Sustainability Transformation from Supply Chain Integration: Quality in Natural Resource Production Systems as a First Step toward Eco-Labeling?

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Abstract
Commercial natural resource extraction by individuals in farm/forest communities generates and diversifies household income and ostensibly provides incentive to protect forest resources. However, once resources can be procured outside of the forest (e.g. by cultivation), extractive systems often tend toward unsustainable practices. The economic and environmental effects of such shifts in production processes ultimately resonate throughout the farm/forest livelihood system. Such has been the case for extractors of Chamaedorea palms (Chamaedorea spp), which are used in floral arrangements and in Easter celebrations and have historically been collected from tropical forests in Mexico and Guatemala. Recently, the certification of palm extraction and/or trade has arisen as a strategy to facilitate conservation and economic benefits. Eco-labeling efforts for palms began in 2001 and a small, but growing demand characterizes today's market. The overarching objective of this research was to evaluate the feasibility of certification while looking at its ability to promote both forest conservation and economic development. To do this, palm extraction has been considered at three levels: the farm/forest livelihood system, the value chain, and the broader global commodity system. This paper assesses the dimensions and components of the global system.

Palm certification appears limited by three factors. First, economies of scale represent an obstacle for actors in the commercialization process. Second, the seasonality of certified demand suggests that extractors might confront challenges adjusting their year-round processes to accrue benefits for a single season. Finally, barriers to entry for newly certified extractive systems could be imposing. In Guatemala, a shift from quantity- to quality-based procurement within a sustainable management framework has led to stable arrangements offering price incentives for high-quality palms throughout the year, while leaving open the option for sales to consumers of certified palms during the Easter season. Quality procurement has reduced the number of palms harvested while providing incentives for forest communities to increase value-added processing. We concluded from this experience that a combination of quality-driven procurement of natural resources and vertical integration of early-stage processing might represent an intermediate step in the development of markets for natural products certified for sustainability, a phase that could otherwise preclude participation.

Keywords: *NTFP, Value Chain, Quality, Conservation*

Introduction

Few genera of palms rival *Chamaedorea* for variety in foliage, size, and growth habit (Hodel, 1992). Collectors prize numerous species as garden specimens and a general tolerance in the genus for shade favors the plants' survival indoors. Trade of Chamaedorea specimens and the cultivation of plants from seed can be dated to the 19th century; however, large-scale procurement and distribution did not begin until the middle of the 20th century (CEC, 2002). The harvest of palm leaves followed rapidly, and since the 1950s North American and European florists have used the imported leaves of several species from the genus Chamaedorea as decorative foliage in floral arrangements. Churches also use the large fronds of certain species for Palm Sunday celebrations (CEC, 2002). Chamaedorea palm fronds have been imported to the United States for commercial use since the middle of the 20th century.

Today palms are sourced from several states in Mexico as well as Guatemala and Belize. Markets for these palms exist in North America and throughout Europe as well as in the countries of their origin. Palm frond procurement has gradually been advancing along the path from forest extraction to cultivation in plantations, and the integrated livelihood and conservation benefits associated with palm extraction have

diminished accordingly. Certification of palm management and extraction has been suggested as a counter-measure to the plantation trend (Current*, et al.*, 2003).

Environmental and social justice standards target procurement/production systems, in general, and sometimes an entire value chain. Commodity procurement often occurs in multiple localities and global sourcing may; therefore, involve numerous, interrelated value chains. Thus, outcomes of efforts to certify a particular procurement/production system or value chain using a set of standards may depend partly on the attributes of the broader commodity system. Specifically, efforts to certify extraction or trade based on environmental and/or social justice standards may not adequately address the economies of scale necessary for all enterprises within the extractive system or value chain to remain profitable. Profitability, of course, is a business fundament and failure to consider it in certification efforts or other interventions may quickly precipitate market failure. Overdevest (2004: p.174) observed:

> "[S]trategies for certifying high-standard coded products…are limited in constructing markets for certified goods. Such market construction refers to the capacity of NGO schemes to create a critical mass of certified supply."

Overdevest's observation highlights the importance of achieving critical levels of supply, and in the case of Chamaedorea palms, where demand is incipient; it is conceivable that market failure could equally result from insufficient consumer demand. Moreover, both the overall size of both supply and demand, as well as their dynamics, should be considered as influential factors in the success of NTFP certification efforts (Ros-Tonen*, et al.*, 1995; Shanley*, et al.*, 2005). For this reason, it is insufficient to examine a particular procurement system or emerging market niche in isolation. These and other components need to be viewed as parts of a broader commodity system and understood within that context. To date, little to no effort has been made to integrate localized certification efforts into a comprehensive framework linking the numerous diverse Chamaedorea procurement systems and contexts.

Theoretical Framework: The Global Commodity Chain

It is possible to delineate relatively discrete value chains, or production-to-consumption systems (Belcher, 1998), that are conceptually or socially distinct but, in fact, no system exists in isolation. Seemingly distinct value chains eventually come together, resulting in what might be referred to generically as a meta-system or, in the present context, a procurement network. Hopkins and Wallerstein (1986: p.159) defined a Global Commodity Chain (GCC) as, "a network of labor and production processes whose end result is a finished commodity." Others have built upon this concept (Gereffi and Korzeniewicz, 1994; Gereffi*, et al.*, 2003). Contrary to the name, the global commodity *chain* is a commodity *system*: rather than a linear structure, it is a network comprised of all parallel and interconnecting permutations of individual production-to-consumption systems, or value chains. In this sense, GCC represents the highest level of analysis possible while retaining organization based upon a single commodity or product. Concerns such as product substitutability, and consumer preference, both of which involve consideration of multiple products, are certainly relevant in production-related discussions, but fall outside of the purview of the GCC framework.

Hypothesis and Research Objectives

The overarching objective of conducting research at the level of the Global Commodity Chain, or System, was to assess the potential feasibility of certified Chamaedorea extraction, given the dimensions of the global system. We hypothesized that the feasibility of certified extraction would depend upon the attributes of certified supply and demand relative to the attributes of supply and demand for conventional product in the global market. The choice of the word *attributes*, rather than values, highlights the importance of understanding not only overall supply and demand values, but also nature of these values with regard to aspects such as seasonality and trend. Similarly, it is important to understand the drivers of overall supply and demand: the principal producers and consumers, respectively.

A complete description of a global commodity chain or system includes three important elements (Kaplinsky and Morris, 2001; Marshall*, et al.*, 2006): 1) important actors and their activities; 2) key trade routes; and, 3) main consumers. We have added to these three items the need, described above, for understanding the attributes of supply and demand. Taken together, these four elements coalesce into the two specific research objectives of this chapter.

Research Objective 1. Identify the *components* of the Global Commodity Chain/System: prevailing production systems, regions, and key actors

Research Objective 2. Describe the *dimensions* of the Global Commodity Chain / System for Chamaedorea palms

Methods

The process of establishing the dimensions and components of the GCC was informed by the first author's previous research and through consultation of published literature on Chamaedorea palms and palm production and marketing systems. Although early Chamaedorea research primarily focused on palm biology, recent work has sought to address conservation and development issues relating to commercialization (CEC, 2002; Current and Wilsey, 2002; Bridgewater*, et al.*, 2006; Endress*, et al.*, 2006; Wilsey and Radachowsky, 2007). These studies provide a reasonably comprehensive overview of Chamaedorea production systems and regions as well as insight into the dimensions and dynamics of the markets for palm fronds.

Aggregate trade data were accessible through government reports organized by the harmonized tariff schedule, which is based on the international system established by the World Customs Organization. Chamaedorea palm fronds are aggregated with other foliage, branches, and like products. In the United States, Chamaedorea palm import data are classified using the Foreign Agricultural Service's (FAS) Foreign Agriculture and Trade system (FATUS). Similarly, Mexico's National Institute for Geographic Statistics and Information (INEGI, in Spanish) aggregates trade data for Chamaedorea palm fronds with data for other live plants and floriculture products (CEC, 2002). Finally, Guatemala's data can be found accessed through the *Ventanilla Única*, which is managed by AGEXPORT.

The U.S. Department of Agriculture (USDA) Agricultural Marketing Service (AMS) provides disaggregated trade data through their online portal (AMS, 2007). Mexico's Secretary of Environment and Natural Resources (SEMARNAT) and Guatemala's National Commission for Protected Areas (CONAP) maintain records on the authorized transport of Chamaedorea palms (Reyes Rodas and Wilshusen, 2006). All data were standardized through the conversion of reported units to stems (Table 1). Temporal reporting inconsistencies (e.g. the AMS 10-year moving window) have been addressed by synthesizing data from multiple sources.

Table 1. Select equivalencies in reported units

Quantity	Unit A	Quantity	Unit B
1	Bunch	20	Stems
1	Roll	30	Bunches
1	Gruesa[1]	144	Stems
1	Gruesa (*C.elegans*)	0.95	Kg

[1] *Stems / gruesa may vary by location*

Mexico and Guatemala's reporting of production and/or transport, rather than export, data allows for the possibility that significant quantities of illicitly harvested and exported palm may escape inclusion in national statistics. Thus, in characterizing the market we have elected to use the US import statistics rather than national or regional production and transportation figures in order to avoid the problem of underreporting resulting from illicit harvesting or other factors. There are obvious limitations characterizing a global system using U.S. import data, but since much of the internationally distributed palms pass through the U.S., we concluded that it represented the best available strategy.

Commodity system information as well as specific information about the actors and institutions comprising and influencing the Chamaedorea GCC was collected through use of a "modified Sondeo" method. A Sondeo is a rapid assessment method that was developed to facilitate a holistic understanding of particular systems, notably farming systems (Hildebrand, 1981). Because Sondeo was developed for use in a particular location, the method required some modification, if only to allow for the challenges imposed by working within the expanded geographic footprint of the GCC. First, the method was developed for use by an interdisciplinary team of researchers working within a community or region. For this phase of research, which extended beyond the zone of influence of many local and regional institutions, a single researcher with interdisciplinary training conducted the Sondeo. Second, the Sondeo calls for conversations with key informants to transpire over the course of several days to a week. In this research, conversations were by necessity dispersed over three field visits, which occurred between the summer of 2005 and the summer of 2007.

Results

Components of the Global Commodity System

Production Systems

Palm Extraction

Historically, most commercial palm leaves have been extracted from naturally occurring populations, those in which regeneration is a natural process. Even today, a large part of the palms encountered in markets originated in relatively unmanaged forest ecosystems (Everett, personal communication). Extractive systems vary with location but the procurement process is fairly uniform. An individual or team of extractors enters the forest on foot in search of naturally occurring palms or palm clusters. Trips to and from the forest frequently require several hours of walking. In many regions, distances from communities to harvesting locations have increased over time with sustained commercial pressure on the resource. Palm fronds are cut by hand to meet local and/or industry specifications using a modified machete or a knife. Extractors bundle the fronds into *gruesas* (144 stems in theory, but varied in practice); gruesas are later assembled into *bultos* (*gruesas* bound or wrapped by burlap or blankets). The number of gruesas in a bulto depends on the carrying capability of the harvester, but a bulto typically does not exceed ten gruesas. Carrying the bulto on their backs, extractors hike out of the forest or, in some contexts, to a central collection point in the forest, so animals or pickup trucks can bring out the palms. Extracted palms are typically sold to middlemen, or *coyotes*, who may reside in the harvester's community or who may simply visit periodically to buy palms. Traditionally, extractors have been paid based on the *quantity* of gruesas harvested. In recent years there has been an effort in some areas to shift to *quality*-driven purchasing (CEC, 2006). Selection and processing typically occur further along in the value chain.

Palm Cultivation

Palm plantations in agroforestry systems are the second important source of supply. As with many NTFP, there is a growing trend toward system intensification and palm cultivation. Unlike the relative uniformity of the extractive production experience, plantations can take varied form. Perhaps the most (commercially) successful plantation system is cultivation under the natural forest canopy in recovering forest fallow. In this system, existing understory vegetation is cleared and palm plants are transplanted – from germinated seed stock – under the requisite shade of the original tree canopy. Coffee production systems represent another context within which palms are cultivated. Both the traditional polyculture and rustic coffee production systems common to Mexico contain a diverse assortment of commercial and useful species and palm fits well within these diversified systems. Palms have also been observed in cultivation under the shade of rubber tree plantations.

Production Regions

Commercial palm fronds destined for sale or redistribution in the United States have principally been procured from Mexico and Guatemala (Figure 1), the former responsible for the greater share over the products' commercial history (CEC, 2002) (Figure 2). Figure 2 is deceptive, however, in its portrayal of overall production: not all palms enter the U.S. prior to broader distribution. In 2005, Guatemala, as a case in point, shipped principally to Holland (48.4%), followed closely by the United States (46.6%) (Reyes Rodas and Wilshusen, 2006). Nevertheless, even with Guatemala's production figures doubled Mexico remains the leading producer. Palms from Belize are reaching international markets via illicit extraction by Guatemalan harvesters, who have for years been crossing the contested Guatemala-Belize border to cut fronds for years (Bridgewater*, et al.*, 2006).

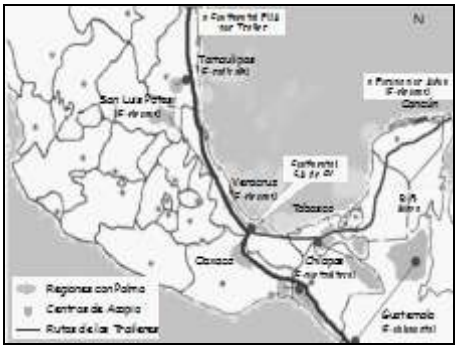

*Figure 1. Principal palm regions **THIS IS ONLY A DRAFT FIGURE***

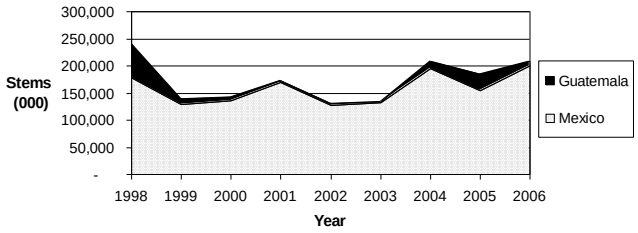

Figure 2. Annual imports to the U.S. from Guatemala and Mexico (AMS, 2007) (adapted from CEC 2002)

Mexico

Mexico encompasses several important palm regions. One of the most important, in terms of volume, is the *Los Tuxtlas* region in the state of Veracruz. In Veracruz, palms are primarily cultivated under the shade of fallow forest. The rapid increase in the importance of cultivated palm in Veracruz corresponds with and contrasts the decline of palm extraction in the *Chinantla* region to the south, in the adjacent state of Oaxaca. In Chinantla's *Rió Cajonos* valley, a source of naturally abundant palms, extraction remains a time and resource intensive production activity. Rising fuel prices coupled with high variability in extraction rates have negatively impacted contributions from this region.

The states of Chiapas and Tabasco are important sources of extracted palms (Camarena M, 2005). A large majority of palms have historically originated from the *Selva Lacandona*, located in the eastern part of Chiapas and sharing borders with Tabasco and El Petén, Guatemala. Another important extraction region in Chiapas extends along the *Sierra Madre de Chiapas*, the coastal range beginning east of the Isthmus of *Tehuantepec* (in Oaxaca) and running southeast toward Guatemala. At its northwestern limit, the Sierra Madre range abuts Oaxaca's *Chimalapas* region. Throughout Chiapas and into Tabasco and the Chimalapas, *C.quetzalteca* is the predominantly extracted commercial palm

The *El Cielo* Biosphere Reserve in the state of Tamaulipas represents another important palm extraction region (Endress*, et al.*, 2006). Within the Reserve, extractors collect the leaves of *C.radicalis* from seasonal tropical and pine-oak forests. San Luis Potosi is another Mexican state known to have significant palm extraction activity. Little information is available for this region, but the majority of the palm is *C.elegans* destined primarily for European markets.

Guatemala

Most of the Guatemala's Chamaedorea is extracted from the naturally occurring populations within the Maya Biosphere Reserve – a mosaic of protected areas in the country's northernmost department: El Petén (Reyes Rodas and Wilshusen, 2006). Palm extraction is an integral part of life and livelihoods in the Reserve's community forest concessions, in some villages contributing more than 50 percent to male incomes (Radachowsky and Ramos, 2004).

A direct-sale agreement in 2005 to commercialize palms between the largest U.S. palm importer and two community forest concessions – Uaxactún and Carmelita – represents a landmark development in the

value chain and the creation of a certified market. Palm management in both concessions is certified through an addendum to FSC certification for sustainable forest management, the latter a legal stipulation for the community concessions. Terms of the arrangement specify that the palms must meet product quality, rather than process sustainability standards. The palms can be sold to conventional markets based on their quality, as well as to seasonal consumers interested in certified palms. Moreover, the concessions have integrated their procurement system to include many of the value-added processes formerly handled by intermediaries and consolidators.

Principal Actors

This section presents a general overview of the GCC and its component actors. Actors in the individual palm value chains can differ by region, as can their specific roles and the shape of the value chains themselves. Figure 3 portrays a general schematic model of the GCC and its numerous actors and variations in paths to the international market.

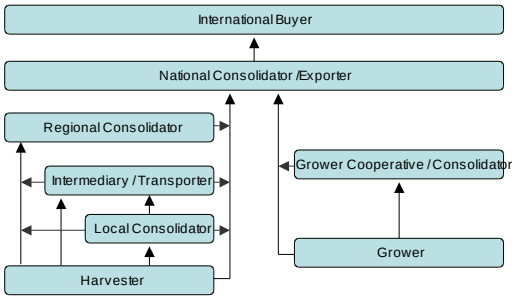

Figure 3. General Schematic Model of the GCC for Chamaedorea Palms

International buyers of palms fronds are limited and the market at this level could justly be described as a monopsony. In the United States, one buyer – Continental Floral Greens (CFG) of Texas – reputedly imports the vast majority of stems. Smaller importers include W.F.R., Inc. and Simpson's Greens, both located in Florida. CFG and W.F.R. (formerly Jewel) are the original importers of Chamaedorea palm fronds described earlier in this chapter.

Consolidators and exporters operating at the regional and national levels comprise the most diverse general category of actors in the supply chain. This diversity can be attributed to the fact that the value chain may take varied form between the harvester/grower and the importer, depending on numerous factors. Perhaps the largest national consolidators in Mexico and Guatemala are Continental and Plantas Arco Iris, respectively.

Local consolidators, when they exist, take varied forms. One development professional described a case in a community in the Chinantla region of Oaxaca where one community member stored all of the palm fronds extracted by others throughout the week until the arrival of the intermediary (Santos, personal communication). In Uaxactún, Guatemala, a community-managed storage facility was built to store palms brought in from the forest by pickup truck before they were cargo trucked to nearby Santa Elena. In these and most other cases, local actors consolidate extensive palm extraction so that the relatively capital intensive modes of transportation may achieve economies of scale during periodic visits to the community.

Intermediaries, or *coyotes*, operate both independently and as formal or informal employees of larger actors throughout the value chain. Intermediaries are frequently disparaged for exploiting extractors, but they often play important, yet under-valued roles in the commercialization process. In some cases, the coyotes are themselves former extractors that have developed relationships with actors further up the value chain. One role of the intermediary is the provision of transportation for extractors without a means to get their palms from the forest to the market. In the economically marginal regions where Chamaedorea palms are found, this role must not be understated. Another role of the coyote is to stabilize supply through the consolidation of small quantities of palms harvested over a broad area, or by numerous harvesters. When institutions such as producer/extractor cooperatives are absent, it can be the coyote that helps to ensure that minimum feasible levels of supply are achieved in a particular region. Several extractor communities in the Chinantla region of Oaxaca, for example, were left without a market when an independent intermediary relocated.

Extractors comprise one foundation for the palm commodity system. In most contexts, extractors operate independently, selling their harvest to an intermediary or other consolidator. Local contractors may

also organize harvesters, or a community-level association may organize them. Recent emphasis on the certification of palm production systems is driving new emphasis on models within which both communities and harvesters take more responsibility for delivering a quality – or value added – product.

Cultivators represent the other foundation for the palm procurement system. Cultivators can be large operations, such as *Flor de Catemaco* in Veracruz, Mexico, or cooperatives comprised of smaller growers, such as *Tropicales de los Tuxtlas*, also in Veracruz. Palm cultivation by households in extractor communities has been promoted and observed, but it is extremely difficult to differentiate mode of production in those contexts.

Dimensions of the Global Commodity Chain

The Conventional Market(s)

Palm fronds are important in the floral industry, yet are not typically components of a flower shop's retail assortment. Florists employ palms and other greens in retail floral arrangements either as decorative material, filler, or to provide structural support (Current and Wilsey, 2002). Typically, flower shop retail customers request floral arrangements based upon one or a few predominant flowers, whereas additional flowers and filler greens are added at the discretion of the florist. In the floral industry; therefore, the end consumer of Chamaedorea palms is effectively the retail florist, rather than the flower shop patron.

Certain denominations of Christian churches comprise another source of demand for Chamaedorea palms (CEC, 2002). Palms, which represent victory, are used in Palm Sunday celebrations. In contrast to the flower shop scenario, churches purchase the actual palm fronds – by stem or bunch, in accordance with the congregation and the specific use in the celebration (i.e., structural décor or distribution to parishioners). Palm Sunday palms can be purchased through retail florists and wholesalers, but are also available through businesses catering specifically to religious organizations. Church-driven demand is large, relative to demand throughout the year, but it is limited to the weeks preceding Palm Sunday. The notion of environmentally and/or socially certified palm production and distribution has the greatest traction among church consumers (Current*, et al.*, 2003).

It is difficult to estimate the respective proportions of Chamaedorea import volume attributable to floral industry and church use. Floral wholesalers and retailers serve as intermediaries for both the floral and church markets, so floral industry data may overestimate use in floral arrangements. Finally, cross-denominational estimates of church palm use almost certainly include a wide variety of palm species including, but not limited to, Chamaedorea varieties.

Market Dimensions and Trends

Commercial import of Chamaedorea palms began around 1950. Import and sales volumes increased in subsequent years before peaking – once in the late 1970s, then again in the late 1980s. Annual import data synthesized from several sources (Johnson, 1999; CEC, 2002; AMS, 2007) offer a picture of the overall trend in palm imports to the United States since the early 1970s (Figure 4).

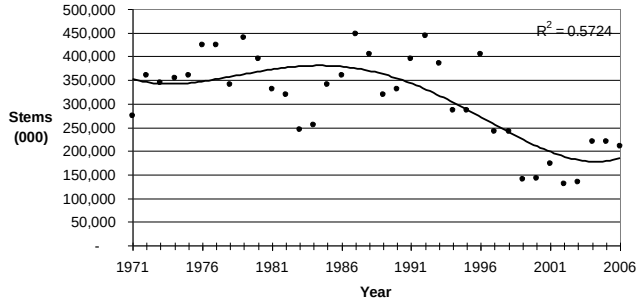

Figure 4. Total annual palm imports to the United States, 1971-2006

Although annual imports have been volatile throughout, they reached an absolute peak of nearly 450 million stems in the mid 1980s before beginning an erratic, downward trend. Only in recent years has the downward trend that began in the early 1990s slowed, or perhaps stabilized, with imports rebounding from fewer than 150 million stems in the early part of the current decade to about 225 million annually.

Palm imports also vary by season. For most species demand doubles or trebles, with respect to the week-to-week baseline, during the weeks preceding Easter. Seasonal peaks vary by species; however,

and one of the most popular overall sellers – *C.oblongata* – typically receives only a 20-30 percent bump in demand during the Easter season. This point emphasizes to the importance of recognizing that Chamaedorea is a "commercial composite" Comprised of species possessing different market attributes.

Product Heterogeneity

Latin Greens and Commodore are the two most common trade names used in the United States to generically reference all commercial varieties of Chamaedorea foliage. Because the commercial classification is comprised of numerous species, or products, it is important to recognize that aggregate annual and seasonal export, import, and sales figures mask differences in species-specific values. *C.oblongata* (Wide), *C.elegans* (Jumbo), *C.quetzalteca* (Giant or Chiapas), and *C.ernesti-agusti* (Fishtail) are the predominant species, in terms of unit volume, used for commercial foliage (CEC, 2002; Reyes Rodas and Wilshusen, 2006). Species level data are often unavailable or unreliable (Camarena M, 2005). Significant demand volume differences as well as regional availability of varieties may prove to be important considerations in determining location-specific production system and market interventions, such as certification.

Eco-Palms: an Emerging Market

The most noteworthy emergent trend in the palm market is the recent establishment and rapid growth of the market for "Eco-Palms" amongst church consumers. In 2001, the North American Commission for Environmental Cooperation (CEC) commissioned a study of the overall market for Chamaedorea palms in North America and Europe (CEC, 2002; Current and Wilsey, 2002). This market study identified a potential opportunity for developing a market for sustainably extracted palms oriented toward church consumers. This potential market niche was further explored in a subsequent study (Current*, et al.*, 2003) and, in 2005, a pilot sale of "Eco-Palms" was organized and administered by the Center for Integrated Agricultural and Natural Resources Management (CINRAM) at the University of Minnesota. In 2006, the pilot was expanded to a regional sale centered on the Minneapolis-Saint Paul urban area. The regional effort sold 80,000 stems, up from 35,000 in 2005 (Table 2). Fueled by the success of the 2006 regional effort, the sale went national in 2007 with sales of nearly 364,000 stems.

Table 2. "Eco Palm" Sales

	2005	2006	2007
Sales (stems)	5,000	80,000	364,000

Source: (Lacey, 2007)

Eco-Palm sales have generated a buzz among project promoters and in the broader Chamaedorea community. Yet, it is important to contextualize these sales figures by juxtaposing them against the conventional palm market. Plotting *imports* of conventional palms and *sales* of Eco-Palms (both logarithmically transformed and the latter lagged one year) demonstrates two important points (Figure 5). First, annual sales of eco-palms have grown exponentially. This pattern has justifiably fueled optimism. Optimism should be tempered; however, as the volume of eco-palms remains several orders of magnitude lower than the volume of conventionally produced stems. In 2006, just over 200 million conventional stems came into the United States compared to the 400,000 stems of eco-palms sold in 2007.

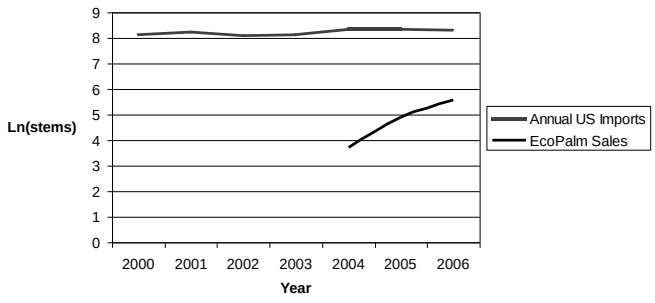

Figure 5. Total annual imports to the U.S. and sales (1-yr lag) of Eco-Palms (AMS, 2007; Lacey, 2007)

Discussion and Conclusions

We hypothesized that the feasibility of certified extraction would depend upon the relative attributes of conventional and certified supply and demand in the global market. Three observations germane to the hypothesis emerged from the analysis.

First, economies of scale represent an obstacle for actors involved in the commercialization process. Present demand makes segregation of eco-palms from conventional palms in the supply chain infeasible over the long term (Everett, personal communication). This assessment by one of the largest U.S. palm importers sheds light on the present gulf between annual demand for 400,000 eco-palm fronds and the over 200 million fronds annually imported to the U.S. We are reminded of Overdevest's (2004) observation that strategies for the certification of high-standard products and processes are often limited by the difficulty of constructing viable markets. For palms, the viability of a certified market appears to be limited by nascent consumer demand, manifested in insufficient economies of scale in the supply chain.

Second, the seasonality of certified demand suggests that palm extractors face challenges associated with adjusting their year-round activities to accrue benefits for the Easter season. Communities extract palms throughout the year in most regions. Their willingness to pursue certification for the seasonal market will likely depend on three factors. First, the price of certified palms is a determining factor in assessments of the benefits of certification. Second, certification confers benefits to extractors through market, learning, and signaling mechanisms (Rickenbach and Overdevest, 2006). The extent to which they 1) recognize and 2) value these benefits will play an important role in their willingness to certify. Third, as state institutions increasingly focus on sustainability guidelines for the harvest of forest products, the extent to which certification facilitates state authorization for palm extraction might increase amenability to subjecting extraction to certification standards, even if market benefits accrue during the Easter season.

Finally, the barriers to entry for certified extractors could be imposing, especially if they are interested in accessing only the seasonal certified market on their basis of their ability to easily accommodate certification standards. The global palm commodity network is comprised of a few dominant actors and regions; most have established relationships with other actors in the value chain and significant history in palm commercialization. Transaction costs to intermediaries and buyers of building relationships with new suppliers could represent a significant obstacle, particularly to existing actors, given the often under-developed socio-political infrastructure in extractor communities. This challenge becomes even more imposing if present extractors determine that certification makes sense. The case of the certified MBR community forest concessions and the current push for certification by international actors such as Rainforest Alliance suggest that such a scenario is worthy of serious consideration.

We conclude that a combination of *quality-driven procurement* of natural resources and *vertical integration* of early-stage processing might represent an *intermediate step* in the development of markets for natural products certified for sustainability. Early success in Guatemala's MBR highlights the value of including quality standards in sustainable management and/or social justice certification schemes. Although the forest concessions in the MBR are commercializing palms that are certified for sustainable management through an addendum to FSC forest management certification, they are being purchased for their quality attributes. Palm certified for both quality and other social/environmental standards thus provides a possible solution to the problem of insufficient economies of scale. With proper handling (i.e. segregation) throughout the supply chain, these palms can be sold at current prices in the conventional market, or, when the demand exists, for a premium as certified palms to churches and other interested consumers. Moreover, emphasis on quality provides an opportunity for extractors and communities to assume increased responsibility for early-stage palm processing; in effect, vertically integrating these links in the palm procurement system. The recent direct-sale experience of the forest concessions in the MBR provides some early evidence that such a model can be successful.

Combining *product* quality standards and extraction *process* standards (i.e. sustainable management) represents a bundling of attributes that when taken alone might be insufficient to support commercial success for actors throughout the value chain. Vertical integration at the extractor level helps to ensure that more of the benefits to certification will accrue to harvester communities, where they may reinforce conservation efforts. Thus, the bundling of product quality and process standards coupled with vertical integration early in the supply chain might serve as an intermediate step in the development of a certified palm market, during a market development phase that might otherwise preclude the commercialization of process-only certified palms. Over time, as the market for "sustainable" or "fair" palms approaches

anticipated levels of success and scale, product quality and process standards could be unbundled, although we expect that a regressive move of this type would be unlikely.

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