sites:** forest, workshop, and community

Craft wood is derived from a variety of tree species, but the wood of the *Bulnesia sarmientoi*, or Palo Santo, is preferred. I focused on *Bulnesia sarmientoi* gathering sites to estimate this species' site density and size-class structure, as well as to estimate craft-wood abundance (the dead wood at these sites). Five wood-gathering sites were selected with the assistance of experienced artisan guides. I asked these guides to lead me to sites where they would be willing to invest their own time for the purpose of craft wood gathering. At each site of the five gathering sites, a group of three belt transects, each 30 X 120 m, were placed at random angles from a common origin and sub-divided into 30 X 30 m sampling plots; one sample plot from each transect was randomly selected for measurement and observation.

All *Bulnesia sarmientoi* trees were identified, classified as live, snag, or fallen, measured for diameter at breast height (dbh) or diameter at mid-length (fallen trees), and measured for length (downed, dead trees). A visual estimate of height was made for all snags. All seedling and sapling heights were measured or estimated. Trees with dbh <3

cm and crown height <3m were considered saplings, and those with diameter <0.5 cm and distinct morphological leaf structure (less developed) were considered seedlings. I also recorded any evidence of live tree cutting.

A sample of the total workshop population was selected by passing each household in the community and soliciting every 7<sup>th</sup> to participate (280 houses passed, 39 solicited). If no workshop was present or residents were unwilling to participate, the next immediate house was solicited, and subsequently, the selection pattern resumed. A total of 25 workshops were originally selected (out of 39 solicited houses): one abstained and, due to time and resource constraints, four were randomly de-selected to obtain 20 remaining workshops. This represents an estimated 10% of the community workshop population (estimated total workshop population of 180).

Modes of cash income generation within the community were determined via standard interviews from a separate, random selection of 61 households from the entire household population (20% of community households) (see Appendix I). Additional information was solicited from workshop owners, woodcraft buyers, community members, and affiliated persons through standardized interviews (same questions asked verbally) and informal conversations throughout my 15-month stay in the village (May 2004-August 2005) (see Appendices II & III).

**Sustainability criteria:** modes and means of analysis

1.) The density of *Bulnesia sarmientoi* in the forest was primarily addressed by collecting data from wood gathering trips and by interviewing producers about harvesting practices. Estimates of craft wood abundance (live and dead) at gathering sites were also used to support the above data. Trip data was collected by following four wood gathering trips

into the forest by a random set of artisans and recording trip segment times (to site, at site, from site), overall amount of wood collected (supply-time estimate), species collected, gathering methods, and general observations. Interviews were conducted during gathering trips to cover topics listed in Appendix III and during regular visits to all 20 workshops to pose questions from Appendix II.

I collected abundance data on live and dead wood (abundance and size-class) from a random selection of plots at five gathering sites (see previous section, “selection of field sites”). Dead wood abundance was estimated on the basis of size (minimum diameter and length) and quality. Minimum size dimensions were estimated from measurements of craft wood supplies from all 20 workshops during a 3-month period (minimum quality characteristics were also determined from these same craft wood samples) (see Appendix IV). Average overall trip times compared to average amount of wood collected, interview data, and field measurements were used to estimate the relative time invested in acquiring wood and the density of *Bulnesia sarmientoi*.

2.) Seasonal constraints to production were addressed by interviewing artisans and collecting artisans’ sales data during a 12-month period. Standard questions were posed about the availability and access to wood supplies, in conjunction with questions regarding opportunities and constraints to selling crafts (Appendix II). As a secondary analysis, I used sales data from producers to establish a possible seasonal correlation between sales volume and times of inhibited forest access due to rain, but this was preempted by a very dry year with few days of inhibited access.

3.) Tree species sustainability (*Bulnesia sarmientoi*) was addressed by collecting field measurements at gathering sites (primarily, evidence of live tree cutting and harvesting activity, and secondarily, live tree abundance and size-class distribution) and by questioning producers and buyers of crafts about the use of live and dead wood for craft-making. Further analysis of live tree size-class distribution and abundance was used to address reproduction through evidence of true seedlings and large-class individuals. The presence of seedlings suggests sexual reproduction, and the largest size-class individuals “contribute most to population growth,” according to Ticktin (2004).

4.) Ecosystem sustainability was not investigated, but rather was addressed retrospectively through field measurement and interview data that suggested only dead tree stems (*excluding* bark, twigs, leaves, seeds, or fruits) were harvested by artisans for craft-making (see #3 above). A brief theoretical analysis was conducted on how harvesting may affect ecosystem nutrient cycling, structure, and function based on a review of relevant literature.

5.) The criterion “conservation initiatives” was addressed by collecting data from interviews of artisans and buyers about the marketability of crafts made from live vs. dead wood, general harvesting practices and limitations, and personal observations of harvesting practices and finished products. My analysis centered around a.) the use and marketability of dead vs. live wood for craft-making and b.) harvesting practices. A secondary analysis based on field measurements from gathering sites (live tree stumps,



tree abundance and size-class structure) was also conducted to support information regarding harvesting practices.

6.) Market demand for crafts was addressed by interviewing buyers and artisans about current and past market demand and structure, perceived market trends, and future market prospects (see Appendix II). I also collected sales data from 20 workshops during a 12-month period (at least two weeks of sales data for each month per workshop, who was buyer and where their market is). My main objective was to gain insights about market stability and variables controlling market demand.

7.) Craft trade infrastructure was addressed by interviewing buyers and artisans about the availability of buyers/intermediates/end consumers for the purpose of selling crafts (who, where they sell, how transported, see Appendix II). I also gathered information on how artisans obtain wood from the forest (mode of transport, trail conditions) and how they get their crafts to market. The above information was then used to construct a framework of physical and social craft trade infrastructure available to artisans for producing and selling crafts, from obtaining wood from the forest to securing the sale of their crafts at market, including constraints and opportunities.

8.) Resource tenure and property rights were addressed by collecting information regarding ownership of lands where wood is gathered and the presence of agreements or exchanges between landowners and local artisans. Information was solicited from the local NGO (ASOCIANA) working here with local communities and government officials

on land rights issues. One of the NGO members is also a long-standing buyer of crafts, and I interviewed this individual in order to obtain specific information about the lands that contain craft wood resources and the relationship between the landowner and local artisans. I also reviewed Argentine civil code in relation to private land ownership rights and rights of individuals to enter another's land. I analyzed the collected information for its potential to create conflict between landowners and artisans, or create opportunities for either the landowner or artisan.

9.) Pressure for alternative land uses was addressed by collecting information on national, provincial, and local land use patterns and related policies that affect surrounding forests. National and provincial statistics on commercial land-use activities and environmental impacts were used to assess potential threats to craft wood sources by commercial logging, agricultural, and cattle ranching. I attempted to solicit specific information from owners of lands where craft wood sources are located but was unable to contact them directly (absentee landowners are common in this area). Observations from craft wood gathering sites (signs of logging or cattle use) were combined with the above information to assess the potential for and conflicts with, alternative lands uses.

10.) Political power of collectors was addressed by identifying organized bodies, events, or movements within the artisan community directly or indirectly related to the craft industry. In addition, any organized body or individual was recognized as a potential conduit for artisans to influence decisions, both within the community and without, related to the craft industry. This criterion of sustainability is considered closely allied

with the next criterion (“institutional opportunities and constraints”) but focuses more on the organizing capacity of the artisans themselves.

11.) “Institutional opportunities and constraints” was addressed by a.) interviewing NGO representatives, artisans, and community members about current or previous experiences with outside development agencies or organizations and past or current projects that directly affect the community (Appendices I & II) and b.) collecting information regarding the use of institutions by other indigenous communities for securing land and resource rights. Only a brief analysis with limited examples was carried out involving speculative scenarios about how institutions may affect the craft industry.

## **Results**

In the following section, results are presented for each of the previously listed sustainability criteria. The first part will summarize key socioeconomic data for the sample population of artisans, showing average earnings, average length of work week, and number of years as artisan, among others (see table 2). Also presented are data related to craft wood availability and constraints to use by artisans (see tables 1 & 3). This section will largely present pertinent data, leaving further discussion for the subsequent section (see Discussion of Results section).

Artisan average incomes were estimated from 12 months of sales data from the sample workshop population. Most exchanges with buyers occurred in the village for food items or a combination of food and some cash. Based on data collected for prices received in the village and pricing of crafts in regional tourist and international markets, I

estimated the proportion of value captured by the artisan in the village compared to outside retail prices. The estimated proportion of final retail price received by artisans ranges from 5% to 75%, with the average between 30-50%. Retail prices for exported crafts are represented in the lower range (5% of retail price), while the closest regional tourist markets are represented in the higher (30-75% of retail price). The following table summarizes other socioeconomic data.

**Density of exploited species and seasonal constraints:**

The density of *Bulnesia sarmientoi* (live and dead) at gathering sites is summarized in Table 1 and Appendices V & VI. All live tree cuts were within the post and pole size categories. The abundance of craft wood resources allows gatherers to collect a four-day to three-week supply of wood (average = 2 week supply) in a single trip (averaging 4 hours) (see Appendix VII). However, a majority of artisans state that wood resources are diminishing in quantity and/or quality, resulting in longer searches to maintain wood supplies (Table 3). This calls into question how long current extraction rates can be maintained in these collection areas.

Table 1. *Bulnesia sarmientoi* trees, volume of dead wood, and evidence of live tree cutting at five randomly selected gathering sites

	Mean/ha	(+/- Std. Dev.)
Total number of individuals	227	(+/-100)
Number of adults*	58	(+/-18)
Volume dead wood	3.1 m <sup>3</sup>	(+/-2.4 m <sup>3</sup> )
Live cuts (stumps)**	9	(+/-8)

\*Adults trees those with diameter at breast height > 20 cm

\*\*Pole-sized stumps and interviews suggest trees cut for construction purposes, not craft production

Table 2. Socioeconomic data for artisan sample population (approx. 10% of total artisan population)

<u>Question</u>	<u>Response</u>	<u>Proportion of Respondents</u>
How did you learn to make crafts?	Learned from family member	95%
Years as artisan	1-23, avg.=5.2	100%
Avg. workweek	6 days	92%
Craft earnings	\$US 2.30/day \$US 7-27/wk, average=\$US 14/wk std. dev.= \$US 6	100%
Receive cash or other for crafts?	Cash Food/some cash Food	10% 35% 55%
Access to credit	Never Short term (days) Longer term (wks)	95% 3% 2%
Problems selling crafts in village	Never Sometimes Often	49% 51% 0%
Demand increasing in last 5 years?*	Yes No	83% 17%
If yes, why increase in demand?*	More buyers More popular	95% 5%
Could produce more if greater demand?	Yes No	64% 36%
Change in individual sales volume during last 5 years?*	No change Increase Decrease	71% 21% 8%
High demand season	July, Jan./Feb. (tourist seasons)	100%

\*(n=24), \*\*(n=20)

All artisan respondents stated that forest trails are impassable for days to weeks during summer rains, but the majority of artisans claim to use alternative methods to secure wood during those times (specifically, trading with other artisans, purchasing from vendors, and previous stockpiling) (Table 3). During the summer season of this study, rain did not affect forest trails for extended periods; therefore, no analysis was conducted to correlate trail conditions due to rain with craft production and sales. Craft wood is currently abundant, but appears to be declining, which suggests that current harvesting rates may be unsustainable.

**Tree species (*Bulnesia sarmientoi*) sustainability and conservation incentives:**

According to producers, crafts made of live (un-dried) wood are unmarketable and no live trees are cut for drying and future use in craft production (Table 3). Therefore, wood gathering for woodcrafts does not directly contribute to mortality of *Bulnesia sarmientoi* individuals. All buyers confirmed the non-marketability of crafts made of live wood (Table 4). Although initiatives to actively conserve forest wood sources were not discovered, the disincentive to sacrifice live trees for woodcraft production could be considered to have inherent or involuntary conservation effects on tree populations. Evidence of both sexual and vegetative reproduction was discovered, but no further analysis was carried out to distinguish between the two types of individuals, except for true seedlings. Appendix V and VI summarize the abundance and size-class distributions for *Bulnesia sarmientoi* populations and evidence of live tree cutting at five gathering sites, respectively. While population dynamics of *Bulnesia sarmientoi* are unknown, data suggest that dominant or co-dominant stands of *Bulnesia sarmientoi* and evidence of reproduction (presence of saplings and true seedlings) are characteristic at all five sample

sites. Harvesting, therefore, does not directly affect tree mortality, and despite the lack of deliberate efforts to conserve wood resources, *Bulnesia sarmientoi* populations at these sites appear to be reproducing, although population dynamics are undetermined.

Table 3. Craft wood availability and constraints to supply (n=39 unless otherwise noted)

<u>Question</u>	<u>Response</u>	<u>Proportion of Respondents</u>
Problems obtaining wood?	Never	69%
	Sometimes	31%
	Often	0%
How often do you need wood?	1-2 times/week	70%
	1-2 times/month	30%
Can rainy season inhibit access to forest? For how long?	Yes	100%
	Days to weeks	
Method of securing wood during times of inhibited forest access?***	Purchase from vendor	45%
	Trade	34%
	Previous stockpile	7%
	Doesn't secure wood	14%
Recent changes in wood supply?	Less wood	46%
	Farther away	36%
	Less quality	18%
	No change	0%
Cut live trees to obtain wood for craft making?	Never	100%
Produce crafts from "green" (live) wood?	Never	100%
Why is live wood not used?	Can't sell or Not marketable	100%
Why "green" wood not marketable	Cracks upon drying	100%

\*\*\*(n=27)

Table 4. Craft buyer information and their perceptions about craft markets (n=9)

<u>Question</u>	<u>Response</u>	<u>Proportion of Respondents</u>
No. of years buying in village	0-23 yrs., avg.=6.5	100%
Mode of craft transport	Public bus	89%
	Private vehicle	0%
	Shipping service	11%
Distance to market	50 km	11%
	300 km	56%
	1700 km	22%
	International	11%
Sell directly to consumer?	No	100%
Market saturated?	Yes	56%
	No	44%
Deal in “green” (live) wood? Why not?	Never	100%
	Can't sell	100%
Additional processing of crafts (sanding)?	Never	44%
	Sometimes	45%
	Always	11%

#### **Ecosystem-level sustainability:**

The removal of dead wood (biomass) from the forest may have repercussions on nutrient cycling, and certainly has some effect on forest ecosystem structure (density and distribution of snags and fallen stems) (Putz et al. 2001). However, the majority of nutrients are contained in leaves, twigs, bark, fruits, seeds, and flowers (Ticktin 2004) that are left on-site. *Bulnesia sarmientoi* wood is known to contain calcium in the form of oxylate crystals (Dimitri et al. 2000), and the effect of wood removal on site or ecosystem calcium levels is unknown.



The removal of snags and fallen stems may affect soil characteristics (particularly, soil organic matter content, moisture-holding capacity), the community of wood decomposers (species composition, relative abundance, and distributions), and wildlife species' use of insects, fungal food sources, or feeders thereof (trophic and food web structures). Removal of downed wood may also influence under-story succession and species composition and distribution by way of minor disturbances such as opening up space for opportunists on the forest floor or surrounding area (Ticktin 2004). The presence of harvesters may also influence wildlife activities that, in turn, could affect herbivory, seed dispersal, and nutrient cycling.

Dead wood removal affects ecosystem structure (snags and downed wood components) and biomass levels that influence successional processes, trophic and food web structures, and soil characteristics. No ecosystem effects of wood removal were investigated, but effects on the levels of nitrogen and phosphorus are likely to be minor, although the effects of calcium removal warrant investigation.

**Market demand:**

The market for village woodcrafts is roughly divided into three categories: tourism, faith-based groups, and fair trade organizations, with a small proportion destined for a premium market of the highest quality crafts. Seasonal market fluctuations appear every year during the same months due to increased demand by domestic tourists from urban centers (Table 1). There is evidence to suggest, however, that demand is both expanding and diversifying and may be providing increasing sales opportunities throughout the year (Table 1, personal communications). I estimate that there has been at least a 50% increase in the number of craft producers at this location in the last five years with little

loss in sales per producer (based on data from Table 1). Craft earnings are modest, averaging an estimated \$2.30/day for the study period. This figure is comparable to daily food costs (data not shown).

Perceptions of markets seem to be mixed on the part of buyers, with some believing they are saturated (i.e. they are unable to sell more to external markets than at current levels), while other buyers indicate the contrary (Table 4). Most artisans believe they could produce and sell more crafts of all types if buyers demanded more (Table 1).

Overall market demand, therefore, appears to be relatively stable (annual basis) and increasing, with diminishing seasonal fluctuations over the longer term, but the craft industry provides only modest earnings.

#### **Craft trade infrastructure:**

Physical infrastructure: Each wood gathering site can be accessed via multiple trails leading directly from the village. Terrain is generally flat, and the trails allow bicycles and carts up to 1m wide to travel freely when dry (when wet very difficult). In order to reach consumers, the crafts must be transported to the nearest national thruway via a 45 km gravel road that is susceptible to flooding during the summer rainy months. During the study period (15 months), it was very dry in the region and the road leading to the community was flooded on only three days (personal observation).

With few exceptions, artisans do not possess private vehicles. A private bus company services the village from the nearest national thruway 6 days/week, 3 times/day, and readily accepts cargo up to 50 kg for a nominal fee. From the national thruway, crafts reach their domestic destination by private vehicle or bus; international shipments may use ocean-going transport from the national capital or, less frequently, air transport.

International routes to Western Europe, Canada, and the United States have been used since the early 1980's by one of the originators and currently most important buyers in the local craft industry (Deane 2004, personal communication).

Social infrastructure: Presence of buyers/intermediaries (permanent residents, temporary residents, and visitors) enables artisans to sell crafts in the village. Artisans have no problems accessing buyers in general, although some have expressed problems finding buyers when the village access road is flooded (see Table 2). I would characterize producer-buyers arrangements as patronage relationships, whereby individual artisans sell to the same few buyers under a semi-flexible exchange agreement. With local, permanent buyers, the typical arrangement involves the exchange of food items or, less frequently, clothing or cash. Some buyers are known to grant short-term (days) credit, but most do not. One buyer imposes a minimum exchange amount for staple items such as rice or sugar (artisan cannot purchase less than 1 kg, for example).

Non-local buyers travel to the community either by bus or private vehicle and buy from intermediaries, directly from artisans, or both. Non-local buyers are a mixed population characterized by their buying histories in the community (recent to 20-yr history) and particular outside markets they target. Some non-local buyers pay for crafts to be shipped and infrequently visit the community, while others routinely visit the community to buy and transport crafts and administer a system of exchange.

At least two non-local buyers have arranged for a local intermediary to purchase crafts at a central community location and then either ship them to the buyer or wait for the buyer to arrive. In both cases, the exchange for crafts is entirely in cash, an uncommon system here. In one case, an arrangement with a local intermediary includes

an incentive program administered whereby the buyer provides additional benefits to artisans in proportion to the number of crafts produced. This incentive program delivers building materials for house construction at the end of the year. The arrangement appears to be motivated by a premium crafts market and therefore would tend to favor better-skilled artisans.

Most artisans state a preference for a cash exchange for their crafts although, as indicated in table 1, this occurs only about 10% of the time. A few artisans have expressed and displayed the tendency to accept a lower price for crafts if the exchange is in cash instead of food (and forego any benefits from their previous relationship with other buyers who don't pay in cash). A recent shift to cash exchange seems to be occurring, mostly due to the two aforementioned non-local buyers collaborating with local intermediates, and benefiting more skilled artisans. The possible reasons for this and potential benefits and problems are discussed below. Overall, trade infrastructure is well-established and provides ready access to buyers on-site.

**Resource tenure and property rights:**

Despite at least a 90-year history of continuous use by local residents, access and control over the most important craft wood sources is legally held by private landowners and, therefore, subject to their land-use decisions. No formal or informal agreements exist between the owners of these woodlots and any residents, individual artisans, or groups of artisans that would provide secure rights to any craft wood sources. Nor have any artisans or Anglican representatives attempted to establish formalized agreements with surrounding landowners for any purpose. Control over craft wood resources remains

linked to the immediate and future economic interests of surrounding private forest owners.

The legal basis for wood gathering on private forests could not be explicitly documented in the laws (e.g. I could not find a reference in Argentine law that explicitly deals with private property of absentee landowners and rights to collect dead wood by adjacent residents). The legality of gathering wood on private lands is unclear, as responses by knowledgeable individuals are contradictory (personal communications, Alejandro Deane, Anglican representative and long-time buyer of crafts, & Robert Munday, long-time resident and Anglican representative). There appears to be no payment or other compensation between any artisans and landowners for resource access. The practice of entering and gathering craft wood from private forests is tolerated to varying degrees from un-fenced, un-demarcated property boundaries with effectively no discouragement to entry, to fenced properties with armed patrols. It appears that the most important craft wood gathering sites are located in the former, un-fenced areas. In essence, though, craft producers do not hold any legal property rights, but continue to enter fenced and un-fenced private forests to gather wood resources, mostly consistent with traditional or customary use practices.

**Pressure for alternative land use:**

The cattle, logging, and agricultural industries, combined with the climatic conditions, contribute to desertification in the Chaco and threaten soil integrity and productivity (Medioambiente 2003a & 2006). Rankin (1997) describes “rich grasslands dotted with bushes and trees” turning into “virtual deserts” from the effects of introduced cattle. The Argentine government seems to be in partial agreement with that assessment, attributing

desertification of the Chaco to, among other factors, “inadequate management of natural resources”, “inappropriate agricultural practices,” and effects from cattle and sheep ranching (Govt 2003).

### Agriculture-

Agricultural activities are identified by the government as a major cause of deforestation of native forests in Argentina (Medioambiente 2006). The artisan community is located just 25 km outside of territories promoted by government agencies as appropriate for non-irrigated agricultural enterprises (Medioambiente 2006). Correspondingly, the degree of deforestation is dramatically reduced as one approaches the community from the agricultural areas just off to the west (Medioambiente 2004 and 2006).

Wage labor on commercial farms attracts some community members to either commute to or live temporarily near these sources of seasonal labor. One out of 12 persons surveyed had recently accepted seasonal work on a commercial farm (Appendix II) and stated they did so because the work provides slightly higher earnings per hour compared to craft production. Most artisans admitted to at least one occasion of working on farms (from several days to a few months), but that the higher pay compared to craft earnings came at a price of heavier work, longer hours, supervised schedules, unfamiliar surroundings, and separation from family members (most artisans mentioned at least two of these).

Local agriculture is limited to subsistence needs and is practiced by only 7% of persons surveyed (Appendix II).

## Logging-

Argentina's forestry sector has undergone both a decline and an expansion in the last ten years and is currently on an upward trajectory in terms of overall production. Between 1997 & 2000, imports outweighed exports by more than double on average (Medioambiente 2005a). Since the economic collapse in 2001, Argentina has accelerated overall domestic forest product extraction and decreased forest product imports by about half, placing increased pressure on native forests (Medioambiente 2005a).

In 2001, 83% of the national wood production originated from Chaco forests (Medioambiente 2003b). Despite incentives to increase production from tree plantations and alleviate production pressures on native forests, a 29% overall increase was observed in the Chaco region between 2002 & 2003 (Medioambiente 2005b). A similar increase occurred nationally in the overall extraction of raw logs as well as the production of manufactured forest products for the same years.

The extraction of *Bulnesia sarmientoi* appears to be following this same trend, although on a much smaller scale. Commercially logged *Bulnesia sarmientoi* contributes only a small proportion of timber produced in Argentina, representing on average 0.02% of primary material (logs, all species) for the period between 2001 and 2003, and 0.7% of logs produced in the province of Salta for the same period (Anuario 2001, 2002, 2003). In 2003, one-fifth of national *Bulnesia sarmientoi* production originated from the Province of Salta, but more locally, it did not appear as a commercial timber species harvested from the department in which the artisan community is located (Anuario 2003, Minetti 2001).

Commercial logging within the department (analogous to county of U.S. state) where community is located did, however, represent 63% of the production of raw logs within the Province of Salta in 2003 (Anuario 2003). The most common trees logged from forestlands directly adjacent to the community are *Prosopis alba* and *Prosopis nigra*, known locally as Algarrobo, and valued for carpentry and furniture. There are two small saw mills in the community where Algarrobo logs represent the primary raw material and mill operators work nearly every day producing furniture and door and window frames (personal observations). Selectively logged with axe and cart, raw logs are sold to local sawmills or buyers in nearby towns, and at least three community members work full time in supplying the saw mills with Algarrobo logs.

#### Domestic animal husbandry-

Regionally, the cattle industry impacts more land area than agriculture or forestry activities (Medioambiente 2006), and is considered the primary cause of deforestation in the region (Leake 2004, personal communications). Locally, the industry is dominated by small producers (<100 head, 300 ha.) utilizing enclosed patches of cleared forest and free-range forested areas (Adámoli et al. 2004) for both market (mostly local consumers) and subsistence production (Bravo et al. 2001, Bucher & Huszar 1999).

Cattle and goat rearing are primary forms of animal husbandry in the area. Approximately 10% of community members possess goats, but none possess cattle (Appendix II), although beef is common in community members' diets (personal assessment). My observations from craft wood gathering sites include the presence of domestic cattle, either grazing or passing through gathering areas, with undetermined effects. The presence of domestic animals may have a direct effect on *Bulnesia*



*sarmientoi* reproduction through foraging on the foliage of seedlings and saplings, which will be discussed further in the next section on Discussion of Results.

#### Fuelwood:

The preferred fuelwood sources are dead, downed wood from a variety of species: *Prosopis alba*, *Prosopis nigra*, *Schinopsis quebracho-colorado*, and *Ziziphus mistol*, among a few others (not including *Bulnesia sarmientoi*) (personal observations). All of these woods are dense and slow-burning, yielding very little smoke if controlled properly (personal assessment). *Bulnesia sarmientoi* is not normally burned at all, but is used occasionally for the purpose of illumination as it continuously yields a bright, prominent flame accompanied by black smoke undesirable for cooking purposes. There was no evidence or indication of a fuelwood shortage in this area that might initiate gathering of species other than those listed above.

I conclude, then, that logging and cattle ranching likely pose the greatest threats to forest cover and *Bulnesia sarmientoi* populations in the area and therefore potential effects of these activities on the woodcraft industry must be evaluated in the context of each landowner's economic interests and land-use patterns. Competition over *Bulnesia sarmientoi* supplies for fuelwood is unlikely.

#### **Political power of collectors and Institutional opportunities and constraints:**

##### National and regional examples:

Palmer (2003) suggests that national and provincial priorities regarding land and natural resources in the Chaco are focused on private property and development at the expense of "indigenous and environmental rights." This has been reflected in a number of court cases involving land rights disputes between indigenous groups and private individuals

and companies engaged in logging, road building, and petroleum exploration or extraction (SAIIC 2003).

On the other hand, several recent political victories by indigenous communities in Argentina resulted in land acquisitions by evoking Article 75, part 17 of the national constitution, which recognizes indigenous people's rights to traditional lands (WRM 2003, Clarin 2005). These acquisitions were won with the support of large organizations such as Greenpeace, and in each case, the defendant was a private corporation, foreign or domestic, interested in exploiting natural resources. In addition to evoking indigenous constitutional rights to traditional lands, advocate organizations emphasize the callous nature of outside companies and the inevitable, local environmental damage they are likely to cause at the expense of poor, indigenous communities' livelihoods and security.

According to one source, Greenpeace will not pursue claims coming from the community of Misión Chaqueña because they are not within their "target areas" (Deane 2006, personal communication). While the significance of this is uncertain, perhaps no large corporation is directly threatening the community, and Greenpeace is reluctant to oppose or target small, private Argentine landowners as would be the case in Misión Chaqueña.

Examples of local institutional influence:

External political support by the Anglican Church is a possible institutional means of support for the residents of Misión Chaqueña. The Church organization ASOCIANA has represented this community in a number of recent internationally funded, socioeconomic development programs, as well as more locally derived initiatives. ASOCIANA is formally engaged in efforts, at least regionally, to map indigenous peoples' resource use.

“Resource mapping” has played a part in cases brought by indigenous groups to the provincial courts against private interests, including logging companies (WRM 2003). At present, no resource mapping initiatives associated with land claims are being promulgated in Misión Chaqueña.

The question remains as to how important a role would community members themselves play in the struggle to maintain access and control to surrounding forest resources. Currently, there is no organized group of artisans within the community, nor has a grassroots movement or group been identified that could be considered representative of artisans’ interests. While there exists a village commission consisting of elected officials (4 of the 12, artisans), my monitoring of commission activities for one year showed that no initiatives were proposed that directly related to the craft industry. I would conclude, then, that neither artisans nor those in political power are pursuing the idea of formally securing important forest resources, craft-related or otherwise.

My investigation also suggests ambiguous perceptions regarding the need for such a movement or organized effort representing local artisans or any other group in the community. Results from interviewing both artisans and non-artisans reveal that many do not perceive a problem now or in the likely future related to forest access or the need for a representative body to defend their position on resource rights (interviews not randomly selected, personal assessment). To the extent that there is concern, it has been caused by recent conflicts over illegal logging of a timber species not used in craft production. There presently appears to be little interest in organizing political power amongst producers to control and defend their interests, particularly on forest gathering sites of craft wood.

This lack of interest may partially be a reflection of the inherent social and political divisions between families that exists here. It is well known both among residents and Anglican representatives that a particular social and political structure operates here, mostly associated with the social structure of families, but also influenced by past events (e.g. destructive and constructive effects on social relations). This structure may have profound implications for organizing political movements across the community or artisan population and as such, must be considered a constraint to political or economic organizing, albeit one that could be overcome. For example, community-wide organizing is rare and, when it has occurred, has been short-lived, but apparently having the desired results. So, the lack of interest for organizing that apparently exists here may be associated with residents' awareness of the political momentum required to instigate successful movements or events.

**Result Highlights:**

Table 5 summarizes each of the major criteria reviewed in this paper, with its corresponding overall result and key characteristics. The table does not show linkages or potential interactions between each criterion, but these are addressed in subsequent sections.

Table 5. Summary of overall results for each sustainability criterion, with key evidence

<b><u>Sustainability Criterion</u></b>	<b><u>Overall Results</u></b>	<b><u>Key Evidence</u></b>
1. Density of exploited species	Dominant to co-dominant stands, dead wood declining	Short search and carry times, reported to be increasing
2. Seasonal constraints on production	Year-round resource availability	Resource access via collection, purchase, or trade
3. Tree species sustainability	Harvesting does not directly affect mortality, evidence of species reproduction	No sacrifice of live trees for craft production
4. Ecosystem sustainability	Not investigated, but likely minor	Only dead stem wood removed (no leaves, twigs, bark, seeds)
5. Conservation incentives	Currently no incentive to cut live trees, but could be provoked in future by resource depletion	Crafts of live wood unmarketable, no sacrifice of live trees for drying and subsequent use in craft-making
6. Market demand for crafts	Steady market demand, upward trend past 5 years	More buyers arriving in village, underlying reason unknown
7. Craft trade infrastructure	Well-established, artisan dependency on middlemen	Favorable access to buyers, but not directly to consumers
8. Resource tenure and Property rights	No secure rights, uncertain resource access	Lack of ownership and currently no agreements with private landowners
9. Pressure for alternative land use	Mostly undetermined, cattle ranching most common threat to forest	Climate favors cattle ranching over agriculture
10. Political power of collectors	No evidence of sustained political power overall	Currently no organized body of collectors
11. Institutional opportunities and constraints	High potential, but poor history of collaborative success	Few examples of development project success

## **Discussion of Results**

The residents of Misión Chaqueña are clearly dependent on the surrounding forests for nearly all of their livelihoods. These forests are privately owned, and no formal or informal agreements currently exist between private landowners and artisans or the town council regarding resource access or use. Despite a long history of resource use of these private forests that continues to the day of this writing, no customary rights have been formally recognized.

The use of forest resources in the Misión Chaqueña area extends far beyond cattle and timber. Residents gather fuelwood, wild foods, medicines, and construction materials from nearby private forests and have been doing so since the community was founded 90 years ago. This fact holds the potential for conflict as well as for resolution. The potential to establish formal agreements between private landowners and the elected town council may be a viable management option due to: the proven, long history of resource use by residents highly dependent on forest resources (vs. ambiguous use, absenteeism of many owners), relatively benign effects of craft wood gathering on forest health, and a constitutional obligation by the provincial government to recognize indigenous rights to traditional territories (Article 75, part 17, National Constitution). No formal claims have been initiated based on either this constitutional provision or customary-use rights by local residents, but the potential exists nonetheless.

In general, obstacles to negotiating and maintaining formal agreements with private landowners include: unfamiliarity with these types of arrangements on both sides, absence of a formal, forest management plan representative of community-wide interests

(including interests of private landowners), lack of a functioning governance system to implement management plans, and a lack of political support by relevant institutions (Arnold 2001). In my opinion, each of these conditions exists in Misión Chaqueña. Residents have no previous experience in formal, forest management planning or negotiating management agreements, nor are these current objectives of the Anglican organization best-positioned to negotiate and develop such plans or agreements on behalf of the community. Each of these is intimately related to management of forest resources and must be addressed in concert with resource users' objectives to achieve sustainability, something that does not appear to be happening in Misión Chaqueña.

The principal goal of the Anglican organization regarding land issues is to acquire title to land for the primary purpose of settlement, and secondarily for resource use. This pattern of land acquisition does not include a specific priority for securing craft wood sources; however, recent conflicts between new settlers and surrounding private landowners over illegal logging has made Anglican officials reconsider the organizations priorities regarding land use and impacts (Leake 2004). Some artisans report that access to current gathering sites is being threatened by an increase in illegal logging that provokes some landowners to install fencing. In separate recent incidents, police have been called-in to investigate individuals suspected of tree theft and to control violent confrontations sparked by this issue.

Access, control, and the craft wood supply:

Some artisans have stated that they continue to enter fenced private forests “quietly” or “hidden” and use a saw to cut wood instead of a much louder axe. Perhaps this demonstrates the willingness on the part of some artisans to risk arrest or injury in the

attempt to secure wood (even while wood can be purchased in the village). On the other hand, it may demonstrate that fencing and patrolling of private forests is not entirely effective in restricting access. Whatever the case, illegal logging has apparently increased awareness of and hostility towards artisan communities by private forestland owners, as well as prompting greater consideration within the Anglican organization's planning strategies.

Access and control of craft wood also appears to be complicated in another sense: all respondents stated that higher-quality wood sources are increasingly difficult to find, are further away, or have disappeared entirely. This point relates not only to increased search-and-carry times, but also resource tenure and land access problems if artisans were to enter previously un-used, privately-owned forests containing craft wood that may impose more restrictions on access and increased risk of personal injury or arrest.

This trend, if representative, may also indicate that wood harvesting rates are exceeding the forest's natural production rate, resulting in an overall decline of craft wood supplies. This would not be surprising considering the upward trends in both the number of producers and the demand for community crafts in the past five years. It is conceivable that the rate of consumption of craft wood has surpassed the forest's production rate and that producers have been consuming natural wood stocks accumulated over years. Low decomposition rates may have facilitated the build-up of wood, especially of resin-laden, rot-resistant wood like that of *Bulnesia sarmientoi*.

From an ecological perspective, if stocks of dead wood are being depleted, harvesting activities have the potential of mimicking past fire regimes by removing biomass from the ecosystem. However, many other effects of fire disturbance would not



be replicated by harvesting, particularly with regard to species composition and distribution, soil conditions, nutrient cycling, forest vegetation structure, and related wildlife habitat (Varner et al. 2005). On the other hand, fungal outbreaks may be diminished, fuel buildups reduced, and natural ecosystem structure (component of snags and fallen logs) could be more closely retained than without harvesting (Putz et al. 2001). Controlling fungal outbreaks may play a vital role in the health of *Bulnesia sarmientoi* stands, as the heartwood of this species is often infected by fungal pathogens (according to local beliefs stated to me), which contributes to mortality and reduces craft wood quality.

Disturbance effects by animal grazing on *Bulnesia sarmientoi* population dynamics are also a potential concern. Low numbers of seedlings at gathering sites (see Appendix V) could be a result of foraging by domestic cows, pigs, and goats, or possibly wild deer and feral pigs. On the other hand, low seedling numbers may indicate a higher degree of vegetative reproduction compared to sexual reproduction at these sites. Studies conducted to differentiate between vegetative and sexual reproduction carried out at a variety of site conditions found throughout the Chaco distribution for this species could indicate differences and causes of different seedling numbers and modes of reproduction.

#### Craft markets and trading:

The primary concern to artisans regarding their work is how much do they earn for their work. This was reflected in many conversations I had with producers about pricing and quality topics related to their craft. Artisans noted concern over high-priced exchanges that favor buyers. For example, craft-making tools were occasionally obtained in exchange for woodcrafts, but the costs were perceived to be double or triple that in the

nearby town. Exchange rates for staple goods (rice, sugar) and minimum purchase requirements also favor buyers. Supporting data could be useful to document artisan-buyer exchange rates, particularly for food, clothing, and tools in village stores and surrounding outlets.

A common practice among buyers is further processing of purchased crafts to “add value.” I witnessed numerous incidents of sanding and polishing crafts by buyers after their purchase. This could depress craft prices received by artisans by encouraging production of unfinished, lower-priced products. In other words, artisans could receive higher prices if they sold only fully finished products, thus capturing more “value-added.” Of course, this price effect remains unknown and may not be valued by artisans in comparison to the amount of additional work (or specialized tools) required. Finishing is often facilitated by power sanding tools and additional, finer-grain sandpaper, and requires additional labor. Artisans may not see a beneficial trade-off under these circumstances, or, due to lack of access to credit, may not be in a position to acquire additional capital to further process crafts.

Another factor influencing craft prices is the variable market demand. On an annual basis, demand appears to be less than the artisan’s potential production capacity. This places downward pressure on prices that remain at a low level even during high demand months. Assuming a gap exists between supply and demand, market development strategies could expand existing markets or create new ones. In addition, tracking and targeting of higher demand periods may offer opportunities to set higher prices, which would increase community income opportunities. This approach is complicated, however, by the independence of producer workshops and nearby

competing artisan communities and craft suppliers that may not regulate their prices in-step with competitors.

Benefits of trading woodcrafts could potentially be better captured by artisans through reducing the number of middlemen involved in the trade and by selling more directly to consumers. This could be encouraged by networking with trading partners, providing access to forms of credit, reducing or eliminating permitting fees associated with transporting craft goods, and providing education opportunities that increase artisan awareness of market locations and price structures. In addition, improving artisan communication and marketing skills (language proficiency and cultural differences are often over-looked) should be addressed simultaneously with providing educational opportunities.

Methods to facilitate trade could potentially increase either demand for, or prices of woodcrafts, or both, with varying effects on the sustainability of craft production. On one hand, increased demand or higher prices may increase pressure on forest wood supplies. On the other hand, higher prices could create incentives to reduce craft production by providing the same income for less work, thus diminishing pressure on forest resources. Higher prices could also attract new artisans to the industry and thereby increase demand on wood resources, a trend that already appears to be taking place, although not because of shifting craft prices.

Any factor that increases the volume of craft produced over the long term (expanded market, greater existing market demand, higher prices, increased production efficiency, access to capital) will likely increase demand for raw materials and eventually exceed the intrinsic, sustainable harvest limit of naturally occurring dead wood. The use

of only dead wood could act as a control mechanism by imposing a maximum harvest limit on gathering activities. Ultimately, the volume of dead wood gathered cannot exceed its natural production rate. And since no live trees are currently cut down or girdled to create more craft wood, artisans are apparently bound to follow the forest's natural rate of dead wood production, although as stated earlier, they may still be consuming stocks that have accumulated over years.

Of course, harvesting methods and their effects are mute points if access to forest wood sources is restricted. Without a strong political voice, artisans are at the whim of outside interests who own and control the forests utilized by Misión Chaqueña. At present, forest owners are mostly absentees and have not intensified their use of forests beyond cattle grazing under intact forest canopy. However, their intentions and use of forests could change, and the artisans have no legal or contractual rights to wood should that occur.

## **Conclusions**

During the past 20 years, woodcraft production has become the most important economic activity, employing nearly 80% of men in Misión Chaqueña. Many have become highly skilled and demand premium prices for their products, and a few market their own crafts. Craft-making is a formal part of school curriculum and learning starts in primary school. It is the principal livelihood source of the community, but is not legally secure and represents a critical threat to sustaining the industry.

Harvesting effects remain largely undetermined from a biological standpoint, but some characteristics of the current system appear to favor ecological sustainability of

craft production. Harvesting does not directly contribute to tree mortality and does not likely remove significant nutrient amounts (nitrogen and potassium) from the ecosystem, although the effects of calcium removal warrant investigation. According to Ticktin (2004), these are key ecological factors in the maintenance of tree populations.

The density of *Bulnesia sarmientoi* individuals and overall stand maturity at gathering sites currently supports an adequate supply of craft wood with relatively little time invested in harvesting activities. Good quality wood is also available through village vendors at reasonable prices, allowing producers to access these stockpiles of craft wood during times when rains limit access to forests. However, the long-term availability of craft wood at gathering sites is uncertain due to increasing numbers of artisans and the potential for expanded markets. In addition, current wood harvesting rates appear to exceed production rates, at least at the five studied gathering sites, and according to artisans, wood quantity and quality have declined over the years.

Annual market demand exhibits stability and predictability, as well as signs of potential growth and expansion, while bi-annual demand fluctuations appear to exist due to seasonal, domestic tourist markets. The current level of market demand and well-established trade infrastructure provide opportunities for producers to sell crafts in the village, but a combination of factors are depressing prices and discouraging economic organizing that could bolster producers' advantages in the market. Some such factors include selling of unfinished crafts, independence of individual workshops acting as competitors, and expanding woodcraft industries in other, nearby villages creating further competition in an already competitive market (from producer stand-point) of moderate demand. Current production and marketing constraints include dependency upon

middlemen, limited institutional capacity of producers, lack of economic cooperation among producers, and lack of access to forms of credit.

The principal constraints to sustaining the woodcraft industry overall, are insecure forestland tenure, declining craft wood resources, weak political power of craft producers, social divisions between families, and a poor history of collaboration with local institutions. Insecure property rights appear to discourage motivations to manage forest resources or politically organize in order to defend craft wood sources. This is reflected in the complacent attitudes of many artisans regarding what most perceive as increasing wood scarcity.

Political organizing of producers also faces profound obstacles from a socially-divided community structure characterized by families unwilling to collaborate with each other at the community level. The Anglican organization has constructed a map of families within the community that is supposed to provide a model of the existing social divisions, presumably for the purpose of planning development projects (Leake 2004). However useful or not, this implies an additional constraint to establishing community-wide, organized political power on the part of artisans if such social divisions cannot be bridged or otherwise negotiated.

Political organizing is also discouraged by the lack of institutional capacity within the Anglican organization specifically established to identify and develop goals and objectives directly related to the craft industry. Some resource management planning is taking place within the Anglican organization, but it is secondary to the Anglican institution's goal of securing land for the purpose of settlement by local indigenous groups and does not include a formal mechanism to incorporate artisans' and residents'

input regarding forest resources, particularly forest sources of craft wood.

A poor history of development project success further constrains the potential for successful organizing and planning around forest resource issues, particularly at the community-wide level. Past development project failures have produced a problem of trust between some residents and local institutions. This problem is reflected in accusations of mis-management of funds and corruption between local residents and institutions and threatens the potential for success of projects and ideas dependent upon collective planning efforts with those institutions. Furthermore, there is little experience of close, collaborative planning initiatives at the community-wide level with outside institutions, bringing into question how such a process would even be initiated and promulgated.

To summarize, this study highlighted pertinent economic, social, and biological aspects to the local woodcraft industry and should serve to aid future planning of forest management initiatives and economic or political organizing of local artisans. Information provided could help to establish a legal status for artisans and suggest avenues to organize politically and economically. For example, artisans work “in the black” and have no formal worker’s rights in Argentina, no pension benefits, no worker’s compensation program, and no means to access credit. Socially and economically disadvantaged and culturally ostracized, many artisans desire livelihood alternatives to complement or replace craft-making, but few alternatives currently exist in the community. If woodcraft-making is to continue at this location, artisans could make use of the information contained in this study to devise strategies for improving and sustaining the industry.

## **Future prospects: research and management needs**

Many questions about the local woodcraft industry have been left unanswered by this study. My investigation was conducted over a short period of time and as such, the picture described has limitations. For example, attempting to assess the availability of craft wood is complicated by expanding the time frame beyond the current study period. Wood supplies appear to be diminishing in quantity and quality, so an accurate estimate of the rate of change would be important to assess the long-term sustainability of craft production. This would require an estimate of the amount of dead wood currently available and the annual rates of dead wood production and consumption.

The growth, reproduction, and yield of *Bulnesia sarmientoi* populations and other biological aspects of harvesting require long-term monitoring to determine species and ecosystem harvest effects. To estimate harvesting effects requires un-harvested areas to act as controls and monitoring for long time periods. I was unable to locate un-harvested areas in the Misión Chaqueña area, although some may exist elsewhere. At the very least, it would be important to monitor tree populations at gathering sites for growth, reproduction, and survival to assess population dynamics over the course of years to decades (e.g. increasing or decreasing size of tree populations, shifts in size-class structure or distribution, reproductive shifts {vegetative v. sexual}, and abundance of dead wood).

Monitoring should also seek to answer questions such as: can gathering affect the supply of dead wood by indirectly threatening the live tree population (i.e. by trampling or creating paths or other minor disturbances)? Are harvesting or managing methods changing (e.g. cutting of live trees, plantings)? What might be done to promote the



health, growth, or reproduction of trees and stands? Who will perform the monitoring? How will they be trained? Across what scales will monitoring take place (e.g. parcels, tree populations, stands, community, landscape)? How will property boundaries or landowners come into play? Will landowners even allow these activities on their property?

The potential repercussions of increased wood demand on tree species sustainability have already been discussed. It is important to note that the interest of woodcraft producers for healthy, well-managed forest resources may be secondary to their economic concerns. There may be no perceived relationship between healthy forests and a healthy woodcrafts industry on the part of producers. As such, any forest management plan applied to craft wood resources must make this link and have the capacity to respond to shifts in the market with appropriate strategies. This implies the presence of managers who actively and adaptively respond to shifts in demand pressures on wood resources with the recognized authority to do so. They would act to make the above link, even when all producers may not recognize it.

Forest management plans or even rough guidelines do not currently exist (i.e. there are no plantings, controls on cutting practices, or resource inventories that address potential changes in market demand or harvest practices and intensities). For example, if producers began to cut live trees for drying and subsequent use, tree populations would suddenly be under threat, with long-term negative effects on craft production rates and artisan incomes and livelihoods.

The potential for artisans to collectively develop and maintain a forest management plan was only briefly considered. An organized group of producers formed

for the purpose of influencing the craft industry would be the first of its kind for this community. In fact, no such organized body exists at the community-wide level. If a representative body were to form, an accurate evaluation of its effectiveness to manage resources and the industry would still be years away. In my opinion, it does not appear that artisans are currently interested in or actively moving towards organizing at the community level.

There appears to be little outside assistance to facilitate organization or development of the local crafts industry. Local NGO's do not appear concerned about promoting or collaborating with new grassroots organizations at this location. In fact, it appears that there is a lack of belief, both without and within the community, that producers could effectively manage their own affairs. There is historical basis for this assessment as many community projects have failed in the past due to mismanagement of funds and personnel problems (based on non-random interviews). For example, each side blames the other for the collapse of a major agricultural project in the late 70's and early 80's (personal communications). Other projects failed because, allegedly, "funds were mismanaged" or "corruption reigned" on one side or the other, depending on who was recounting the story. This appears to have eroded trust among the residents for outside projects, an important element in collaborative planning (Arnold 2001, Beierle & Konisky 2000) and, in my opinion, one of the fundamental challenges faced by this community and the Anglican organization involved. Many remain suspicious of any project initiated in Misión Chaqueña, even though the community may be partly responsible for past project failures.

One cannot dismiss the possibility that past failures were one of misplaced priorities and misdirection of authority, or that they were not well-received by the community and did not reflect meaningful participation or inclusive solutions that were actually representative of the community's interests. From what limited interactions I witnessed between outside institutions and community members, there appears to be tensions regarding not only overall goals, but also methods appropriate for achieving them. In addition, it is not clear to me how decisions were made and to what degree community members were involved in the decision-making process.

Nevertheless, it cannot be assumed that producer-led management is doomed to fail. Past failures could serve as lessons to improve future prospects, not reject them for the sake of convenience or out of fear. Documenting project processes and evaluating their success or failure have not been undertaken by local institutions. This exercise and the information produced could help learn from mistakes and identify obstacles to the potential success of future projects.

*A final word...*

Inherent in this investigation is the assumption that artisans actually want to continue with crafts as a trade and a source of employment, and that they are concerned enough about the industry and the forest resources upon which it depends to invest their time and effort to defend them. I assumed this implicitly when I first arrived there. But as I spent more time with the artisans, I began to question this assumption. Below are some impressions and opinions about the artisans and their working conditions.....

Many artisans desire livelihood alternatives to complement or replace craft-making. Some are bored of craft work or have physical problems after two decades of craft-making. Others have vision problems from many years of meticulous work in poor lighting conditions, but don't have enough money to consider purchasing glasses. All want a retirement plan after years of labor, but no artisan has one. Artisans would benefit from a worker's compensation plan, especially when they get sick and cannot make crafts. Some have tried to save money in order to send their children to college (but I met no artisan that sent their children to college through craft earnings alone). A few have left the village in search of something else.

This community represents the longest standing, commercial indigenous craft industry in the region- 24 years at present. It became very clear to me at some point why some artisans are simply not satisfied with their working situation in Misión Chaqueña. Some of the original craftsmen still work six days-a-week to earn just enough to provide for their families, and all artisan incomes are well below the national poverty level. Skilled laborers living in poverty seemed very strange to me and made me feel exceptionally naïve. The realities of political and economic volatility in Argentina are in stark contrast to my middle-class American environment where economic and social opportunities for a Caucasian male abound.

In response to my questions about the level of technology in workshops, an Anglican representative and doctor who spent many years in Misión Chaqueña described community members as "content to sit in their favorite chair" and "watch the world go by." "Why would they need technology to save them time?" More than a few times I have wondered about these replies. At the same time artisans are encouraged by the

Anglican representatives to stay at home and make woodcrafts, they are discouraged by the same representatives from making improvements that many artisans appear to desire.

I later realized that technology may, in fact, cause problems for artisan families. If the only goal is to save time and increase income, then acquiring time-saving technology may have the following unanticipated, negative consequences (this paragraph based on: Kerr No publication data). More efficient, technology-driven craft production may not be responsive to actual markets that demand rustic, hand-made products. The image of poor, indigenous people working in a labor-intensive arts industry could be appealing for some consumers, particularly with faith-based or fair-trade sectors. Therefore, industrialized production processes may negatively affect market demand and social relations. Conversely, more efficient technology may increase demand pressures on already diminishing wood resources.

Acquiring higher levels of technology within workshops, however, is a trend within the artisan community. The labor-intensive finishing step of sanding and polishing is being transformed from a manual to a partially mechanized activity. Power sanders are increasingly common in workshops and are said to “save time” and “do better.” The possibility that artisans would apply those values to other power tools is evident as a few have acquired band saws, while others now have chain saws.

Artisans may be looking for any advantage they can get, especially considering their modest incomes and low capture rate of “value-added.” Craft earnings are commonly in the form of food or goods, not cash, and food usually comes from buyers in the village. This can be an advantage to artisans since travel is required to purchase items in the nearest town, but I found this arrangement disturbing for a number of reasons.

First, non-cash earnings are difficult to save. Also, non-cash income may be a more difficult means of establishing a credit line, especially in the formal sector. Furthermore, I realized that some buyers were earning a profit not only on the food and other items they offered in exchange for crafts, but also when they sold crafts to the next buyer on the chain of middlemen. In other words, many buyers exchange crafts twice, while artisans only once. After I investigated exchange prices further, I began to realize that some merchants are probably earning more for each craft bought and sold than the artisans themselves who live just feet away.

I concluded that daily earnings by most artisans only provided for the daily family consumption of food. It was difficult to determine what was left over after food requirements were satisfied, if anything. Some are obviously better off than others: the most skilled and productive artisan can make up to \$4.50 a day, nearly twice the average (from table 1). Some artisans even receive a “fair” price by “fair” traders, although artisans affirm that there has been no difference in prices received for crafts since “fair-trading” was initiated.

Identifying and assessing the principal challenges faced by this artisan community to improve their livelihoods goes well beyond this study’s purpose. In my opinion, though, perhaps the greatest challenges lie in the cultural differences and the history that this particular indigenous group has with the larger, Argentine society, as well as among its own members. Former inter-tribal and intra-band feuds are known to still exist. In fact, the Anglican organization has created a map of the community based upon family names and relations, presumably in an effort to better understand the social dynamics of community life and pursue initiatives accordingly (Leake 2004). Furthermore, racism is

thought to operate here (perhaps on both sides), and social segregation is all too apparent (although not in all cases). Cultural and social divisions continue to play out on a daily basis and represent constraints to political and economic organizing.

As a more personal observation, apathy and hopelessness also find a home here among residents. This may be due in part to an historic dependency on Anglican missionaries, stemming from a patrimonial relationship between them and residents of Misión Chaqueña. Ten years ago, the missionaries left (physically) the village, and outside religious influence has been relatively limited. Concerns about this were repeatedly expressed to me by many community members, even to the extent of recruiting me to fill the void left by the missionaries. I was not sure what the void-filling role entailed exactly, but I surmised that its intended purpose would be to elevate the local political and economic status of the village. In my opinion, many within the community question their own capacity for political power in the absence of Anglican missionaries.

On the other hand, hope lives here too. There appears to be common ground between the Anglican organization and the community that could serve as a fertile bed for new ideas. Most families need craft wood and craft-making is a long-standing livelihood strategy. These facts represent a definitive starting point to work towards collaborative solutions with local landowners and institutions. The craft industry could be an opportunity to establish cooperative, participative, and innovative strategies for community development and resource management, beginning from the most common interest of increasing craft prices and incomes to negotiating formal agreements with landowners to secure resource rights. New models could emerge here and set an example

for other successful communities: just as Misión Chaqueña originated the woodcraft industry, it could now revolutionize how the industry proceeds into the future.



# Appendix I

## Household Survey

After requesting to speak with the “boss” (of the house) the following questions were posed:

- 1.) Do you mind speaking to me about the work your family does?
- 2.) What kind of work does your family do? {If a description was not given for the spouse’s occupation, I asked specifically about it. }
- 3.) Have you worked recently on a farm? For how long? How long ago?
- 4.) Are there other forms of work you do also? {If response is negative, I would ask about specific activities like domestic animals. }
  - a.) Do you sell animals sometimes?
  - b.) Do you have a pension or government check?
  - c.) Do you sell firewood, posts, timber, other forest products?
  - d.) Do you get temporary work sometimes?
- 5.) Have you ever received benefits from a specific (development) project in the village?
  - a.) Why or why not?
  - b.) How many projects have there been here?

## Appendix II-Household survey data & results

House #	Work (Man)**	Work (Woman)	Secondary*	Recent seasonal work?
283	A	A	F	NO
154	A	A	NO	NO
203	A	A	NO	NO
97	C	A	NO	NO
14	A	A	L	NO
57	A	A	NO	NO
244	H	E	NO	NO
210	A	A	H	YES
75	A	A	NO	NO
306	A	A	NO	NO
221	A	NA	F,C	NO
120	A	A	NO	NO
303	C	A	NO	NO
50	A	A	P	YES
148	A	A	NO	NO
291	A	E	NO	NO
22	C	A	NO	NO
278	A	A	NO	NO
241	A	A	NO	NO
141	C	A	L	NO
252	A	E	NO	NO
211	F	A	NO	NO
53	A	A	P	NO
304	A	A	NO	NO
200	A	A	B	NO
84	A	A	NO	NO
74	C	A	NO	NO
34	A	A	NO	NO
45	A	E	F,H	YES
296	A	A	NO	NO
11	A	A	NO	NO
59	A	A	P	NO
118	A	A	NO	NO
92	C	A	F	NO
208	A	A	NO	NO
151	A	A	L	NO
164	A	A	H	NO
232	A	A	NO	NO
68	A	A	NO	NO
103	C	A	NO	NO
180	A	A	NO	NO
288	A	A	P	NO
61	G	A	NO	NO
269	A	A	NO	NO
18	A	E	NO	NO
49	H	A	F	NO
173	A	A	NO	NO
10	A	A	NO	NO
139	A	A	NO	YES
197	A	A	H,L	NO
89	C	A	NO	NO
164	A	E	NO	NO
215	A	A	O	NO
36	A	A	F	NO
114	A	A	NO	YES
77	A	A	NO	NO
19	C	A	P	NO
261	A	A	G	NO
179	A	A	L	NO
86	A	A	NO	NO
27	A	A	NO	NO

### Primary Source of Income

	Men	Women
Artisan	78%	90%
Carpenter	15%	0%
Construction	3%	0%
Forest Products	2%	0%
Govt Job	2%	0%
Family Care	0%	10%
total	100%	100%

### Secondary Income

NONE	59%
Forest Products	10%
Domestic Animal	7%
Crop production	7%
Temporary Work	6%
Construction	6%
Carpentry	1-2%
Business	1-2%
Gov't check	1-2%
Other	1-2%
Total	100%

### KEY

A= Artisan  
 C= Carpenter  
 H= House/Building Construction  
 F= Forest products (fuelwood, posts, etc.)  
 G= Government (teacher, nurse, work plans)  
 E= Everything (care provider, firewood, etc.)  
 P= Plot for food growing  
 L= Livestock rearing/selling  
 B= Business owner  
 O= other (sporadic income, donations)

\*Includes all members of household

\*\*Based on average/typical week

## Appendix III

### Standard Questions for Craft Producers (sections I-IV) and Buyers (section V)

- I. Initial Solicitation of Workshops (selection of workshop)
  - Do you sell woodcrafts?
  - Are you the artisan/Is the artisan at home?
  - Do you have a workshop?
  - (After explanation of my interest, I would solicit their participation): Would you like to participate in a study about woodcrafts?
  - (After more detailed description of expectations on their part, I would again confirm desire to participate): How does that sound? Can I come here every two-weeks/month and ask about your woodcraft sales?
  
- II. Selected workshops are initially characterized (number and names of full-time artisans, electricity, power tools)
  - How many artisans work in the workshop everyday?
  - What are their names?
  - Do you have electricity/light?
  - Do you have a “bench grinder” (power sander) or other power tools?
  
- III. Standard questions to artisans during routine visits to collect sales data:
  - How many crafts did you and other artisans in workshop sell in the past week or past two weeks or past week and this week? {if none, why didn't you sell crafts?}
  - For what price did each different craft sell?
  - To whom did you sell?
  - Did you receive cash or other (food, clothing, other) for the crafts? {If received cash, how much (proportion of sale)?}
  - Did you have help finishing/sanding from others?

## Appendix III (cont.)

### Standard questions for producers and buyers:

- IV. Additional standard questions posed to every artisan at least once:
- How did you learn to make crafts?
  - How long have you been an artisan?
  - Why did you want to learn craft making?
  - Have you had other types of work? (What types of work have you had?)
  - (if other type of work) How much do you make (from other work)?
  - (if other type of work) Which do you prefer? Why?
  - Do you have a day off in the week?
  - Do you have problems sometimes obtaining wood for craft making? (if so, why? And how do you obtain wood then?)
  - Is it different now (obtaining wood, making or selling crafts)? What is different? Why?
  - Have you noticed any changes in the collection sites themselves in recent past?
  - How often do you go to the forest for craft wood?
  - How far is the wood? How many kilometers?
  - How much time does it take you to get there?
  - How much time does it take you to collect and bring wood back to the workshop?
  - When it rains, do you still collect wood? {if not, how do you obtain it? }
  - Can you obtain credit for crafts or to improve workshop? {How? Where? Who? Under what conditions? }
  - Have you ever received credit for crafts or to improve workshop? {When? In what form? To what end? }
  - Do you ever have any problems or difficulty selling your crafts?
  - Who buys your crafts? {if not from village, where do they come from? }  
{In not sold in village, then where and how? }
  - Do you sell to different buyers?
  - When is it difficult to sell?

## Appendix III (cont.)

### Standard questions for producers and buyers:

- Is there a best time-of-year? Best month?
- What kind of wood do you use?
- How is the wood? {How is the quality, character?}
- {if response includes implication of live or dead character, then further questions: Can you sell crafts that are “slightly green”, “green”, live wood?}
  
- {if response does not include implication of live or dead character, then further questions: Can you use green wood for crafts? (if yes, Do you? Does anyone?)}

### V. Questions for buyers about practices and market demand:

- How long have you been buying crafts here?
- You come every month, week?
- How do you get here (mode of transport)?
- How much do you spend? Cash or other?
- The same each time? Same artisans? Same quantity of crafts?
- How do you transport the crafts to market?
- Need a permit to transport crafts?
- How far is the market?
- What city/province/country?
- Sell to intermediate or consumer?
- Spend additional time finishing the crafts (sanding, polishing)?
- Can you sell crafts made from “green” (live) wood? Why? Why not?
- Have you ever sold or bought crafts made of “green” wood?

## Appendix IV

### General Topics of Discussion, by target group

#### Artisans in their workshop:

- Is there an artisan organization or cooperative? Was there?
- What do you think about the prices of handicrafts?
- Which do you prefer: cash or food or other/combination in exchange for crafts?
- How is your eyesight? Need glasses?
- When do you normally work (day or night or both)?
- What would you like to see change in your workshop? In the community?
- How could there be changes? Who has the influence/power?
- If you had access to credit in order to improve your workshop, how would you use it?
- What happens when you get sick? How do you cope?

#### Artisans on gathering trips:

- Who owns the land?
- Are we allowed to gather wood?
- Is it (wood, site) easy to find?
- What are we going to look for?
- This is a good piece (of wood)? What will you use it for?
- How much wood is there here?
- How long have you gathered wood here?
- Do all artisans use the same methods to gather wood?
- Do all artisans gather from the same sites/areas?
- Have you seen any changes in the sites/areas in recent past/since beginning?
- Is wood harder to find now?

## **Appendix IV (cont.)**

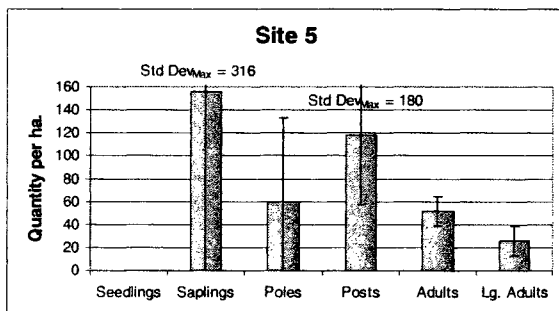
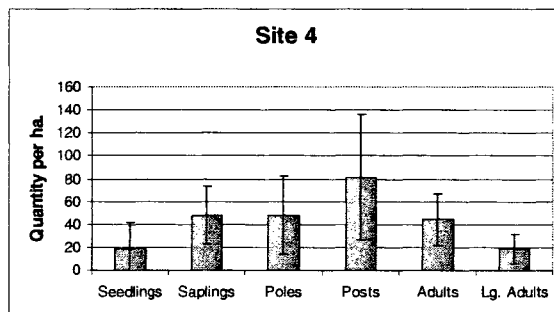
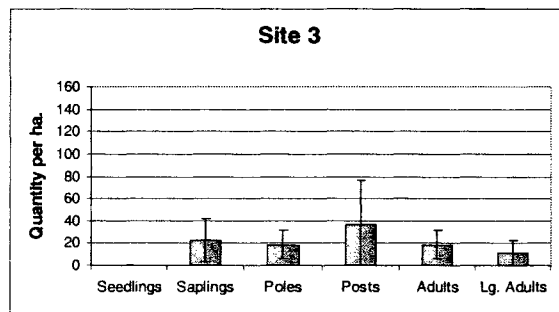
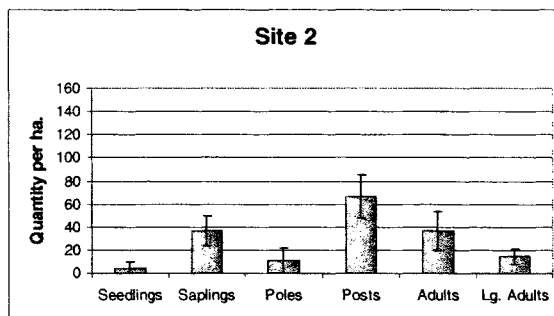
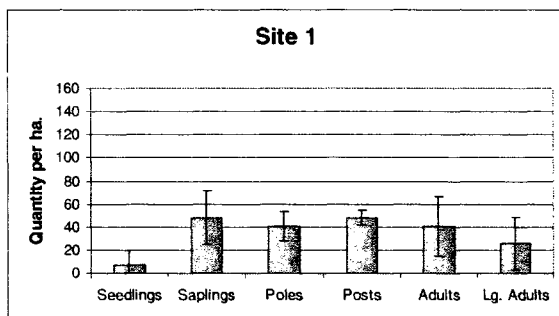
### **General Topics of Discussion, by target group:**

For community members and others associated with the village:

- Is there an organization or cooperative of artisans?
- Is the work (of handicrafts) growing since a few years ago?
- Is the work better than other forms?
- Do you think the community needs a school of handicrafts?
- How much wood is there? Is the wood “running out”? Is it harder to get?
- Can one/should one plant the trees for the future? If so, how?
- Can machines help the artisans work? Do they want them?
- What does the future of handicrafts in the village look like? Better? Worse?

## Appendix V

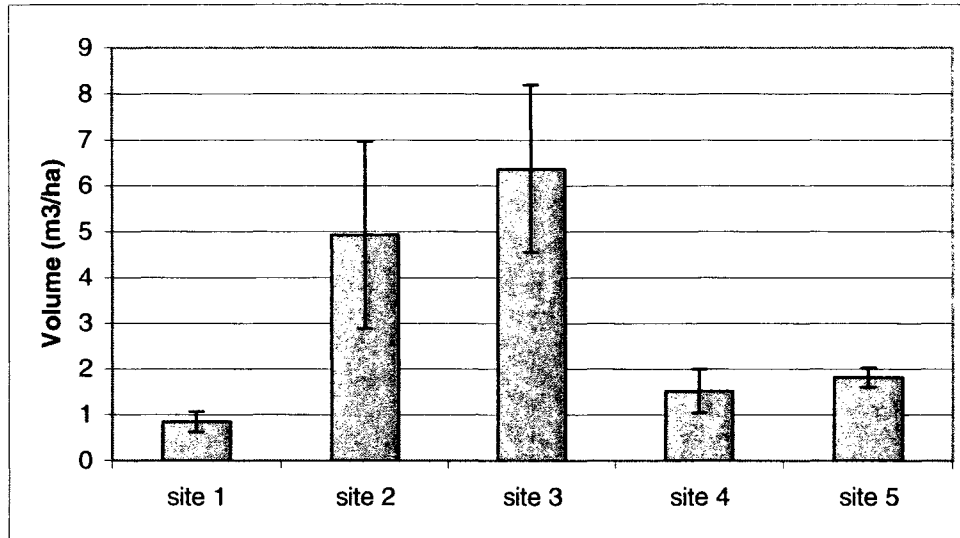
**Observed Abundance of *Bulnesia sarmientoi* per hectare at five randomly-selected gathering sites, by size class (error bars = Standard dev.)**





## Appendix VI

### Observed dead wood (*Bulnesia sarmientoi*) at five randomly-selected gathering sites

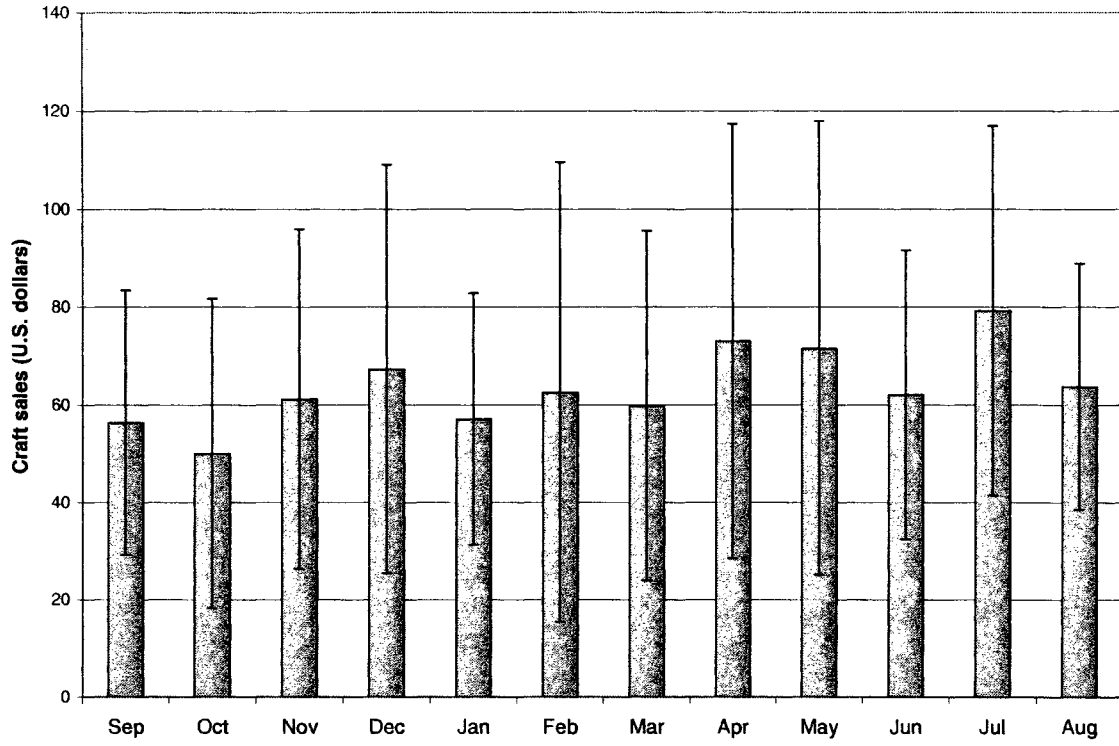


### Observed live tree stumps of *Bulnesia sarmientoi* at five randomly selected gathering sites

	Live Stumps Observed	Per ha.	Diameter Range	Size class
Site 1	3	11	12-18 cm	Post
Site 2	0	0	NA	NA
Site 3	1	4	6 cm	Pole
Site 4	2	7	10-13 cm	Post
Site 5	6	22	12-17 cm	Post

## Appendix VII

Average monthly craft sales per producer (Sept. 2004-Aug. 2005)



## Appendix VIII

### Summary of wood gathering data: time spent and wood gathered (based on trip observations and workshop interview information)

	Overall gathering time (hrs.)	Wood supply (weeks)
Trip #1	2.3	0.6
Trip #2	4.3	3
Trip #3	4	2
Trip #4	4	1.5
Workshop #1	3.5	1.0
Workshop #2	5	2.9
Workshop #3	4	2
<b>Average Overall</b>	<b>3.9</b>	<b>1.9</b>
Std. Deviation	0.8	0.9

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