



Forest Products in Nicaragua

by A.L. Hammett, J.K. McCrary, and G.P. Bauer



Recent events have shown Nicaragua to be a resilient country. It was devastated by a major earthquake in the 1970s, consumed by 10 years of civil war, affected by the strange weather patterns of El Niño, and most recently, hit hard by Hurricane Mitch. Yet there is reason to believe that things can improve for the people of Nicaragua, and it is hoped that the forest products sector will be able to contribute to a brighter future for this country.

Nicaragua offers us an opportunity to examine some of the forces that affect forest resource management and forest products utilization. Nicaragua has long been ignored as a source of forest products. With ample supplies of raw materials, a strong entrepreneurial business community, and an underutilized workforce, Nicaragua has great potential. As our need

to understand the forest sector possibilities of other regions grows, a closer look at this country is warranted.

Nicaragua covers an area slightly larger than the state of New York (50,446 square miles), and has a population of just under 4.5 million (22). The country has a low population density as well as the greatest endowment of renewable natural resources among Central American nations (8). Nicaragua's forests cover over 6 million ha (1.6 ha per capita), which is just over 50 percent of its land area (23). Its standing forests total more than four times the area covered by the forests of its neighbor, Costa Rica (24), and there are natural ecosystems such as mountain pine-oak forests (*P. oocarpa* and *Quercus williamssi*) and coastal pine savannas that are not found further south (12).

Nicaragua, has several high-valued hardwood species, including extensive but poorly maintained and evaluated stands of mahogany (*Swietenia macrophylla* on the eastern side of the country; *S. humilus*, which is much rarer and only grows on the Pacific side); Nambar (*Dalbergia retusa*); and small plantations of teak (60 ha) (23).

Important changes in land use policy in 1990 greatly affected the forest products industry in Nicaragua. These changes prohibited productive forestry activities on just over 1.7 million ha of land within the national system of protected areas (SINAP); while 2.6 million ha of land was designated for production forestry purposes (15). The Nicaraguan system of protected areas was expanded during the 1990s, so that today it includes 2.2 million ha of land, which is about 17 percent of its national territory (4). The protected area system of Nicaragua today includes the Sís-a-Paz International Peace Park (a bi-national park of 500,000 ha along the border with Costa Rica (19)), and the BOSAWAS Biosphere Reserve that extends into the Honduran Mosquita. These two areas constitute the largest American tropical rain forest north of the Amazon. With this increased area of protected forests now mandated by land-use restrictions, it is critical to use wisely the remaining available timber-producing areas and improve planning so that adequate resources will be available to the forest products sector.

Nicaragua has faced a bewildering array of governments in recent years. In addition to this situation, wars, civil strife, embargoes, and the collapse of its Eastern bloc supporters have all contributed to the erosion of Nicaragua's economy. Nicaragua has by far the lowest population density in the region (36 persons/km², which is 1/5 that of El Salvador) (21)), but high unemployment (unemployment plus underemployment equals about 49 percent of the workforce) and extremely low wages (GDP \$452 per capita) have continued through the 1990s (22). With the turmoil of civil war and changes in government, Nicaragua's

socioeconomic position in the world has plummeted. We agree with Elizondo (8) that development in Nicaragua will rely heavily upon the sustainable development of its natural resources.

With recent political stability and abundant forest resources, it seems likely that Nicaragua could improve its lot through developing its forest products sector. To learn more about the potential of the forest products sector, the authors made several field trips to Nicaragua during May and June of 1998, and conducted follow-up interviews later in 1998. In this article, we describe the forest-based enterprises that we visited and discuss the obstacles that must be overcome in order to develop the country's forest products sector.

Historical Perspective

Nicaragua approached the end of the 1970s under a family-run dictatorship, with political instability and civil war stalling a strong agriculture-based economy. More than 1.5 million ha of land, mostly natural pine and pine-oak forests in the North-Central mountains and the Northeastern pine savannah, was converted into pasture. Many of the logs being harvested were exported and the opportunity to add value in Nicaragua was lost. Although pine boards and plywood (manufactured from *Pinus oocarpa* and *Pinus caribea*) were also used domestically, more than 50 percent of these products were exported to foreign markets (10).

In 1979, the long-standing Somoza family reign in Nicaragua was overthrown by a conglomeration of opponents led by the socialist-leaning Sandinistas. In this revolutionary period (1979-1990), the private forest products sector deteriorated as most lumber companies and natural resources were nationalized. Idealistic environmental policies began to be implemented when the government created a cabinet-level position that focused on the environment. In addition, forest harvest concessions awarded to overseas firms during the Somoza period were cancelled (7), a national system of protected areas was established, and ambitious reforestation schemes were developed, especially in the agricultural northwestern sector. However, with little infrastructure and few resources and personnel, implementation of these programs proved difficult or almost impossible. In addition, during this period, over 75 employees of environmental protection or forest service organizations were kidnapped or killed, and several reforestation projects were destroyed by fires set by rebels (17). International markets became severely constrained during the revolutionary period, as well as domestic capacity to finance improvements or ordinary maintenance in forest products enterprises (10).

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The environmental policies also proved to be economically unfeasible (8).

An economy ravaged by war, embargo, and internal political conflict was inherited by the pro-capitalist successor to the Sandinistas, the democratically elected government headed by President Violetta Barrios de Chamorro. By the end of the Sandinista period, processed wood production had dropped to lower than one-quarter of the peak levels of the 1970s, and remained low through the mid-1990s. Whereas internal use of processed wood has not risen substantially since the end of the 1980s, exports of sawn wood increased from fewer than 5,000 m³ in 1991 to over 55,000 m³ in 1995 (10). When export markets for roundwood increased, this allowed an increase in the production of roundwood to pre-revolution levels. But since this unprocessed roundwood has been mainly exported, important opportunities to increase product value inside Nicaragua have been lost (10, 24).

Deforestation

The agricultural frontier in Nicaragua was described more than a century ago by the mining engineer, Thomas Belt (3). His description of primary forest being cut to produce basic grains, and then, within a few years, cattle, corresponds to a recent socio-economic characterization of the agricultural frontier today (14).

Peace and reintegration of previously embattled political factions within Nicaragua have brought new problems and exacerbated old ones in the environmental realm. Soldiers have quite remarkably beaten their proverbial swords into plowshares, but with several unintended results. Thousands of former soldiers have been sent to the agricultural frontier in the



As in many other countries in the region, collecting and selling firewood for cooking provides important income for many Nicaraguan people. The harvest of firewood leads to the deforestation of many hectares of land. (Photo by Jeffrey McCrary.)

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northern and southeastern sections of the country, where they clear still more forestland for farms and ranches. They are being accompanied by peasants who had once fled the same areas and now feel secure enough to return, and by others in search of more productive lands. In addition, forestry resources have been privatized, and large-scale forestry concessions, although strongly disputed, have been awarded to foreign companies in recent years (7,10). These pressures are moving the agricultural frontier still further eastward into the primary forest (11,20), and into areas, particularly in the north, that have been traditionally inhabited by non-Spanish speaking, indigenous people.

Each day, the agricultural frontier penetrates into areas with higher rainfall and lower soil quality, provoking a crisis in unsustainable land use patterns. Furthermore, changes in forest cover patterns and concomitant land uses such as periodic burning in Nicaragua are considered to contribute to increases of local temperatures by more than 3°C since 1944 (13). The periodic burning of agricultural fields, wood lots, and pasture lands reached a point of crisis during the 1998 dry season, when airports throughout Central America were closed for more than a week due to the resulting smog (personal observations by the authors during May-June 1998 field trips and (1)).

Forest-Based Enterprises

With a large available workforce, ample forest resources, and close proximity to markets, it seems likely that Nicaragua should have good potential for an expanded forest products sector. We interviewed the owners and employees of nearly 100 forest products enterprises in the political departments (similar to counties) of Carazo, Masaya, and Managua, and large-scale producers of sawn wood in the political departments of Managua, Masaya, and Ocotal. We reviewed the types and quality of products, work conditions, production levels, and staff sizes. The following enterprises were interviewed in May and June of 1998: 5 sawmills, 35 firms that made furniture

for the domestic market, 2 firms that exported furniture, 4 enterprises that sold medicinal herbs, 40 handcraft firms, and 4 firms that made baskets and woven floor mats. Each enterprise representative was asked about access to raw materials, markets for products, and use of by-products.

Furniture Producers

For several of the furniture producers, marketing on the local level is not well integrated, in particular for those in the small village of Masatepe (department of Carazo). Several furniture producers sell only by order to retailers in one of two local retail markets or to retailers who sell in larger markets such as Managua. A producer organization in Carazo has helped considerably to locate suitable supplies of raw materials. Tight government controls on timber harvests and poor market systems often force furniture and handcraft producers to obtain their raw materials by purchasing logs from smugglers. We did not see air- or kiln-dried wood being used except by shops producing for export markets.

Although many of the enterprises grouped themselves together to collectively market their products, or have a family-run retail sales location, we encountered 10 that had no retail outlet. These predominantly low-quality furniture makers would make products by order for neighbors or would take the initiative to make a product, such as a baby crib, and then carry it door-to-door in search of a buyer. We saw several low-quality products made with a variety of species because sufficient quantities of one species to make an entire product were not available.

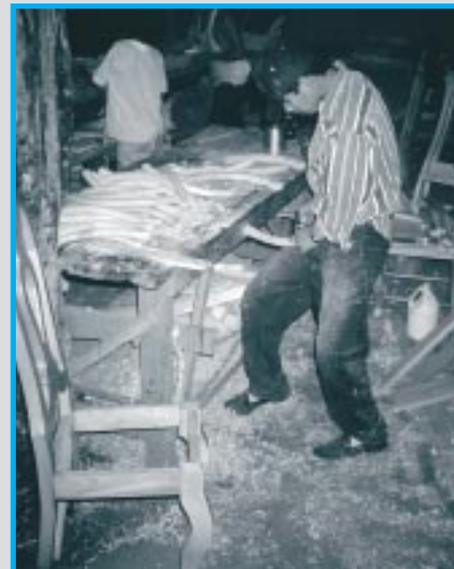
We found that only two of the wood-based enterprises recovered any economic value from wood-waste. Most of the enterprises gave away or sold their wood scraps for a small price. Two other enterprises used sawdust in mulching operations. Even though several shop operators told us they give away sawdust, smoldering piles of excess sawdust were often observed. On several occasions, we noted wood scraps were also burning in the sawdust piles.

All furniture production in Nicaragua is labor intensive. All the enterprises, except the export-market producers and one shop that produced furniture for domestic consumption, used crude tools in generally poor condition. Most of the furniture producers employed five or fewer people. On two occasions, we noted that the enterprise owner was illiterate. Almost all furniture enterprise representatives mentioned the difficulties in obtaining supplies of desired wood. On five occasions, the recently imposed government ban on access to mahogany and other precious hardwoods was mentioned as having a negative effect on business. None of the enterprises monitored quality control and they all had poor gluing techniques and

difficulty producing furniture pieces of uniform size. The following elements generally needed to produce export-quality products are not available to these enterprises: adequate employee training, tools, management techniques, and capital.

We observed many artisan, handcrafted furniture enterprises. Rattan-style furniture is quite popular in Nicaragua, and made of local hardwoods such as Spanish cedar (*Cedrela odorata*). However, instead of bending smaller pieces to shape, workers carve these smaller pieces out of larger stock, by hand. This process is not only wasteful but leads to irregularities that make the pieces unfit for U.S. and European markets. In spite of this poor quality, several wholesalers purchase this furniture for resale to other Central American countries. Rattan and other vines that would be suitable for manufacture of this style of furniture are expensive and only imported in small quantities. We interviewed two furniture makers working with rattan and found the quality of this furniture very poor.

We found much of the furniture made in western Nicaragua suitable only for domestic markets and not up to international quality standards. These findings concur with earlier work in the region that described the following obstacles faced by forest products enterprises: obsolete machinery, interruptions in raw material supplies, bottlenecks in the production facilities, insufficient maintenance, poor managerial resources, and lack of adequate training (16). While



Nicaraguan furniture makers lack the ability to bend furniture parts, so they cut smaller pieces out of larger stock, which wastes wood. (Photo by Jerry Bauer.)



At a sawmill in the city of Masaya, a worker paints the ends of hardwood lumber slated for export. (Photo by A.L. Hammett.)

we could not gauge the quantities in question, it was apparent that much of the furniture wood for internal consumption does not enter the sawmills and therefore bypasses government control. Several firms stocked rough lumber that had been ripped by a chainsaw. Local enterprises do all their own drying, planing, and finishing.

Sawmills

The inefficiencies of wood procurement were most apparent at the sawmills visited. Many of the logs are hauled from distant forests to the East, some over a day's haul. Often the logs have to be obtained illegally to assure ample inventory is in place. Most sawmills seemed to have a substantial log inventory; many logs had diameters exceeding a meter. However, many logs were cracked and degraded during harvest and transport to the mill, or during storage, and this vastly reduced the potential yield of each log.

Sawmill equipment, even though old and perhaps inefficiently used, appears to be of good quality. At each mill, we saw equipment that was idle or operating far below capacity. Several mill personnel reported that spare parts were available, but often costly and subject to delivery delays. Wood is pulled or pushed through radial or bandsaws by oxen, farm tractor, or by employees by hand. Employees did not use any safety equipment. Each sawmill had a blade shop and spare blades. At each sawmill we visited, wood is cut without drying, then sorted, end-coated, and banded for shipment, while the drivers wait for the lumber. There are five dry kilns in the country, but

apparently none of them are operating effectively. Wood purchasers complain that due to the limited drying capacity, operators tend to accelerate the drying process such that instead of curing the lumber slowly it is often "toasted" at high temperatures for only 2 to 3 days. The resulting degrade provides a barrier to high value uses or export markets.

There are at least two mills in Nicaragua currently making plywood (one is almost entirely dedicated to export business). Preliminary indications are that this segment of the forest products sector holds the most promise and could produce sheathing for use in low-cost housing and other valuable applications (18). Currently, all particleboard in Nicaragua is imported, but if local production can be established using recycled wood fiber and fiber from timber thinning operations, this could help replace building materials lost during Hurricane Mitch. The large volumes of sawdust and scrap wood that are currently being burned daily could also be utilized if a particleboard plant was operating in the country. In addition, cement and other raw materials such as agriculture residues and non-wood fibers could be used in the production of panels for low-cost housing (18).

Handicrafts

A large number of handicrafts are made near the west coast. We interviewed several handicraft producers and vendors near Masaya, as well as basket weavers in nearby Carazo. A government-sponsored association of producers and sellers of handicrafts provides technical and marketing assistance to the members for a fee. Its members are provided workshops on wood identification and grading, staining



Wood bowls made from lumber scraps and native species are turned on a lathe and destined for sale in a market in Masaya. (Photo by A.L. Hammett.)

and painting techniques, the latest styles of crafts, and some marketing techniques. However, many forest-based handicraft producers are not members of the association. Three handicraft enterprises told us that they considered the program's assistance limited and expensive. In many of the enterprises that we interviewed, the handicrafts were being produced in back rooms of homes, by family-operated businesses with fewer than five workers. Wood used in handicrafts is often purchased from firewood cutters directly or in large firewood markets. It was interesting to note that Nambar (*Dalbergia retusa*), which is illegal to cut, appeared to be available from firewood suppliers (2).

Non-Timber Forest Products

Herbal medicines are for sale in most central markets throughout Nicaragua. The individuals we interviewed did not claim to have had education in the use of herbs, with the exception of an herbal doctor. This man prescribed herbs for the treatment of physical ailments, which he diagnosed using a mixture of Christianity, spiritualism, a radio antenna, and photocopied pictures of histological stains of tissues. He claimed to have been taught this technique by foreigners in a seminar several years earlier. Some of the herbs he used were grown in his yard and others he sought in nearby forests. He reported treating several dozen people per week, exclusively poor individuals from the town or surrounding countryside who had little with which to pay a more expensive western doctor. We received little information from the other vendors of herbs, as most were not particularly willing to discuss their product sources with us.

While it became clear to us that there was considerable use of medicinal herbs among Nicaraguans, we could not conclude how they are informed about herbs and their uses. Apparently there is little coordination among the herbal practitioners, and it is possible that the traditional knowledge base of medicinal herbal use is being eroded by the increased access to western medical care and by other forces. These products have long been important, not just in Nicaragua but throughout the region, and their continued availability will be determined by the health and amount of forest cover.

We detected relatively few other uses of non-timber forest products in the areas we visited. We did see natural dyes that are used to color fibers and some wood products. Their use has declined because the woven backs and seats in furniture are now being made from an imported plastic product rather than the traditional wicker (*Heteropsis* sp.), which is less accessible than previously due to unsustainable harvesting techniques (20).

The Role of Firewood

As is true in many parts of the world, firewood is Nicaragua's largest traded forest product. Perhaps the biggest pressure on the sustainability of forest products enterprises in Nicaragua is the chaotic firewood supply system. Firewood volumes exceed cut wood volumes by tenfold, and firewood represents 70 percent of the total commercial value of wood products in Nicaragua (10). A government estimate of firewood use is 20 tons per day in the capital alone (9), which is a conservative estimate. Firewood provides about one-half of Nicaragua's energy needs, and is especially important among households of the poor (24). Firewood prices are near \$60 per ton in Managua, almost three times the price in the capital of neighboring Honduras. The poor, trapped by lack of capital, cannot purchase electric or LPG-based cooking systems (6) so they must use firewood.

While no interviews were conducted with firewood dealers, we must recognize that all forest products enterprises are impacted by the structure of the firewood industry in Nicaragua. As in many other areas of the world, hills and protected areas are ravaged by the extraction of illegal firewood. Several illegal truckloads of firewood enter Managua and other cities daily. Control measures are needed to limit this illegal firewood harvesting on unattended private lands and those areas with environmental mandates.

Overview of Technical and Marketing Expertise

We could not estimate firm size based on production volumes as many firms understate their volume to avoid taxes, so we characterized business size

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using the number of employees. The larger firms where those with 40 or more employees; the medium-sized firms employed from 10 to 40 workers; the smaller firms had 1 to 9 workers. The following is a general summary of technical and marketing expertise for the firms interviewed.

In the larger firms, which included export-quality furniture plants and two sawmills, we saw several advantages that permit profitability. There is ready access to a number of desirable wood species and other raw materials that could be used to make high-grade products. However, a recently applied ban on the cutting of mahogany, Spanish cedar, and other increasingly rare timber species has made it difficult for many producers to fulfill long-term contracts. One of the furniture shops was using mahogany but the owner did not wish to divulge the origin of his wood. The owner claimed to be unable to fulfill an export contract for parquet flooring, even though he was utilizing recycled mahogany end-pieces, due to the logging ban.

Nicaragua lacks a domestic market for high-quality wood products. These products are, in general, only sold by direct contact with a market outside Nicaragua, which requires considerable capital to arrange. Investment money is necessary for 1) buildings and machinery; 2) marketing; 3) stockpiling of raw materials due to instabilities in the supply; and 4) training of employees, because there are few well-trained workers for the forest products sector.

The larger enterprises can also be characterized by organized internal management, and by integration of by-product use. For example, one furniture producer also makes educational toys from scrap wood, and the



Local handicrafts are displayed for sale in Masatepe, a small town in western Nicaragua. (Photo by A.L. Hammett.)

better-run sawmills have markets for at least part of their sawdust and end-piece production.

The medium-sized firms (those with 10 to 40 employees) have access to moderate levels of technology. They face irregular access to raw materials, especially to specialty woods such as Namar (*Dalbergia retusa*) and Spanish cedar (*Cedrela odorata*). Both furniture and crafts producers participate in some wholesale markets, and perform some marketing activities to maintain sales (sales calls, roadside or central market stalls, etc.). We saw several pieces of furniture and many handicrafts that were ready for export to Costa Rica. However, these firms get very poor prices, and face strategic problems due to lack of transportation, lack of skilled labor, lack of credit



Obstacles Facing Forest-Based Enterprises in Nicaragua

Often necessary to buy wood through illegal channels

Little dry-kiln capacity, except for export products

Few established retail outlets

Marketing strategy needed

Supplies of raw materials not of sufficient quantity to make an entire product

Lack of training, lack of skills

Little recovery of economic value from woodwaste

Use of crude tools in generally poor condition

Lack of capital and low-interest loans

Little quality control, poor gluing techniques, and lack of uniform sizing

to improve product quality and product integration, and inconsistent utilization of by-products. None of these businesses was concerned with adding wood-drying processes, as the market in Nicaragua does not demand those aspects of quality. The medium-sized and smaller firms that we visited were all practically cottage industries, i.e., small, with intensive family involvement, and self-capitalized.

The 15 smaller firms (1 to 9 employees) that we interviewed had low levels of technical expertise. Here, access to raw materials presented little problem because the shop owners could obtain the low-quality material they used from firewood suppliers. The shops were very small and they lacked work. These businesses make products for general use, such as inexpensive chairs, baby cribs, woven baskets, and other products for everyday use. Products are all made using primitive tools, very low capital, and with very poor business skills among the shop owners. One shop owner in this category quoted a price for a chair marked up at less than 100 percent of the cost of his raw materials. Products are often sold without finishing, and peddled by the producer, door-to-door. This is a relatively large and chronically underutilized sector of the Nicaraguan economy, due as much to lack of education and training of the workers as to the weak Nicaraguan demand for products.



Wood boxes for use in packaging cigars are made in a small factory in Estelí, north of Managua. Tobacco is a major agricultural crop and cigars are an important source of export earnings for Nicaragua.

Future Directions

Based on our work thus far in Nicaragua, we made some observations that indicate what the future might hold for the country's forest products sector.

- The country has a wealth of experience with forest products, and the entrepreneurs who are returning from exile during years of war want to capitalize on new technology and business opportunities.
- Several countries in the region have benefited from forest-based economic development programs; for example, Costa Rica has developed a large eco-tourism trade.
- Vast areas of pasture, abandoned due to the drop in meat prices, offer suitable areas for investment in new tree plantations.
- The well-established sugar industry already uses wood to fuel its electricity generation plants during the off-season when bagasse is not available.
- With technical and marketing help, the thriving, but small, artisan furniture industry could benefit from demand in the region and beyond.
- Increased attention to natural resources and their conservation is common among donor agencies who are currently assisting in Nicaragua (5).
- Construction in Nicaragua has been traditionally built of reinforced earth, concrete block, or clay brick. With the country's housing shortages estimated at 500,000 units (especially after the damage caused by Hurricane Mitch), alternative housing systems are being sought. Composite wood-cement panels with modular housing seem to satisfy local health and safety needs, and the cultural preference for cement-based materials in the tropics (18). With large quantities of agricultural residues and low-quality, small-diameter wood available, and with ample supplies of concrete, local manufacturers could produce low-cost panel products to help alleviate the acute housing shortage.

Nicaragua's most pressing need is to find economical and efficient sources of firewood so that the country's timber resources can be put to the highest and best use. Complicating attempts to develop its forest products sector is the cleanup and humanitarian effort needed after the destruction caused by Hurricane Mitch. In the aftermath of this disaster, several donor agencies are beginning or renewing their assistance to Nicaragua (21). If the forest products sector can be the focus of some of this assistance, the

country would benefit in many ways. Some feel that much of the flood damage could have been averted had Nicaragua practiced better land planning and limited the clearing of native forests for agriculture. However, the first priorities of these donor agencies are the immediate needs associated with health, food, roads, and housing, and rightly so; help for other economic development will come later.

It is hoped that rather than concentrating solely on natural resource conservation, attention will be paid to how the forest products sector can be further developed. When compared to other countries in the region, Nicaragua has abundant forest resources with great potential for sustaining economic development (5). A vibrant domestic forest products sector (forest plantations, well-defined and integrated segments, and healthy domestic and export markets) would help the country's economic development.

Further exploration of the potential for non-timber forest products will likely reveal opportunities for

new enterprises and expansion of existing ones. The existing handicraft and furniture workshops could add greatly to the country's economy, but they need help with quality control, business skills, and marketing enhancement. The country's western region would greatly benefit from better timber processing options, increased markets, and the development of market structures (5).

With the end of the civil war, exiled businessmen have begun to return to Nicaragua, either to open new businesses themselves, or to invest in the new ventures of others. Many have expressed an interest in financing forest products enterprises. This entrepreneurial spirit and confidence in Nicaragua's potential has survived in spite of all the hardships that the country has faced. If Nicaragua's raw material and financial resources are invested wisely, the forest products sector can help the country to recover from its economic problems and play an increasingly larger role as a supplier of forest products.

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- The authors are, respectively, Associate Professor and Coordinator of International Programs, College of Forestry and Wildlife Resources, Virginia Tech, Blacksburg, Va.; Fulbright Fellow and Professor, Faculty of Science and Technology for the Environment, Central American University, Managua, Nicaragua; Biological Scientist, International Cooperation Unit, International Institute of Tropical Forestry, USDA Forest Serv., Río Piedras, Puerto Rico. At the time this article was written Bauer was on special assignment with USAID/Nicaragua. This work was made possible by funding from U.S. Information Service (USIS), U.S. Agency for International Development (USAID), and the Conservation, Food and Health Foundation, Inc. Reprint No. 8886*