

Who Knows? Local Non-Timber Forest Product Knowledge and Stewardship Practices in Northern Michigan

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SUMMARY. Non-timber forest product (NTFP) literature frequently laments the absence of an information base for policy and management decisions. While formal scientific data on the biological and social ecologies of most NTFPs are limited to nonexistent, long-time gatherers often have extensive experiential knowledge bases. Researchers and managers may overlook this expertise because of assumptions about the nature of knowledge and the identity of individuals who possess valuable information. These assumptions are explored and contrasted to the concept of local knowledge. A case study of gatherers in Michigan's

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Upper Peninsula found that many possess extensive knowledge of the products they harvest and observe stewardship practices to assure their sustained availability. The paper is illustrated by descriptions of four gatherers and concludes with recommendations for incorporating the local knowledges of individuals from a variety of cultures into policy, research, and management. [Article copies available for a fee from The Haworth Document Delivery Service: 1-800-342-9678. E-mail address: <getinfo@haworthpressinc.com> Website: <<http://www.HaworthPress.com>>]

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The major problem related to research concerning NTFP is the limited availability of information related to sustainable utilization . . . The difficulty stems from a singular lack of hard scientific data . . . (Tewari and Campbell 1995, p. 57)

INTRODUCTION

Concerns about the (un)sustainable harvest of non-timber forest products (NTFPs) lurk in virtually every discussion of their potential as a tool for preserving biodiversity or promoting economic development. Laments about the lack of information on which to base sustainable management are nearly universal in the expanding body of books and articles on NTFPs. These concerns are founded in well-documented cases of unsustainable NTFP use, especially following the development of a commercial market for products (Homma 1996). Yet the work of ethnobotanists and anthropologists documents extensive knowledge of NTFPs and their long-term harvest by gatherers in the developing world and among indigenous peoples in North America. For example, Grenand and Grenand (1996) and Kainer and Duryea (1992) have described long-term reliance on forest-based goods and social processes that develop and maintain knowledge of NTFP use, ecology, and management in tropical South America. Publications by Anderson (1999), Gottesfeld (1994), Nabhan et al. (1991), Richards (1997), and Turner (1998) document the ecological knowledge and plant technologies of Native American and First Nations peoples in North America.

Why, then, do researchers and resource managers feel that so little is known about what is probably the oldest interaction between humans and forests—the gathering of wild plant material? It is true that as a group, researchers and managers possess only rudimentary knowledge of the biological and social ecologies of NTFPs. However, as the ethnobotanical and anthropological literature suggests, we ignore an extensive body of knowledge when we maintain that information does not exist. Examination of assumptions about the nature and location of knowledge may shed light on this disconnect and address the need for information on which to base strategies for sustainable NTFP use.

Using a case study from northern Michigan's Upper Peninsula (UP), this paper suggests that considerable information about NTFPs currently exists in the United States among gatherers of diverse ethnic backgrounds. A brief discussion of theoretical work on knowledge and its implications for NTFP research serves as prelude to a description of results from fieldwork that revealed local knowledge and stewardship norms among gatherers in the UP. These are illustrated by four examples of gatherer knowledge and stewardship practices. The paper concludes with recommendations for the inclusion of local knowledge in NTFP research, planning, and management.

KNOWLEDGES AND KNOWERS

Scholars of the sociology of science and feminist analysts of the history of knowledge and power have examined the rise of science in the history of human efforts to understand and act within the material world. They note that the scientific drive to discover and describe patterns in nature and to use that information to influence both social and biophysical processes is not historically unique. However, science is distinguished from other systems of knowledge by its commitment to universal principles or laws, their discovery through examination and manipulation of the individual parts of the object under study, and subsequent broad application across time and space. These scholars also chronicle the processes by which science has supplanted other knowledge systems and scientists have attained the status of unique authority (e.g., Haraway 1989; Harding 1986; Merton 1973; Mulkay 1979).

Such analyses have coincided with recognition of the often unanticipated and undesirable consequences of the science-based Green Rev-

olution and development projects such as massive dams and flood control programs. A growing body of literature draws on these theoretical insights and empirical case studies to suggest the existence of local knowledge and the need for its incorporation into the information base for sustainable policy, planning, and management (DeWalt 1994; Flora 1992; Kimmerer 2000; Kloppenburg 1991; Murdoch and Clark 1994).

Within this context, local knowledge is defined as information on the social and ecological characteristics of a particular location, which is acquired through experience (particularly physical labor) in a place over time. It is produced through extended observation, direct interaction, and, sometimes, *in situ* experimentation. Local knowledge is characterized by rich, specific detail on the patterns and variations in the aspects of a place with which the knower has direct contact. The highly personalized nature of this knowledge and its boundaries in space and time may be expanded by the inter-generational transfer of local knowledge. However, its fundamental characteristic is that it is produced and reproduced through direct experience (DeWalt 1994; Kloppenburg 1991; Murdoch and Clark 1994). Consequently, there is no singular local knowledge. Rather, more accurately there are local knowledges. To the extent that the activities of individuals are conditioned by social characteristics such as age, gender, class, and ethnicity, local knowledges may be similarly differentiated (Feldman and Welsh 1995; Mosse 1994).

Within the context of this ongoing theoretical discussion, it seems worthwhile to ask a number of questions related to sustainable NTFP use. Are there valuable sources of information on NTFPs outside of formal science? If other knowledge bases exist, should they be consulted in planning and managing NTFP programs? And, if local knowledges are potential sources of information, how might they be incorporated? Finally, who possesses valuable NTFP knowledge?

As noted in the introduction, a number of researchers have explored local NTFP knowledge and stewardship practices in the developing world and among indigenous peoples in the United States and Canada. The location of these case studies in distant places and historically marginalized ethnic groups may lead U.S. researchers and managers to assume that local NTFP knowledge is the exclusive domain of 'othered' cultures. That is, that knowledgeable gatherers must be people whose national and cultural identities are clearly different than those of most researchers and managers. However, any such assumptions must be

made with caution. McLain and Jones (1997) and Love et al. (1998) have recently described the mushroom harvesting techniques and stewardship practices of Pacific Northwestern gatherers with a variety of ethnic backgrounds. And, as described below, a year of ethnographic research on the role of NTFPs in household livelihoods in Michigan's UP revealed extensive local knowledge of NTFPs among both Native American and European American gatherers (Emery 1998a).

NTFP USE IN MICHIGAN'S UPPER PENINSULA

Michigan's UP has the high forest area and low human population density sometimes associated with sustainable NTFP use. Its approximately 10.5-million-acre land base is 83.9% forested (Schmidt, et al. 1997) and has an average of fewer than 18 persons per square mile (U.S. Census Bureau 1990). Second growth maple-beech-birch and spruce-fir constitute the major forest types in the region (44.4% and 24.8% of timberlands, respectively; Schmidt et al. 1997). The ethnic composition of the human population includes a number of Anishinabe tribes (also known in English as Ojibwa or Chippewa) and European Americans. Many of the latter are descendants of loggers and miners who were recruited from Cornwall, Finland, Italy, Sweden, and French-speaking Canada during the late 1800s and early 1900s to work in the region's once-flourishing timber, iron, and copper industries (Cleland 1992; Dunbar 1965; Martin 1986).

Between August 1995 and July 1996, more than 400 hours of semi-structured interviews were conducted with gatherers, buyers, and public and private land managers in the UP to learn what NTFPs were harvested there and the role they play in gatherers' household livelihoods. Results reported here are based on information provided by 43 individuals about their personal gathering activities and experiences. Of these, 10 identified themselves as Native American and 33 as European American. Questions asked during the interviews focused on what the individual gathers, how each NTFP is used, ecological characteristics associated with products, harvesting techniques and norms, and how the gatherer learned these skills.

By the end of the year a list had been compiled of 139 NTFPs from over 100 botanical species that gatherers reported personally harvesting in the region's forests and associated open lands (Emery 1998a).¹ These products are used as medicine, food, craft or decorative materi-

als, and ceremonial items. They provide for household needs through both nonmarket (personal consumption and gifts) and market means (sale in raw and processed forms). Nonmarket uses constitute nearly two-thirds (64%) of gatherers' NTFP livelihood strategies, with edibles the single largest functional use among these. Market uses account for the balance of livelihood uses, with the sale of processed craft or decorative items most frequently mentioned.

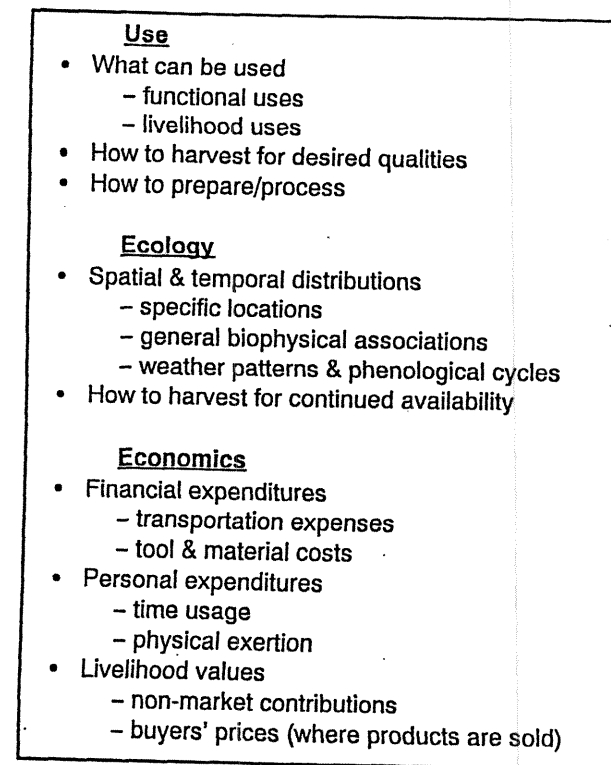
As in many natural resource dependent areas, unemployment is chronically high in the UP² and NTFPs are part of livelihood strategies by which households rely on contributions from a number of individuals and sources to meet their needs. NTFPs are particularly important when formal employment and income are inadequate to meet household needs and for individuals with limited access to jobs by virtue of age, gender, or disabilities of various types. Not surprisingly, NTFP livelihood strategies are usually displaced by formal employment opportunities. However, gathering also has important cultural and recreational dimensions and is pursued by individuals and households even when there is no pressing financial need (Emery 1998b). At such times, gathering allows people to enjoy time in the woods, keep their NTFP skills alive, and pass them on to younger friends and family members while deriving immediate practical benefit from the activity.

Unlike the Pacific Northwest, recent booms in the commercial market for many NTFPs have not reached the UP. Although some NTFP businesses in the region do sell products in the national and/or global markets, capital and ownership continue to be local, as does virtually all labor. Consequently the social structures and technologies of NTFP harvesting appear to have remained relatively stable over the last several decades.

KNOWLEDGE REQUIREMENTS

Whether for personal consumption or sale, gatherers must have substantial knowledge and skills to convert forest plant matter into livelihood resources. This knowledge may be thought of as having three dimensions—use, ecology, and economics (Figure 1). All three are required for an NTFP to make meaningful material and cultural contributions. The general characteristics of local NTFP knowledge are described below and illustrated in the four examples with which this section concludes.

FIGURE 1. UP gatherers' local NTFP knowledge



Use knowledge has three key features: what forest plant matter may be used and how, how to harvest a product for the desired qualities, and how to prepare or process it. For example, such knowledge is required to distinguish edible and poisonous plants, useful and useless or potentially dangerous medicinal doses, and tree barks that will make aesthetically pleasing and durable containers. When NTFPs are a source of cash income, gatherers must know which products have commercial value and who buys them. Regardless of their livelihood use (e.g., market or nonmarket), gatherers must also know how to harvest NTFPs so that they have the desired qualities and how to prepare them so that they are fit for their intended functional uses.

Ecological knowledge, the second dimension, is also critical because gatherers must know how to find a product in quantities suffi-

cient to make harvesting and processing worthwhile. This knowledge has spatial and temporal dimensions. Spatial knowledge includes specific locations in which a product is known to occur as well as the general biophysical characteristics associated with it. The latter may include land-use history, soils, hydrology, aspect, elevation, and co-location with other plant and tree species.³ Temporal knowledge is also essential because many NTFPs are ephemeral, with the plant present in the forest only briefly or possessing the desired property (such as nuts, fruits, or running sap) for a short period of time. Thus, gatherers must know *when* to look as well as *where* to look. This includes knowledge of the annual and interannual occurrence of products in association with weather and climate patterns and the co-occurrence and phenology of associated forest species, especially easily visible phases such as budding, leaf out, and flowering.

Detailed ecological knowledge is facilitated by small gathering ranges. Of the 21 individuals for whom data were collected on the distances they typically cover to harvest NTFPs, 12 (66%) gather within a 30-mile radius of their residence, with 75% of these (9 individuals) reporting that they stay within 10 miles. Thus, most harvesting occurs within the territory of gatherers' day-to-day lives, and they often have repeated experience with productive locations over time.

The final dimension, economic knowledge, is also critical if NTFPs are to provide livelihood resources. If the intent is to provide for personal consumption or gifts, expenditures of time, money, and personal energy must be reasonable in comparison to the material and cultural benefits derived from harvesting. When planning to sell an NTFP raw, the gatherer must know the prevailing buyers' prices and calculate the costs of transportation, tools, and labor to be sure the time and effort will provide needed income. Likewise, crafters and others who sell processed NTFPs must know the costs of materials, transportation, and gathering and production time as well as the prices they can charge for their goods. Many of the individuals interviewed were able to specify each of these costs and reported factoring them into decisions about when and where to expend their efforts.

STEWARDSHIP PRACTICES

When the intent is to rely on NTFPs on an ongoing basis, gatherers must know how to harvest products so that they will continue to be

available year after year. This is critical to assure an adequate population of the desired species within a reasonable range. Everyone interviewed reportedly had relied on NTFPs for several years, if not decades, and hoped that both they and their grandchildren would be able to continue to do so. When asked, "Are there things you will and will not do when you pick 'NTFP X'?" and "Do you have any rules for yourself?", many gatherers responded by describing stewardship practices that are intended to meet the dual goals of plant sustainability and gathering sustainability.

Specific stewardship practices vary with the biological characteristics of particular products and individual harvesters. However, most UP gatherers articulated one or more general norms or rules that they observe when harvesting NTFPs (Figure 2). Several people mentioned rotating their gathering from individual trees or in particular areas over periods of 3 to 10 years.⁴ Other gatherers monitor plant biology as a key determinant of the gathering times for several products, looking for physiologic characteristics that indicate a product can be harvested without causing long-term damage or interfering with reproductive cycles. Nearly a dozen people stressed the importance of gathering selectively at nesting scales from individual plants to the landscape level. These gatherers will harvest only some leaves on a branch, some plants from a patch, and some patches in a landscape in any year. Minimizing harvest impacts was mentioned more frequently than any other norm. Gatherers talked about taking only what they will use or need and leaving no visible sign of their activities, indicating that they

FIGURE 2. UP gatherers' stewardship practices

- **Rotate gathering** over multiple years on same area and/or individual plants.
- **Time gathering** in accordance with plant biology.
- **Gather selectively** at nesting scales from individual plants to landscapes, never take everything.
- **Minimize harvest and impacts**, taking only what is needed/will be used and/or leave no damage or visible sign of gathering activity.
- **Maximize utilization**, creating and leaving no waste.
- **Promote growth** through harvest techniques or other intentional propagation.
- **Protect sites** from over-harvesting by closely guarding knowledge of their locations.

consider it unacceptable to damage soils and plant matter or leave waste of any kind. Closely related was an emphasis on maximizing utilization. A number of people stated that they endeavor to use everything they collect. A few gatherers consciously employ harvesting techniques that they believe promote further biomass growth or engage in seed dispersal and other propagation efforts. Finally, many people keep their sites a closely guarded secret in an effort to protect them from over-harvesting by others.

Examples 1-4 illustrate gatherers' knowledge and stewardship practices:

EXAMPLE 1. Knowledge—livelihood uses, economics of expenses and market values
Stewardship practices—promote growth

Allan¹

Allan gathers five NTFPs, which he sells to a local microenterprise. Almost every year since he was 12 years old, he has cut balsam (*Abies balsamea* (L.) P. Mill.), spruce (*Picea* spp.), white pine (*Pinus strobus* L.), and red pine (*Pinus resinosa* Ait.) from October through early December for the seasonal greens market.

Allan harvests on both private and public land. In the latter case, he indicates that regulations require boughs to be cut flush with the bole of the tree, a practice he believed was responsible for the decreasing quantity of balsam boughs available. When harvesting on land where this limitation is not imposed, Allan prefers to cut only the two most recent year's growth. This practice, he says, "causes side branches to grow more" so that he can recut from the same trees every 3 years. He indicated that branches should not be harvested from more than one-third of a tree's total height and says that he makes it a rule never to leave litter in the woods.

Bough harvesting is part of a mix of largely self-employment activities that support Allan's family of five. Because it is so critical to their seasonal income sources, it is not surprising that he was able to provide a detailed accounting of the costs associated with it. Speaking in 1996, he indicated that he spends \$20-40 per day on gasoline, \$21 per roll of twine (each can tie approximately 5 tons of boughs into bundles), and \$14 for clippers, of which he buys 10-14 per season. In addition, he reports purchasing \$200-300 worth of permits each year. At 38 years of age, Allan states that he is an especially fast worker in the woods, cutting 4 hours per day whenever the weather permits. With the 1995 buyer's purchase price of \$140-160 per ton, he cleared approximately \$9 per hour for his efforts.

¹Names have been changed to protect gatherer's confidentiality

EXAMPLE 2. Knowledge—spatial and temporal distributions
Stewardship practices—minimize impacts, efforts to promote growth

Janet and Dave¹

For more than 25 years, Janet and Dave have run a small wild edibles business out of their homestead, supplying a variety of mushrooms, leeks (*Allium tricoccum* Ait.), fiddleheads (*Matteucia struthiopteris* (L.) Todaro & spp.), and "anything edible" that grows in the UP to upscale restaurants around the country. European Americans who moved to the UP from lower Michigan when their children were young, they report gathering more than 20 NTFPs in the region.

Although not their sole source of income, the wild edibles business is their primary livelihood activity. Janet said that one objective of their early business plan was to show that it is possible to make a living in the forest without harming it. She stated that "When we get out of an area, you'll never know we were there." Janet and Dave prefer to do most of their own gathering with assistance from immediate family members and close friends. However, the need for additional labor at busy times has prompted them to train local high school students and others to harvest selected products. Janet indicates that they visit the locations where these new gatherers have harvested and will not buy from them a second time if they have not observed norms for sustainable harvest and minimal disturbance of the area.

After more than two decades of searching through UP forests for wild edibles, Janet and Dave have amassed considerable knowledge about the plants they gather. At the time of our interview, Dave had over 20 years of notes on the locations, ecological characteristics, and weather patterns of places and times that he has found edibles. He notes that leeks are one of the first green things to appear in the spring woods. In his experience, they grow primarily in hardwood stands, especially around elms (*Ulmus* spp.), and seem to like moist ground. However, he has found them both on hills and in swales and says they often are not in places he expects them to occur. "For conservation purposes," Janet and Dave have tried to propagate leeks. They tried to cultivate them on their own from seed and provided corms to a local greenhouse. Both efforts were unsuccessful, as were attempts to interest a regional university in taking on the task.

¹Names have been changed to protect gatherer confidentiality

EXAMPLE 3. Knowledge—functional uses and preparations, harvesting for desired qualities and continued availability
Stewardship practices—time gathering, promote growth, protect sites

Walter

Walter reported gathering seven NTFPs. Among these is wiikenh¹ or flag root (*Acorus calamus* L.). He dries the root and prepares it as a tea to treat sore throats, canker sores, toothaches, headaches, stomach ailments, and gynecological problems. He indicates that spring-harvested wiikenh is weaker medicinally and less bitter; when harvested in the fall, it is more potent and bitter.

Walter is active in efforts to reconstruct and restore Native American cultural practices in Michigan's UP and his efforts in this regard have included building a birch bark longhouse. He also makes birch bark containers, which he jokingly referred to as "the original Tupperware."² Walter described his technique for harvesting birch bark at length. When the sap is running, a shallow horizontal cut is made around the tree at what will be the top of the piece. A second horizontal cut is made at the desired bottom, then a vertical incision is run between the two previous cuts. Walter, like other gatherers who described this process, said that when done properly and at the right time the bark pops off, often with an explosive sound. He contends that trees may be reharvested every three years with the bark becoming smoother with each harvest and with age.³ He also stressed that it is critical to harvest only when the sap is running hard and the inner bark should never be scored.

Wild rice (*Zizania* spp.) provides another example of Walter's knowledge and stewardship practices. He harvests rice only for his household and extended family. However, because it commands a significant market price and is in high demand, he stressed that he reveals the location of his 'rice river' only to trusted family members. Walter is making an effort to increase the population of rice along rivers in his area by broadcasting seed. He harvests by boat in a two-person effort, with one poling against the current while the other knocks the seed into the craft. Walter stated that there are two harvests, an early crop in August and a late crop in September. Once gathered, he lays out the rice to air dry for a day, turning it a couple of times, then scorches it in a wash tub. A skilled tradesman, Walter thrashes and winnows his rice using a method he devised to force air through an old drum-shaped grill. He and his family consume the rice steamed, boiled, and popped like corn.

¹The Anishinabe name is provided first as this is the name that Walter used.

²The use of trade, firm, or corporation names in this publication is for the information and convenience of the reader. Such use does not constitute an official endorsement or approval by the U.S. Department of Agriculture or the Forest Service of any product or service to the exclusion of others that may be suitable.

³Another individual reported observing a 10-year rotation length.

EXAMPLE 4. Knowledge—temporal distributions
Stewardship practices—importance of observing all norms

Abby

Abby, whose ancestry includes French Canadian and Eastern European Jewish forebears, as well as Ojibwa, Potawatomi, and Odawa, identifies herself as Native American. She listed 38 NTFPs that she gathers and has strong feelings about what she regards as the right way to harvest them. In addition to the norms listed in Table 2, Abby was the first person to mention four Native American gathering rules:

- Pick everything the way it is supposed to be picked (i.e., to assure it's continued growth and reproduction).
- Always put down tobacco as an offering.
- Ask the plant's permission before harvest.
- Tell the plant how it will be used.

These rules are regarded as particularly important when gathering plants for medicinal or ceremonial uses. Tradition also prohibits the sale of such products. However, she noted that not all Indians observe these norms. "Some gathering approaches are in conflict," she said, indicating strong disapproval when telling me about beds of the sacred plant, sweet grass (*Hierochloa odorata* L.), which she had harvested for years before they were over harvested by youth trying to make money.

Abby also described a broad temporal schematic for NTFPs. While some things can be harvested all year (e.g., spruce gum, white pine needles, spruce tips), in general "the woods dictate what you can get when." She indicated that leaf products tend to be gathered in the spring and summer, roots in the fall, and bark and whole tree items such as sap in the late winter and early spring. She and her family often scout for NTFPs and harvest them in combination with other activities such as hunting and fishing. Thus, she noted that chokecherries (*Prunus virginiana* L.) coincide with bear season and high bush cranberries (*Viburnum* spp.) with bird season, the latter being eaten together at Thanksgiving dinner.

CONCLUSIONS

The quotation with which this paper opens continues with a list of topics for which hard scientific data are lacking:

the economics of NTFP management, trade and marketing in different forest types; (on) biological production function for

most NTFP species; local harvesting and utilization patterns; and the impacts of commercialization and changing patterns of use on the state of NTFP and related activities. (Tewari and Campbell 1995, pp. 57-58)

In fact, Janet and Dave, Walter, Abby, Allan, and other experienced gatherers possess considerable knowledge of these facets of the products they gather. Taken individually, their knowledges are rich in specific detail of the temporal and spatial patterns of NTFPs and their livelihood uses. Examined collectively, they provide extensive information about the biological and social ecologies of NTFPs. Such local knowledges also provide valuable information on stewardship practices for sustainable NTFP use. Gatherers' harvesting norms are intended to assure the continued biological presence and harvesting availability of NTFPs. Of course, not all gatherers observe appropriate norms at all times; to paraphrase Flora speaking of farmers, gatherers are no more moral than the rest of us (1992; p. 96). But long-term gatherers have every incentive to preserve both the presence of products in the forest and their access to them. In many cases, they have had years to observe the combined effects of their harvesting and changes in weather or land use and adjust their practices accordingly.

Thoughtful combination of local knowledges and formal science has been suggested as a means of arriving at more socially and ecologically sustainable agricultural and natural resource practices (DeWalt 1994; Flora 1992; Kimmerer 2000; Murdoch and Clark 1994). There is every reason to believe that such an articulation would be valuable for sustainable NTFP use in the United States as well. For example, gatherers' stewardship practices might serve as the basis for studies of the impacts of specific harvesting techniques on NTFP populations and ecological functions. Incorporating such 'real world' information increases the potential for research to produce results that are both socially and ecologically sound.

Just how a melding of local knowledges and formal science is to be achieved is a worthy agenda for NTFP researchers over the next several years. While the specifics are likely to be as diverse as the situations in which they are implemented, researchers and managers who wish to incorporate local knowledges into their work should observe some guidelines:

- Seek experienced gatherers from a variety of age, gender, income, and ethnic groups to develop a comprehensive picture of local NTFP knowledges and practices.
- Be prepared to invest time and effort to learn from gatherers. Understand that their knowledge is rich in detail and may sometimes draw on informal experimentation and/or readings in formal literature, but is generally not expressed in systematic terms.
- Respect gatherers' right to choose what information they share and their need to protect continued access to NTFPs as livelihood resources.

Through day-to-day experience and the intergenerational transfer of skills, NTFP gatherers have accumulated significant knowledge of the products they harvest and practices that make them a sustained source of livelihood resources. Learning to recognize and work with information produced outside formal scientific channels will immediately increase the knowledge base available for NTFP research and management.

NOTES

1. No products were included for which only second-hand reports were available.
2. 1995 average annual unemployment in the region was 8.9% (Salow 1996) versus 5.6% for the nation as a whole (Bureau of Labor Statistics 1997).
3. For herbaceous products, it is particularly important to know associations with tree species because the latter are large and much easier to see from a distance.
4. Intervals varied by product and individual.

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