

Nontimber Forest Products in Community
Development and Conservation: The Palm
Desmoncus schippii in Gales Point, Belize

Jill M. Belsky and Stephen F. Siebert

Nontimber forest products (NTFPs) have been advocated as a means to promote forest conservation and community development because of their widespread use and value, as well as their purported potential for sustainable harvesting with few adverse effects on other flora and fauna (Nepsted and Schwartzman 1992). Enthusiasm for NTFPs in community development and conservation stems in large part from reports extolling their high economic value. For example, Peters, Gentry, and Mendelsohn (1989) reported that the net value of fruit and latex extraction in the upper Amazon was \$6,330/ha, while Balick and Mendelsohn (1992) noted that the current value of medicinal plant harvesting in western Belize was \$726/ha. In contrast, LaFrankie (1994) found that sustained production of wild cinnamon (*Cinnomomum mollissimum*) and incense (*Aquilaria malaccensis*) in Malaysia was worth only about \$0.10/ha/year, while sustained-yield harvesting of rattan (*Calamus exilis*) in Sumatra is estimated to generate only about \$4.50/ha/year (Siebert 1995).

In theory, when extraction of a species that exhibits high population densities, year-round product availability, and strong demand has little adverse effect on other flora and fauna, this species could be expected to have high extractive development potential (Salafsky, Dugelby, and Terborgh 1993). However, in many studies the potential value of NTFPs is exaggerated by the assumption of unrealistically high discount rates, unlimited market demands, no transportation difficulties, and an assumed absence of product substitution

potential (Phillips 1993; Tremaine 1993). NTFPs also are rarely the mainstay of the rural household or community economy, serving primarily to supplement other resource and income flows during particular seasons in the year (Arnold 1995). Collectors and NTFP artisans frequently are farmers with high labor demands tied to agricultural calendars, or landless workers who take wage work whenever it is available (Siebert and Belsky 1985; Richards 1993; Belsky and Siebert 1995).

The unwillingness of states to recognize and legalize customary resource tenure and community management institutions has led to the breakdown of local access and management rules, especially when harvesting of NTFPs occurs in protected areas or areas subjected to commercial logging pressures (McCay and Acheson 1987; Berkes 1989; Poffenberger 1990; Peluso 1992). Case studies from around the world have shown that villages with strong community management institutions and secure property rights have sustained access to and use of forests for generations (Poffenberger 1990). However, political, economic, and social changes within and beyond communities have led to the loss of traditional methods of access control, usufruct allocation, and conflict resolution. Overuse and degradation frequently accompany the progressive transfer of resource management decisions to central states, and many previously common-managed resources now operate essentially as unregulated "open access" resources, despite laws and policies that constrain their use (i.e., "paper parks") (Poffenberger 1990). In other cases, possibly due to low population densities, limited product demand, extensive resource frontiers, and/or particular cultural traditions and development histories, no common-managed resources or common management institutions have developed. Whatever their etiology, the lack of management efficacy—whether state- or community-based—seriously threatens the viability of implementing sustained-yield harvest guidelines for NTFPs, even if they are ecologically possible.

Analysis of an NTFP currently at a low level of use in a community in Belize demonstrates that creation of an economically viable industry is not simply a matter of identifying an underutilized, easily renewed resource. We examined current NTFP extraction of tie-tie (*Desmoncus schippii*) a common liana species, used in basketry by the Belizean community of Gales Point. By combining ecological research into the reproductive and growth habits of the plant with sociological data gathered from individuals who utilize the resource, we assessed the viability of tie-tie extraction for a potentially expanded NTFP industry.

Species Characteristics

Desmoncus is a diverse genus of climbing palms found throughout the Neotropics from Mexico southward to Brazil and Bolivia. The group is poorly

known botanically, but it may include as many as 61 species (Uhl and Dransfield 1987). *Desmoncus* spp. are reported to be most common in lowland forests, particularly open areas and along river banks, and are rarer in the undergrowth of closed canopy forests (Uhl and Dransfield 1987). Henderson and Chavez (1993) reported that *Desmoncus* spp. appear to prefer light gaps and other open areas in western Amazonia. Similarly, Quero (1992) found that *D. quasillarius* and *D. chinantlensis* are widespread in disturbed areas and secondary forests throughout southern Mexico.

Canes from *Desmoncus* have been used for centuries by forest-dwelling and rural people. Over a century ago, Alfred Russell Wallace (1853) noted that *D. macroacanthus* was used by Amazonian Indians in the construction of manioc pressing grates. The anthropologist Claude Levi-Strauss (1952) observed *Desmoncus* spp. use in basketry among South American Indians. More recently, Balick (1979) reported widespread *Desmoncus* spp. use by Guahibo Indians in the Amazon Basin, Williams (1981) noted the use of *Desmoncus* spp. throughout Central America for weaving and basketry, and, in a comprehensive review, Phillips (1993) reported that *Desmoncus* spp. provide fiber for weaving and cottage industries as well as edible fruit. In Belize, *Desmoncus* cane is used in whole or split form for weaving baskets and handicrafts.

Despite the widespread distribution of *Desmoncus* spp. and its economic importance, the group remains poorly known ecologically (Henderson and Chavez 1993) and economically. In this chapter, we assess the ecology and use of *Desmoncus schippii* Burret (known locally as "tie-tie") and its potential integration with forest conservation and community development efforts in Belize.

Research Site and Study Methods

We selected Gales Point, Central Belize, a rural Creole village located on a narrow peninsula on the Southern Lagoon about 30 km south of Belize City (three hours by small boat) (see Map 1 in Introduction to this volume), to conduct research on *D. schippii* because of recent activities by the Belizean government and foreign consultants to promote community-based ecotourism and wildlife conservation in the area (GPPC 1992; Horwich et al. 1993; Horwich and Boardman 1993). The natural attractions of Gales Point are many. Of utmost conservation importance are one of the largest Central American populations of the West Indian manatee (*Trichechus manatus*), a hawksbill turtle (*Eretmochelys imbricata*) nesting beach, and waterfowl rookeries (GPPC 1992). In 1992, Gales Point Village and the surrounding estuaries, karst hills, lowland savanna, and broadleaf forests were designated by the government of Belize a special conservation and development zone (known as the Manatee Conservation and Development Area). Volunteers from nongovernmental organizations (NGOs) such as Community Conservation Consultants and

governmental officials are planning the Manatee Community Reserve (MCR), 170,000 acres of public and private land and three large lagoons (Horwich et al. 1993). The specific tourism and local development objectives of the MCR are to develop a locally supported reserve that integrates the use of private and government-owned lands and ensures sustainable use of resources; to maintain and strengthen the local rural culture; and to develop supplementary sources of income through tourism. Integrating tourism with economic development that builds on local culture is a major objective of the MCR, as stated by Horwich et al. (1993): "The sanctuary will concentrate on developing tourism around the community lifestyle, giving tourists an authentic experience of village life, something like the exposure to Creole culture at the Community Baboon Sanctuary."

Since 1992, the planners have worked with interested residents of Gales Point to develop community management institutions built around the model of legal cooperatives to organize and equitably distribute access to and benefits from local ecotourism activities including bed-and-breakfast accommodations, boat operation and tour guiding, farming, and handicrafts based largely on *Desmoncus* basket weaving.

In 1993, 1994, and 1996 the authors and ten Belizean and American students lived in Gales Point and collected data on household assets, livelihood strategies, decision making underlying participation in tourist activities, concerns related to community-managed tourist institutions, and conservation attitudes. The field research methodologies included participant observation, key informant interviews, oral histories, and, in 1994, in-depth household interviews using standard random sampling techniques and a questionnaire developed by one of the authors. Thirty-four households comprise the survey sample (or 56% of 61 permanent-resident households) and included all members of the bed and breakfast and craft associations; the rest were chosen randomly from the remaining village household population.

Ecological research on *D. schippii* was conducted in Gales Point as well as in four other forest types in Belize to estimate the abundance, distribution, and growth patterns of *D. schippii* plants and canes (individual plants produce multiple canes). Twenty-five 10 x 10 m sample plots were established at random intervals off line transects in each site, providing a total of 0.25 ha of forest sampled. Within each plot, *D. schippii* plants and canes were counted and cane lengths were measured.

Ecological Potential for Sustained Yield Management of *Desmoncus* spp.

Desmoncus schippii plants are abundant and widely distributed in a variety of forest types in Belize (Table 10.1). In a cane collection area near Gales Point, we observed an average of 228 *D. schippii* plants, 92 harvestable canes, and a

Table 10.1. *Desmoncus schippii*. Plant and cane populations in Belizean forests. Numbers indicate the mean number/ha (N = 25 sample plots/site).

	Plants	Harvestable Canes	Meters of Cane
Río Bravo broadleaf forest	172	104	952
Río Bravo secondary broadleaf forest	84	532	4816
Mountain Pine Ridge montane forest on limestone	160	216	2264
Manatee broadleaf forest on karst hills	228	92	844
Cockscomb secondary broadleaf forest	40	72	720

total of 844 m of cane per ha. Plant populations varied by forest type from 40 to 228 individuals per hectare; the number of harvestable canes varies from 72 to 532 per hectare, and the amount of cane ranges from 720 to 4,816 m per hectare in forests from southern to northern Belize. The number and amount of harvestable canes (i.e., those greater than 5 m in length) was highest in disturbed sites (compare the well-developed broadleaf forest in Río Bravo with the young secondary forest in the same location, Table 10.1). In fact, significantly greater numbers of plants and harvestable canes were observed in disturbed environments with high light intensity (e.g., canopy gaps) than in undisturbed, low-light environments ($P < 0.05$). These data confirm observations that *D. schippii* appears to prefer disturbed and early successional sites. This preference may bode well for the future availability of cane supplies, as the area of disturbed forest is increasing in Belize.

Use and Value of *Desmoncus schippii*

Desmoncus schippii canes were collected or used by approximately 35% of the households interviewed in Gales Point (N = 34). Respondents reported that at least one member of the household either collected or wove *D. schippii* during the previous year. Women are the primary weavers, producing baskets, hats, and handicrafts predominantly intended for sale to tourists. A few of the older residents (including one man) also weave baskets for home use.

Most weavers rely on one of five young village men to collect canes from nearby forests, although male family members collect canes while hunting or farming in some instances. A common order is one to two dozen vines (approximately 3 to 4 m each) worth about U.S. \$4 to \$5 in total (U.S. \$1 = BZ

\$2). The whole cane is cut lengthwise into strips; one to two dozen vines are sufficient to make about four small baskets worth \$2.50 to \$7.50, or one large basket worth \$7.50 to \$25. Cane length, basket size, and quality vary enormously, making it difficult to specify size, price, and cane requirements precisely.

Of the approximately one-third of village households involved in the trade, approximately 46% reported collecting or weaving *D. schippii* crafts "often" (i.e., at least once each month during the previous year); 54% said they did so "rarely" or only a few times during the previous year. Whether a household collects or weaves cane (at either level) was not significantly related to class differences, defined in terms of the households' self-identified level of food security. Some older residents noted that they wove baskets for household use before plastic items were available, but now no longer do so.

The sale of *D. schippii* crafts is not a major source of income in the village. Wage labor (30%), selling "bush meat" (27%), and remittances from family members working elsewhere (16%) are the primary household income sources; income from newly initiated ecotourist activities was the major source of household income for only 14% of survey respondents (see Table 10.2). The latter reflects mostly boat operators/tour guides and bed-and-breakfast operators. These respondents reported per capita income higher than that reported for members of the craft and farming associations (see

Table 10.2. Primary source of household income in Gales Point.

	Frequency	Percentage
Wages ^a	11	29.7
Sell bush meat ^b	10	27.0
Remittances/pension ^c	6	16.2
Tourism-related ^d	5	13.9
Sell fish	3	8.1
Sell farm goods ^e	1	2.7
Rent	1	2.7
TOTAL ^f	37	100

^aFrom working at nearby Whiteridge citrus plantation and Manatee Fishing Lodge, and providing services within Gales Point Village (teacher, postal worker, carpenter).

^bPredominantly gibbon or agouti, but also deer, peccary, and, to a lesser extent, armadillo.

^cFrom relatives in the United States and Belize City.

^dMostly as boat operators/tour guides and from providing bed-and-breakfast services.

^eThis applies largely to root crops, bananas, and vegetables, as well as roasting cashew nuts (in season) and collecting coconuts for sale.

^fPercentages do not add to exactly 100 due to rounding.

Table 10.3). That income from crafts remains very low is substantiated by the fact that only one household reported that income derived from selling or weaving *D. schippii* was "very" important to their household's economy; over half of the households in the trade (55%) characterized it as a supplementary income source, while 36% utilized it only for emergency or sporadic income.

The low economic value of *D. schippii* to Gales Point residents is not related to its access or supply. As noted above, *D. schippii* is abundant in the Manatee forest, where it is an "open access" resource—that is, cane harvesting is not restricted. Similarly, there are no efforts by the community, currently or historically, to manage cane or plant populations. Villagers report that wild plants are simply cut and new canes coppice from basal clusters (Figure 10.1), which are harvested again after several years. There are no reports of anyone ever cultivating *D. schippii*. Most survey respondents and key informants characterize the plant as plentiful in the nearby forest, although some noted that it is now unusual to find vines longer than 16 m (reportedly common decades ago), and that it is increasingly difficult to locate even short

Table 10.3. Average per capita income by membership in community management associations.^a

Category	N	% ^b	Average per capita income (\$BZ) ^c	Standard deviation
All	29	14	872 (US 436)	597
B & B members	10	16	1,020 (US 510) ^d	747
Boat operators and tour guides	7	12	1114 (US 557) ^e	773
Farm association	10	16	852 (US 426) ^f	680
Crafts association	7	12	885 (US 442) ^g	535

^aSurvey respondents were asked to tell us their average household monthly income over the previous year. Twenty-nine households responded (8 households did not respond). To calculate average per capita income, the mean for each group was divided by 5 (the average size of the household) and multiplied by 12 (total months in a year). N refers to the number of households with at least one member participating in the association.

^bPercent of households in the village as a whole.

^cBZ \$2 = US \$1

The following values refer to statistical comparisons of the income of particular group members with nonmembers. F is the statistical value of the test, and P refers to its significance.

^dF = 4.281; P = .048 (mean scores B & B members and nonmembers)

^eF = 3.02; P = .094 (mean scores BO/TG members and nonmembers)

^fF = .008; P = .931 (mean scores FA members and nonmembers)

^gF = .403; P = .521 (mean scores CA members and nonmembers)



Figure 10.1

Tie-tie (*Desmoncus schippii*) plant, showing spiny stem, inflorescence, and compound leaf

canes (e.g., 4 m long) in the closest collecting areas on the west side of the lagoon. These observations are confirmed in the Manatee sample site, where cane lengths averaged 9.2 m (\pm 2.0 m) and no canes longer than 12 m were observed.

The Potential of *D. schippii* in Community Development and Conservation in Gales Point

Desmoncus schippii possesses a number of characteristics favorable to sustained extraction and use in forest conservation efforts. These characteristics include: (1) high population densities in a variety of forest types and soil conditions, (2) preference for disturbed habitats and secondary forests, which are becoming increasingly common, and (3) use by rural Belizeans as cash income through the production and sale of baskets and other woven products. These

traits, in conjunction with the plant's clustering growth habit and ability to resprout following cutting, suggest potential for sustained extraction.

Despite favorable ecological attributes, there are a number of potential constraints to sustainable *D. schippii* extraction. First, the rate of cane growth and effects of repeated harvesting are unknown. Collectors reported that canes can be repeatedly harvested at three- to four-year intervals; several plants sampled in this study showed evidence of previous harvesting, particularly in the Manatee site.

Secondly, the effect of cane harvesting on other flora and fauna is unknown. Harvesting does not appear to have any direct adverse effects on trees or epiphytes that grow in association with these lianas. However, *Desmoncus* spp. fruits are consumed by frugivorous birds (Hess 1994), and they and other palm species could be a significant, even "keystone," food resource for birds and mammals (Terborgh 1992). If protected area managers in Belize wish to pursue sustained-yield harvesting of NTFPs, the viability and ecological effects of product harvesting must be carefully investigated. Peters (1994) recommends a series of basic procedures before and during any extractive operation, including forest inventory, regeneration studies, and harvest assessments and adjustments. If product extraction is to be compatible with conservation objective, the effects of extraction on plant pollinators, seed consumers, and dispersers, as well as other mutualistic relationships with vertebrate and invertebrate populations, must be assessed. In addition, it will be necessary to monitor the health and vigor of plant populations over time. For example, cane collectors in Gales Point reported that *D. schippii* growth and resprout rates have recently been adversely affected by insects consuming the apical meristems. Such factors could greatly affect the viability of the populations used for NTFP extraction.

Prospects for *D. schippii* harvesting and handicrafts to contribute to community development and forest conservation efforts are constrained by its low market value, uncertain future market demand, and the difficulties inherent at both the community and state levels in establishing and enforcing harvesting guidelines under open-access resource conditions. The latter is exacerbated by the fact that there have never been traditional common management institutions in Gales Point or state policies that monitor or enforce sustainable levels of cane extraction, nor viable producer or community organizations that might assume monitoring and enforcing roles in the future. Contemporary efforts at developing a community craft association are centered primarily on teaching cane plaiting skills and facilitating marketing.

At present, *D. schippii*-based cottage industries in Gales Point do not provide sufficient income to contribute significantly to conservation efforts. Wage labor, farming, and sale of wild game are more important sources of household income than collecting and producing *D. schippii* handicrafts. The minor role of *D. schippii* in the rural economy—especially one characterized

by limited access to land—is striking when compared to the role of rattan in the Philippines and Indonesia (Siebert and Belsky 1985; Belsky and Siebert 1995). In the latter areas, income derived from selling rattan canes and/or making rattan handicrafts are the primary livelihood for many households, particularly those who are landless or without access to producing their own rice supply. While the majority of Gales Point residents are also landless and must purchase basic food staples, *D. schippii* harvesting and handicraft manufacturing have not assumed a similarly important role in the household economy. The considerably higher market demand for Asiatic rattans and the centuries-long trade history and community-managed traditions are important differences between these two NTFPs.

We suggest that the relatively low socioeconomic importance of *D. schippii* in Gales Point can be attributed largely to the fact that cane harvesting and handicraft manufacturing have not been traditionally widespread in the village, and hence are not a significant part of the “community lifestyle.” *Desmoncus* baskets have gained commercial value only recently with the burgeoning tourist trade, and even that is limited and sporadic. Marketing outlets and logistics remain poorly developed. A major impetus for rejuvenating and expanding cane handicrafts has come from an older part-time Gales Point resident who has been teaching local residents to weave handicrafts (Figure 10.2). Thus far, women with young families have expressed the most interest in learning how to weave. Women with small children find weaving attractive because it provides an opportunity to socialize while working and because it can be done in or around the home in conjunction with other domestic responsibilities. Outside of selling small home-cooked foods, women stressed the limited availability of necessary income-generating opportunities for them in the village.

Handicraft marketing is constrained by the small and unpredictable number of tourists traveling to Gales Point. This situation creates little demand and small incentive for people to manufacture handicrafts. Villagers expressed hope that ecotourism and efforts to establish a crafts center will increase tourist visitation and opportunities to sell handicrafts. Indeed, many survey respondents indicated that they are “watching” the trade and might take up weaving if demand increases and they can be assured a market outlet and reasonable returns for their labor.

Opportunities may exist to improve the *D. schippii* handicraft market. For example, in the village of Teakettle in western Belize, a small group of women weave handicrafts and baskets. One community member transports them to ecotourist lodges and craft centers throughout Belize City. When interviewed, the handicraft producers said that reliable market outlets and good prices underlie their involvement in the trade beyond producing handicrafts for home use. In Teakettle, a major limitation facing handicraft production is that cane supplies are located far from the village. The strength of the demand



Figure 10.2

Basket-weaving using tie-tie canes at Gales Point, Belize.

for *D. schippii* handicrafts in Belize remains to be determined. Personal observation of current quality and cost suggest that it is unlikely the trade could compete in global markets. Additionally, there is some risk of villagers becoming dependent on a single, potentially volatile, tourist-based marketing outlet.

If marketing constraints are overcome and the *D. schippii* trade increases in Gales Point, problems with resource access and supply could arise due to the open-access nature of the resource (McCay and Acheson 1987; Berkes 1989). A reconsideration of property rights would become critical at the village and state levels to determine which individuals in which communities would have access and control over cane supplies, as would monitoring and enforcing sustainable cane harvesting rates. Based on work elsewhere, user or producer groups should play an important role in NTFP management, specifically to ensure that more powerful groups within communities do not overshadow the

concerns of NTFP collectors and producers—typically the least wealthy stratum in rural communities (Belsky and Siebert 1995). Additionally, efforts at legalizing NTFP collection and promoting equitable community management could create additional competition or conflicts beyond communities, involving state agencies, merchant groups, and NTFP collectors and producers in other areas. Conflicts over NTFP policies and practices in Belize could be mediated, however, by the presence of community-oriented conservation consultants to assist with developing harvesting guidelines, monitoring impacts on both people and wildlife, and providing political support for the role of local property rights and community development in conservation.

Conclusion

Despite favorable ecological attributes, the potential of *D. schippii* to contribute to community development and forest conservation is constrained by low market values, uncertain future market demands, open-access resource management and control problems, and the absence of community traditions, local organizations, and state sanctions to develop and support sustainable cane harvesting. Efforts to promote community development and conservation in Gales Point should address primary livelihood activities—hunting, wage labor opportunities, and farming. Local economic viability and environmental conservation are more likely to result from the sustainable development of these activities than on supplementary activities such as NTFPs. These conclusions are likely to be relevant to the management of *Desmoncus* spp. and other NTFPs throughout the Maya Forest region of Belize, Guatemala, and Mexico.

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Governmental and Customary Arrangements Guiding Chicle Latex Extraction in Petén, Guatemala

Barbara L. Dugelb

Scientists and resource managers increasingly are calling for conservation efforts to better accommodate the needs and expectations of local communities. A community-based approach, it is argued, can better combine development objectives with those of conservation and offers an alternative to traditional conservation strategies that impose heavy restrictions on resource exploitation (Western and Wright 1994). On a similar front, recent studies stress the important role of local knowledge and institutions in the strategies adopted by resource users (e.g., Agrawal 1993, 1995; Gadgil et al. 1993; Browder 1995). This chapter describes and analyzes institutional factors affecting the exploitation of chicle latex, a natural base for chewing gum extracted from the forest tree *Manilkara zapota*, in the Maya Biosphere Reserve in northern Guatemala (Figure 11.1). Specifically, it examines the role that both governmental regulations and customary arrangements play in guiding resource extraction, and ways in which these factors might contribute to sustainable management of the resource.

Study Region

In 1990, the Guatemalan government established the Maya Biosphere Reserve in the northern Petén (CONAP 1990). Of particular importance to rural populations living in and near the reserve are the nontimber products extracted from the forests. In 1991, chicle production was worth approximately U.S. \$1.4 million and employed 2,000 seasonal workers (Santiso