



CHAPTER 5

Social Dimensions of Nontimber Forest Products

KELLY WATSON

COLMORE S. CHRISTIAN

MARLA R. EMERY

PATRICK T. HURLEY

REBECCA J. MCLAIN

CARL WILMSEN

5.1 Introduction

ALTHOUGH PUBLIC AND PRIVATE FORESTS IN the United States have long been dominated by timber management (McLain 2002), these forests are also the source of hundreds of nontimber forest products (NTFPs) (Hurley et al. 2008, Schlosser and Blatner 1995). The variety of NTFPs is matched by the diversity of people who harvest them. The existence of these varied and often competing interests means that issues of power, access and control, labor relations, and social justice are equal to ecological and economic issues in their importance.

The potential consequences of climatic variability lend a special urgency because the distribution of costs, risks, and opportunities will change as forest species distribution changes and spatial and temporal patterns of natural hazards change. A key issue is that the impacts of harvest for most NTFPs are not well understood, and social, economic, and ecological sustainability requires continuous research, monitoring, and discussion. For example, where frequently harvested species are affected, particularly where populations decrease or respond in ways that adversely affect desired characteristics, formerly sustainable practices may no longer serve. New knowledge and adjustments in governance may be needed. This chapter seeks to provide a framework of the social dimensions of NTFPs on public and private lands across the United States.

Our starting point in discussing these issues is to acknowledge large-scale data on the social dimensions of NTFPs are sparse. It is thus difficult to characterize NTFP harvesting on a national scale and to draw general conclusions about the conditions, impacts, costs, and benefits of harvesting. Nevertheless, we discuss the findings of a number of regional and local studies that permit us to draw some tentative conclusions about harvester demographics, stewardship, and environmental and social justice issues.

We begin this chapter by providing a brief overview of NTFP user communities, drawing on results from regional surveys to provide information on NTFP harvester demographics. The survey data

also provide insights into the social and economic values of NTFPs for the people who harvest them.

Next, we consider social relationships of governance—specifically, cooperation and communication between landowners/land managers and harvesters. This discussion suggests communication and cooperation are key to integrating scientific knowledge with the knowledge of harvester communities for more effective governance. A closely related discussion explores the literature on harvester stewardship practices and how these might inform NTFP governance strategies. There appears to be some correlation between land tenure and conditions of access directly affecting harvesting practices, and this effect needs to be taken into consideration in developing strategies to ensure resiliency and good stewardship on forested lands.

Following the discussion of governance and stewardship, we explore social networks and labor structures of NTFP harvesting. It is likely that the greatest volume of harvested plant materials and mushrooms goes into commodity production systems, although many people involved in harvesting NTFPs do so entirely outside formal markets. Within commodity production systems there may be labor supply chains involving many intermediaries. Harvesters within these labor supply chains are often vulnerable. The literature on this topic leads us to conclude that land tenure, race, immigration status, income, and education play roles in harvester vulnerability and affect the abilities of harvesters to access sites as well as to participate in forest management decisions that directly affect their lives and livelihoods.

Our discussion ends with a review of findings from recent research on NTFP harvesting in more populous areas and the environmental justice considerations this brings to the foreground. It would be easy to assume that NTFPs are exclusively products of rural and wilderness locations; however, recent research documents their harvest in urban, suburban, and exurban locations by diverse peoples for diverse purposes. This research also suggests that the extent to which people of color disproportionately face barriers to access and inclusion poses important social and environmental justice challenges for landowners in rural, urban, and urbanizing settings.

5.2 An Overview of Nontimber Forest Product Harvesters in the United States

Viewed in terms of the numbers of people who harvest, United States residents enjoy the benefits of NTFPs largely unmediated by markets. The nonmarket nature of NTFP uses may be fundamental to their value (Dick 1996, Emery 2002). If prospective harvesters possess the knowledge and access to land where the desired NTFPs are present, the practice is open to anyone with the physical capacity to engage in it (see section 6.5). Perhaps as a result, the demographic profile of harvesters looks like America. Among the larger social goods are environmental justice and the public health benefits associated with exercise, time spent in nature, and nutritional quality of products consumed.

The number of people who participate in NTFP harvesting, their demographic characteristics, and the ways they use gathered materials provide one measure of the social significance of this use of United States forests. Results of random sample, general population telephone surveys conducted in the U.S. Northeast provide such numbers (table 5.1). Two cycles of a survey assessing participation in a variety of outdoor recreation activities asked people in 20 states¹ if they had picked mushrooms and/or berries in the previous 12 months (Cordell et al. 2012). Weighted results show that for the period 1999–2001, 27.9 million people 16 years of age and older had gathered NTFPs. In 2005–2009, that number was 35 million people, an increase of 25.7 percent. This rate of increase exceeds all other surveyed activities

except the category of “visiting farm or agricultural settings” (Cordell et al. 2012). In addition, of eight common public pursuits in forested areas, only viewing or photographing birds is reported more frequently than gathering NTFPs (Cordell et al. 2012; table 5.2).

In 2004, respondents to a general population survey conducted in four New England states² were asked, “Have you collected any tree or plant materials around woodlands: e.g., mushrooms, berries, cones, or moss?” (table 5.1). Eighteen percent reported they had done so in the previous 12 months, while 26 percent had done so in the previous 5 years. Analysis of the demographics of positive respondents to the survey showed that gathering crosses socioeconomic boundaries, including age, gender, income, and place of residence. This survey also asked how respondents used the materials they gathered (table 5.3). Functional uses mentioned were food (62 percent), decoration (59 percent), cultural (16 percent), and medicine (8 percent). Reported livelihood uses were personal consumption (88 percent), gift-giving (5 percent), value-added sale (2 percent), and sale of raw material (1 percent), with 4 percent reporting other, unspecified uses (Robbins et al. 2008).

Survey results on livelihood uses of NTFPs are striking. The number of respondents who directly use the NTFPs they gather is an order of magnitude higher than those who sell them in any form. Further, ethnographic research suggests that gatherers frequently share and gift NTFPs to family and friends, such that the number of people who use NTFPs in the absence of market exchange of any sort is greater than the number of those who gather NTFPs to sell them (Emery 2001b, Emery and

Table 5.1—Rates of participation in nontimber forest product gathering by residents of the Northeastern United States. Sources: Cordell et al. 2012, Robbins et al. 2008.

Location	Year	Sample size	Previous 5 years percent	Past 12 months percent
Northeastern States ^a	2005–2009	30,000	n/a	36
New England ^b	2004	1,650	26	18

^aConnecticut, Delaware, District of Columbia, Illinois, Indiana, Iowa, Maine, Maryland, Massachusetts, Michigan, Minnesota, Missouri, New Hampshire, New Jersey, New York, Ohio, Pennsylvania, Rhode Island, Vermont, West Virginia, and Wisconsin.

^bMaine, Massachusetts, New Hampshire, and Vermont.

¹ Connecticut, Delaware, District of Columbia, Illinois, Indiana, Iowa, Maine, Maryland, Massachusetts, Michigan, Minnesota, Missouri, New Hampshire, New Jersey, New York, Ohio, Pennsylvania, Rhode Island, Vermont, West Virginia, and Wisconsin.

² Maine, Massachusetts, New Hampshire, and Vermont.

Table 5.2—Rates of participation in forest-based activities by residents of 20 northeastern states, 2005–2009. Source: Cordell et al. 2012.

Activity	Positive response rate	Change in participation rate 1999–2009
Viewing or photographing birds	38.2	17.8
Gathering mushrooms/berries	36.0	25.7
Day hiking	32.7	15.1
Visiting wilderness areas	31.3	10.7
Warmwater fishing	24.5	17.3
Developed camping	20.6	-10.4
Canoeing	12.3	8.2
Primitive camping	11.6	-2.5

Table 5.3—Functional and livelihood uses reported by positive respondents to a 2004 New England survey. Totals may exceed 100 percent, as most respondents use harvested plant materials and/or fungi for more than one function and also may engage in multiple livelihood uses. Source: Robbins et al. 2008.

Functional uses						Livelihood uses				
----- percent -----						----- percent -----				
Edible	Medicinal	Decorative	Cultural	Landscaping	Other	Personal use	Gifting	Sale raw	Sale value added	Other
62	8	59	16	n/a	13	88	5	1	2	4

Ginger 2014, Emery et al. 2003). For those who sell some or all of what they harvest, more do so after adding value, suggesting that NTFPs are a basis for microenterprises. Here, ethnographic research suggests that much of this activity likely takes place within the informal economy and, therefore, leaves no records in formal economic statistics. Practices within the informal economy include bartering; trade; personal use; and recreational, spiritual, and cultural uses (McLain et al. 2008).

Two recent cycles of the National Woodland Owner Survey (NWOS; 2002–2006, 2011–2013) included questions about NTFP harvests on family forest lands (Butler 2008, Butler et al. 2016), providing another important source of data on their social values and uses. The NWOS has been conducted periodically since 1953 and is the official database of nonindustrial private forest owners in the United States. It uses a stratified random sample design to survey over 10 million family forest landowners per cycle. The NWOS is implemented on an annual basis with a subset of the total sample (20 percent) contacted each year.

Results for the 2002–2006 and 2011–2013 surveys show a marked increase in family forest landowners reporting that NTFPs have been harvested on their lands at some point in the past, from 16 percent (2002 and 2006) to 29 percent (2009 and 2013), but a drop of nearly 50 percent in those indicating that harvest has occurred in the previous 5 years. This trend may reflect aging of the landowner population. Proportions of those reporting harvest for sale and personal use were more stable over the two survey cycles and parallel livelihood uses reported by respondents to the general population surveys discussed in the previous paragraph. In the 2011–2013 cycle, reported rates of harvest for personal consumption were an order of magnitude greater than those reported for sale (table 5.4).

The data represented by the 2002–2006 and 2011–2013 NWOS cycles are particularly significant because they span a period of deep economic recession. Data on NTFP harvesting from future NWOS surveys will be invaluable in understanding relationships between NTFP harvesting, owner demographics (particularly age), and macroeconomic conditions.

Table 5.4—Family forest owners with >1 acre reporting harvest of nontimber forest products on their land. Sources: Butler 2006, Butler et al. 2016.

	Estimated # of owners		Percent of owners	
	2002–2006 ^a	2009–2013 ^b	2002–2006	2009–2013
NTFPs ever harvested	1,701,000	10,777,027	16	29
Harvested in past 5 years	1,239,000	1,215,370	73	38
Harvested for sale	163,000	244,238	10	8
Harvested for personal use	1,319,000	2,750,548	78	87

^aEstimated total number of owners = 10,398,000.

^bEstimated total number of owners = 10,777,027.

5.3 Nontimber Forest Product Stewardship

The concept of stewardship encompasses informal practices that NTFP harvesters develop and apply in their daily lives, as well as formal programs initiated by trade associations, amateur science societies, conservation nongovernmental organizations, or Government agencies. Scientific knowledge of NTFP stewardship practices in the United States is fragmentary, as is knowledge about their socioecological impacts or the factors associated with the use and transmission of such practices. For example, researchers in the following studies have examined harvester stewardship: New England (Baumflek et al. 2010, Emery et al. 2003, Emery and Ginger 2014), New York (Emery and Ginger 2014), the Southeast (Emery et al. 2003, 2006), the Pacific Northwest (Ballard and Huntsinger 2006, Jones 2002, Love et al. 1998, McLain et al. 2014, Peck and Christy 2006, Pilz et al. 2003, Poe et al. 2013, Richards and Creasy 1996), southern California (Anderson and Blahna 2000), Pennsylvania (Burkhart et al. 2012), Kentucky (Hembram and Hoover 2008), Kansas (Price and Kindscher 2007), the Washington, D.C. region (Barron and Emery 2009), and the Great Lakes region (Emery 2001a).

Studies of NTFP stewardship practices have primarily used qualitative methods, typically combining key informant interviews with participant and direct observation of harvesting practices; a few researchers have used mail or in-person surveys (e.g., Anderson and Blahna 2000, Burkhart et al. 2012, Richards and Creasy 1996) or field experiments (Ballard 2004, Peck and Christy 2006, Price and Kindscher 2007). Data on NTFP stewardship practices have been systematically

collected and reported on a number of products, including western brackenfern (*Pteridium aquilinum* (L.) Kuhn) (Anderson and Blahna 2000); American ginseng (*Panax quinquefolius* L.) (Burkhart et al. 2012); echinacea (*Echinacea* spp.) (Price and Kindscher 2007); salal (*Gaultheria shallon* Pursh) (Ballard and Huntsinger 2006); galax (*Galax urceolata* (Poir.) Brummit) (Emery et al. 2003); and wild mushrooms (Barron and Emery 2009, Jones 2002, Love et al. 1998, Richards and Creasy 1996). Additionally, Baumflek et al. (2010) report data on sustainable harvesting practices for 30 species in northern Maine.

5.3.1 Knowledge

Much NTFP research on stewardship seeks to document what harvesters perceive to be sustainable harvesting, as well as how they produce and share their knowledge. Emery (2001b) argues that three types of knowledge—ecological, economic, and use knowledge—are important for stewardship. Harvesters' ecological knowledge is often characterized as traditional or local. Berkes et al. (2000, p. 1252) define traditional ecological knowledge (TEK) as “a cumulative body of knowledge, practice and belief, evolving by adaptive processes and handed down through generations by cultural transmission, about the relationship of living beings (including humans), with one another and with their environment.” Ballard and Huntsinger (2006, p. 531) defined local ecological knowledge (LEK) as “local expertise of peoples that may not have a long-term relationship with the local environment, but nevertheless have local wisdom, experience and practices adapted to local ecosystems.”

Many people view TEK/LEK as incompatible with scientific knowledge. However, some harvesters engage in informal experiments or carefully document

observations of plants and ecological conditions to inform their harvesting practices (Barron and Emery 2009, Charnley et al. 2007, Jones and Lynch 2002, Love et al. 1998). Moreover, some harvesters design and implement studies aimed at establishing harvesting “best practices.” An example from the Pacific Northwest is a 13-year experiment conducted by members of the Oregon Mycological Society in the 1990s and early 2000s to determine how harvesting affected chanterelle (*Cantharellus* spp.) productivity and whether the manner of harvesting (pulling versus cutting) made a difference (Pilz et al. 2006).

Harvesters acquire and pass on knowledge about harvesting practices in a variety of ways, with many using multiple learning and knowledge transmittal strategies (Baumflek et al. 2010). Many harvesters learn about NTFPs through on-the-ground training by family members, friends, or neighbors (Barron and Emery 2012, Emery et al. 2006, Emery and Ginger 2014). Field guides, Internet websites, forays, foraging walks, and courses are also common means by which harvesters acquire NTFP knowledge, as is participation in clubs, associations, and informal “meet-up” groups (Baumflek et al. 2010, Hurley et al. 2015, McLain et al. 2014). NTFP buyers are important conduits for the transmittal of knowledge about sustainable harvesting practices

(Burkhart et al. 2012, Emery et al. 2003); among healers who use wild plants in their practice, particularly American Indians, apprenticeships are not uncommon.

A key theme in the NTFP stewardship literature is that NTFP knowledge is often differentially distributed and acquired in different ways across social categories, such as age, gender, ethnicity, and class; it also varies by experience level (Ballard and Huntsinger 2006, Emery et al. 2003, Richards and Creasy 1996). This highlights the importance of designing stewardship research in ways that will capture the variation among harvesters in the type, depth, and breadth of their knowledge.

5.3.2 Practices

Knowledge shapes how people harvest, and conversely, harvesting is the means by which people acquire knowledge about the biological, physiological, and ecological factors that affect plant growth and reproduction under different harvesting regimes. As indicated in table 5.5, researchers have documented the use of a broad array of harvesting practices aimed at ensuring the long-term sustainability of plant populations and minimizing disturbance to the surrounding ecosystem. The practices used vary by species, product, and harvester. Harvesters also often use practices aimed at minimizing disturbance

Table 5.5—Practices designed to sustain plant populations and minimize habitat disturbance.

Practices	Studies that document the practice
Timing harvests to avoid collecting when plants are vulnerable	Emery et al. 2003, Hembram and Hoover 2008
Rotating harvest sites	Emery and Ginger 2014, Hembram and Hoover 2008, McLain et al. 2014, Price and Kindscher 2007
Retention of some mature plants	Anderson and Blahna 2000, Emery et al. 2003, Hembram and Hoover 2008
Monitoring resource abundance and restricting harvests if population declines	Baumflek et al. 2010, Emery et al. 2003, Emery and Ginger 2014, Hembram and Hoover 2008, McLain et al. 2014
Avoiding damage to vulnerable plant parts	Anderson and Blahna 2000, Emery et al. 2003
Propagating plants or fungi by planting berries, seeds, cuttings, or spreading spores	Barron and Emery 2009, Burkhart et al. 2012, Emery et al. 2003, McLain et al. 2014
Avoiding species known to be endangered or threatened	Emery et al. 2003, Emery and Ginger 2014, Poe et al. 2013
Restricting amounts harvested (often as a percentage of product available)	Emery et al. 2003, Emery and Ginger 2014, McLain et al. 2014, Poe et al. 2013
Keeping site locations secret from or off-limits to other harvesters	Emery et al. 2003, Price and Kindscher 2007
Selective harvest	Baumflek et al. 2010, Emery et al. 2006, Emery and Ginger 2014, McLain et al. 2014, Price and Kindscher 2007

of other ecosystem components, such as avoiding trampling on endangered plant species, filling in holes when digging roots, and leaving a portion of fruits, berries, or seeds for wildlife (Baumflek et al. 2010, Emery and Ginger 2014, Emery et al. 2003).

5.3.3 Ethics

Researchers studying NTFP harvesters have documented a set of ethical principles that guide what people harvest, how much they harvest, and when they harvest it (Anderson and Blahna 2000, Baumflek et al. 2010, Emery 2001b, Emery and Ginger 2014, Emery et al. 2003, Price and Kindscher 2007). Emery and Ginger (2014, p. 16) summarize these into five guiding norms:

1. Gather in areas where the targeted species is plentiful.
2. Do not take all the leaves, seeds, fruits, or other parts, and rotate where you harvest
3. Minimize disturbance to the harvesting site.
4. Avoid trampling or harvesting species known to be endangered.
5. Take only what you need.

Additionally, many American Indian harvesters include giving thanks or asking the plant's permission to be harvested among their ethical guidelines (Baumflek et al. 2010), a practice that many nonnative herbalists also follow (Emery and Ginger 2014, Poe et al. 2014).

The American Herbal Products Association has published a set of "good collection practices" for wild plant harvesters (AHPA 2006) that echoes the guidelines described by Emery and Ginger (2014). Harvester rules governing stewardship practices in the United States are often self-enforced (Hembram and Hoover 2008), or as one key informant in Burkhart et al.'s (2012) study of ginseng harvesters put it, "ginseng is an honor system." Hembram and Hoover (2008) point to the lack of community-level enforcement mechanisms as a barrier to sustainable NTFP management. However, to some extent, buyers function as community-level enforcers for products such as American ginseng by complying with legal provisions that require them to refuse to buy small or immature roots (Burkhart et al. 2012). Wild matsutake (*Tricholoma* spp.) mushroom dealers in southwestern Oregon perform a similar function by refusing to buy very small mushrooms (Richards and Creasy 1996).

5.3.4 Stewardship

Limited data are available on the factors associated with stewardship behavior or higher levels of local ecological knowledge among NTFP harvesters. Studies document substantial levels of difference in knowledge and harvesting practices between more experienced and less experienced Latino immigrant salal harvesters (Ballard and Huntsinger 2006); and between American Indians with a generations-old cultural tradition of harvesting matsutake for subsistence and recently arrived Southeast Asian commercial matsutake harvesters in southwestern Oregon and northern California (Richards and Creasy 1996). In all three studies, more experienced harvesters had greater depth and breadth of ecological knowledge and used what they perceived to be more sustainable harvesting practices. However, it is unclear whether the differences in the use of harvesting practices between the Southeast Asian and American Indian harvesters were linked to differences in experience, harvesting motivations, or both since the Southeast Asian harvesters had only recently begun to participate in the matsutake harvest.

Land tenure also influenced harvesting practices of Latino salal harvesters, with experienced pickers practicing less sustainable harvesting on lands on which their tenure was insecure and sustainable harvesting on lands to which they had secure longer-term access (Ballard and Huntsinger 2006). Price and Kindscher (2007) also found that echinacea harvesters used less sustainable harvesting practices on *de facto* open access harvesting sites than on private lands on which anti-trespassing laws were enforced.

5.3.5 Integrating Local and Scientific Knowledge

Managing forests for NTFPs is challenging for many state and Federal land agencies owing to the diversity of species, limited knowledge of these species, and lack of scientific knowledge about most NTFPs. In many cases, harvester knowledge is the only source of knowledge based on long-term observations about the ecological impacts of NTFP harvesting (Emery 2003). In the absence of surveys in peer-reviewed studies, NTFP harvesters are an important yet often under-utilized potential source of knowledge.

One approach to addressing the knowledge gaps within management agencies and the uncertainties associated

with NTFP harvesting is to integrate harvesters' LEK with scientific research projects (Emery and Barron 2010). Burkhart et al. (2012) document state and Federal agencies' lack of capacity to enforce ginseng regulations and call for the establishment of "bottom-up" ginseng planting and restoration partnerships between conservation agencies, harvesters, ginseng growers, and traders as a way to address the regulatory enforcement gap. Pilz et al.'s (2006) guide for participatory monitoring provides detailed guidelines for planning, implementing, and following through on collaborative research involving harvesters and scientists.

Few assessments of such partnerships exist. However, Ballard et al.'s (2008) comparative assessment of community-based forestry groups involved in scientific partnerships included one initiative involving NTFP harvesters that was successful in developing a photo point monitoring system for wild mushrooms. They found that building in mechanisms for regular interaction between scientists and harvesters was a key to developing the trust and respect for the collaboration to work. They highlight the need for more research on strategies that enable greater integration of LEK and scientific knowledge.

For the most part, NTFP harvesters who depend on the resource or the supplemental income their harvesting provides each year recognize that their livelihoods depend on sustainability of the resource. Some NTFP harvesters are keen observers of cause and effect, and the impacts harvesting has on the resource. For example, matsutake harvesters who harvest on the forests of central Oregon argue that soil compaction from mechanical thinning as well as thinning too heavily will inhibit matsutake production. In response to input by mushroom harvesters, officials revised their initial plans for a recent timber sale to protect more matsutake habitat and also required logging over snow to limit soil compaction (Headley and Wilmsen 2010). Such place-based ecological knowledge, gained through years of experience with the resource and working partnerships with the Forest Service on national forests, can complement scientific knowledge, thereby improving forest inventories for specific uses of NTFPs as well as monitoring of those uses (Emery et al. 2014).

Engaging with resource users as stewards of the land they harvest may be a valuable undertaking for land managers. Neither local nor scientific knowledge is expected to replace the other knowledge system, but to bolster the effectiveness of science-based

management. Everett (2001) found that NTFP groups often have the most "reliable information about the specified NTFP abundance, distribution, and impacts of harvesting. Research indicates that without such knowledge, users and managers have no basis for decisions about sustainable harvest levels" (Everett 2001, p. 340). For example, Barron and Emery's (2012) research on morel (*Morchella* spp.) harvesters in the Eastern United States has shown the importance of participatory approaches when designing and implementing forest management on Federal land. Local knowledge provided valuable insight into morel habitat, ecology, and phenological characteristics.

Harvesters and primary processors are key actors in NTFP commodity production-to-consumption systems. As the people most directly engaged with commercially traded plant materials and mushrooms and the ecosystems in which they occur, many harvesters possess extensive knowledge and have strong interests in the outcomes of management and governance processes. Consequently, their input can strengthen management for NTFPs and other forest values (Ballard and Huntsinger 2006, Charnley et al. 2007). Because commercial harvesters and primary processors commonly are members of socially marginal groups by virtue of income, ethnicity, and other characteristics, special efforts may be needed to integrate their perspectives into land management strategies.

Landowner/producer organizations may offer an opportunity for achieving greater integration and cooperation between land managers and harvesters. The Alabama Medicinal Plant Growers Association (AMPGA) is one example. Established around 2008, the AMPGA serves as an umbrella for small landowners from minority and underserved communities and producers to network and share information about production, processing, and marketing of medicinal plants, such as American ginseng, goldenseal, and black cohosh. While much of their product is cultivated, some members also use wild-harvested materials. The AMPGA provides these individuals with a vehicle for networking and peer-to-peer learning to improve financial return to group members. Such organizations also may serve as a source of information for policy and management.

Additionally, harvesters are more likely to adopt and follow permit or other management systems if they perceive that they have contributed to its development

(Everett 2001). This is important because such policy and management are likely to impact resource users most and it is critical there be support from harvester communities for sustainable use and management of forest resources. In many cases, NTFPs provide a much needed source of income or they have significant social and cultural capital, linking people to their natural environments, providing sources of medicinal plants, and maintaining what are sometimes multi-generational ties to the art of harvesting (Emery and Pierce 2005, Fisher 2002, Watson 2010). Increasing gatherer and primary producer input represents an opportunity for enhancing environmental justice, reducing litigation potential, and enhancing the information base available for NTFP policy and management.

5.4 Stakeholder Organizations, Labor Issues, and Social Networks

There is a long history in America of people harvesting NTFPs to supplement their incomes or to support themselves during hard times or when they have few other options (Fisher 2002). The Multiple-Use Sustained Yield Act of 1960 (see chapter 7) requires public land managers to promote “stability of communities” and “to provide for a continuous and ample supply of timber” and “secure the benefits of forests in maintenance of water supply, regulation of stream flow, prevention of soil erosion, amelioration of climate change and preservation of wildlife.” Ensuring these multiple use categories are all met thus requires a balancing act—one that requires that harvesting options remain viable while at the same time forest resiliency remains intact for long-term sustainability.

Including diverse opinions from harvesters in forest management decisions is important for long-term sustainability and resiliency of forested lands (Fisher 2002). Often low-income and minority groups may not have the interest or organizational, educational, or economic capacity to participate in forest management decisions that directly affect their lives and livelihoods and for the benefit of the forests they harvest. Moreover, many harvesters got a start in the commercial harvest of NTFPs in the United States due to events and forces set in motion by political forces. Therefore, immigrants often arrived in the United States lacking the skills demanded by a developed country’s market economy. With few other

options, they turned to what they knew best: earning a living from the land (Saechao and Wilmsen 2012).

Four major areas of concern to NTFP harvesters include lack of consistent access to harvesting sites, fluctuating prices, security and safety while collecting, and resource sustainability that will supply future harvests. Access to NTFPs is mediated by a variety of ecological, economic, structural, cultural, historical, and political concerns. Permitting and leasing are two very common ways of allowing access to harvesting areas. Public and private landowners do both.

Mediation of access is a function of the lower socioeconomic positioning of some groups of NTFP harvesters. In California, Oregon, and Washington, e.g., harvesters of matsutake mushrooms, huckleberries (*Vaccinium* spp.), and floral greens are ethnically diverse and many are recent immigrants with limited English proficiency and low incomes. There are essentially two ways that they are organized as workers: as independent contractors, or employees of a business. When they are independent contractors, they buy permits, lease land, or contract with landowner(s) (as sharecroppers or some other arrangement) to gain access to harvesting areas. They may hire employees to harvest the NTFP, or harvest it on their own or together with family members and/or friends, and sell their harvest to a buyer. Employees work for someone who acquires the needed permits, leases, or contracts, and are paid by the hour or piece.

The way in which control of land and resources is structured affects harvester access to NTFPs. In the floral greens industry in the Pacific Northwest, e.g., brush shed operators (the people who buy greens directly from the harvesters) have increasingly controlled leases. This is due in part to the fact that low-income harvesters typically do not have the capital needed to pay the up-front costs, such as bonding insurance and rent paid in advance, needed to lease land. Under these circumstances many floral greens harvesters, especially recent immigrants from Latin America, are dependent on brush shed owners or agents who sublet from them for transportation and the sale of their product. The sublessees, referred to by the Spanish term *raiteros* (van owners), transport the harvesters to and from the leased land and take them to the brush shed that holds the lease to sell their product at the end of the day.

The *raiteros* charge the harvesters a fee for transportation services and may also charge them a percentage of the

value of their daily harvest. Although the brush shed owners treat them as independent contractors, harvesters are not free to sell to any shed. They cannot afford to travel to alternative buyers often in more distant locations, nor do they have access to market and price information from which they can make selling decisions. This means that they must accept the price the leasing brush shed offers them. Many harvesters fear retaliation if they speak publicly or complain to the authorities about being taken advantage of or poor working conditions. A lack of law enforcement means that working conditions may remain dangerous (McLain and Lynch 2010).

Public land agencies' traditional approach to gathering information for proposed management actions may also affect access to harvesting sites. This process often excludes stakeholder groups that lack formal organizational structures, and members of these groups rarely have the financial ability or time to participate in forest decisionmaking (McLain 2002). Nongovernmental organizations have been useful in bridging these gaps to assist disadvantaged groups in overcoming these barriers. Responsiveness of agency officials can help as well. To address these issues and be responsive to forest communities as well as improve access to national forest land, the USDA Forest Service 2012 Planning Rule (National Forest System Land Management Planning of 2012) and its directives are designed to enhance public outreach so that land management decisions factor in public inputs. In many parts of the country, the Forest Service also reaches out to ethnic minorities in appropriate languages to ensure critical communications and needs are addressed. The 2012 Planning Rule, which explicitly calls for collaborative planning, may provide for expanding the breadth of stakeholder involvement in forest management decisions.

Conditions in the floral greens industry differ markedly from those in the harvest of wild mushrooms. Buyers of wild mushrooms never gained control of land and leases as their counterparts in the floral greens industry did. Moreover, most wild mushroom harvesters are United States citizens or legal residents and therefore are less fearful of retaliation. These differences in the structures of the floral greens and wild mushroom markets prevent large mushroom-buying companies from gaining as much control over the market, as well as access to harvesting sites, as large floral greens companies have (McLain and Lynch 2010).

Cash flow and overhead costs are economic factors that mediate access to NTFPs. Large numbers of harvesters often begin the harvest season with little cash to spare, and thus are very sensitive to changes in permit prices, campground fees, and other expenses. Commodity prices are clearly a major concern to NTFP harvesters because the price they receive for their products determines their income. To the extent that harvesters of floral greens who are dependent on *raiteros* are not free to find the highest price for their product, their annual incomes are lowered. The seasonality of NTFP harvests means that many harvesters of wild mushrooms and other NTFPs depend on intense harvesting activity during only a few months of the year to earn a large portion of their annual household income. Some mushroom harvesters follow the different seasons around western United States and thus spend most months of the year harvesting some type of mushroom (e.g., morels, matsutake, chanterelles). Many also pick huckleberries during the late summer and early fall. Many of these harvests may be under-reported, as collection data rely on the honesty of harvesters, who may be wary of oversight and regulation.

Security and safety are also major concerns of harvesters. These concerns include confrontations with other harvesters, robbery, and theft. There are tensions between commercial, personal use, and cultural harvesters, and these can sometimes lead to confrontations between harvesters. There have been cases of harvesters being robbed of their day's harvest at gunpoint. Theft of floral greens occurs when harvesting on a lease without permission or harvesting on public lands without permits (Welch 2006). In the case of salal on private land, thieves often harvest at night. In the early light of dawn, they bring trucks in to haul away the greens before the lessee arrives for work. While it is not clear how often this occurs, it is a significant enough concern for harvesters to bring it up without being prompted.

Addressing the major concerns of harvester communities is a key step in mediating the disconnect between harvesting communities and land managers. Access to harvesting sites, information about price variability, security and safety, and resource sustainability are major concerns of NTFP harvesters. However, many harvesting communities may be marginalized, due to employment and income, language challenges, or cultural barriers (Emery and Barron 2010, Fortmann and Ballard 2011, McLain 2002, Watson 2010) and therefore lack formal outlets for participating in forest management decisions.

These decisions, however, directly affect the lives and livelihoods of harvesting communities as well as the sustainability of the forest. Therefore, building and improving communication between landowners and harvester communities are critical, as are developing and implementing NTFP policy and management to ensure resiliency and good stewardship on forested lands.

5.5 Urban Harvesting and Social Justice

A diversity of urban spaces support NTFP harvesting opportunities, including city parks, institutional campuses, vacant lots, cemeteries, and other locations (Hurley et al. 2015, Jahnige 2002; McLain et al. 2014). Beyond selected urban areas (i.e., Seattle, WA; Philadelphia, PA; New York, NY) featured in a limited number of studies (Hurley et al. 2015, McLain et al. 2014), research on suburban and rapidly urbanizing areas is also generally lacking (see Grabbatin et al. 2011; Hurley et al. 2008, 2013; and Gianotti and Hurley 2016, for exceptions).

Researchers are paying increased attention to the role that diverse species in the forests of urban, suburban, and urbanizing United States play in meeting the material and cultural needs of residents. Studies, though limited, are documenting the diversity of plant species, range of plant parts, types of uses, motivations for harvest, and the importance of these harvests to diverse peoples living in the cities being studied. Studies have been completed in Seattle, WA (McLain et al. 2012; Poe et al. 2013, 2014), and Philadelphia, PA (Gabriel 2006, Hurley et al. 2015), as well as Baltimore, MD, Washington, DC, and Boston, MA (Jahnige 2002). These studies reveal that harvesters collect common weeds, including many invasive species, from native, nonnative, and invasive shrubs and vines and from many native, ornamental, and nonnative trees. Public and private lands, including actively managed (i.e., public parks and institutional campuses) and largely neglected spaces (i.e., vacant lots), provide an abundance of harvesting opportunities for harvesters. These harvests provide residents with foods, medicines, and materials that support their everyday needs or are part of their regular recreational endeavors (McLain et al. 2014).

Our understanding of NTFPs within United States cities is still in its infancy. For example, while analyses of species have been completed for some United States cities, with some analysis of the ecosystem service benefits,

no studies have assessed the range of provisioning or cultural services associated with the full complement of species occurring within cities. However, analyses of New York City's urban tree inventories and vegetation databases reveal 553 tree, shrub, and understory plant species representing more than 1,100 uses. Most of the species with one or more uses are native, while a significant minority of species—particularly herbaceous species—are nonnative. Whether native, nonnative, or invasive, many species are abundant, although species abundance and distributions within urban greenspaces are uneven throughout the city (figure 5.1).

Most research on urban NTFPs has focused on documenting the range of species that are being harvested, the diversity of peoples engaged in harvesting, motivations for harvesting, places where harvesting occurs, and uses of species targeted (Community Resources 2000; Hurley et al. 2015; Jahnige 2002; McLain et al. 2012, 2014; Poe et al. 2013, 2014). In Seattle, qualitative interviews with NTFP harvesters revealed that 433 plant species and 53 species of fungi are gathered (Poe et al. 2013). A number of species, such as Himalayan blackberry (*Rubus armeniacus* Focke), were commonly mentioned as targeted, whereas species such as salmonberry (*Rubus spectabilis* Pursh) and stinging nettle (*Urtica dioica* L.) were identified as culturally distinct species harvested by Coast Salish native communities. In addition, other species were preferred by particular cultural groups: chestnuts, watercress, pennywort, and plantain for Korean, Hmong, Vietnamese, and Cambodian gatherers; hawthorn fruit for Eastern European collectors; amaranth for Mexican households; and plums and various types of mushrooms for Russian gatherers (Poe et al. 2013). Similarly, research in New York City is finding that several species are particularly important to Chinese immigrants, including ginkgo nuts (*Ginkgo biloba* L.), black mulberries (*Morus nigra* L.), mugwort (*Artemisia vulgaris* L.), and common dandelion (*Taraxacum officinale* F.H. Wigg). Interviews with this immigrant group revealed an additional 49 foraged species, of which 12 are mushrooms, one is a seaweed, another 25 are herbs, five are shrubs, and six are trees. In Philadelphia, PA, engagement with NTFPs by new groups that organize through social media is on the rise (Hurley et al. 2015). In-depth interviews with 38 members of this group and other NTFP harvesters revealed that 160 plants and four species of fungi are gathered. Providing a food source is

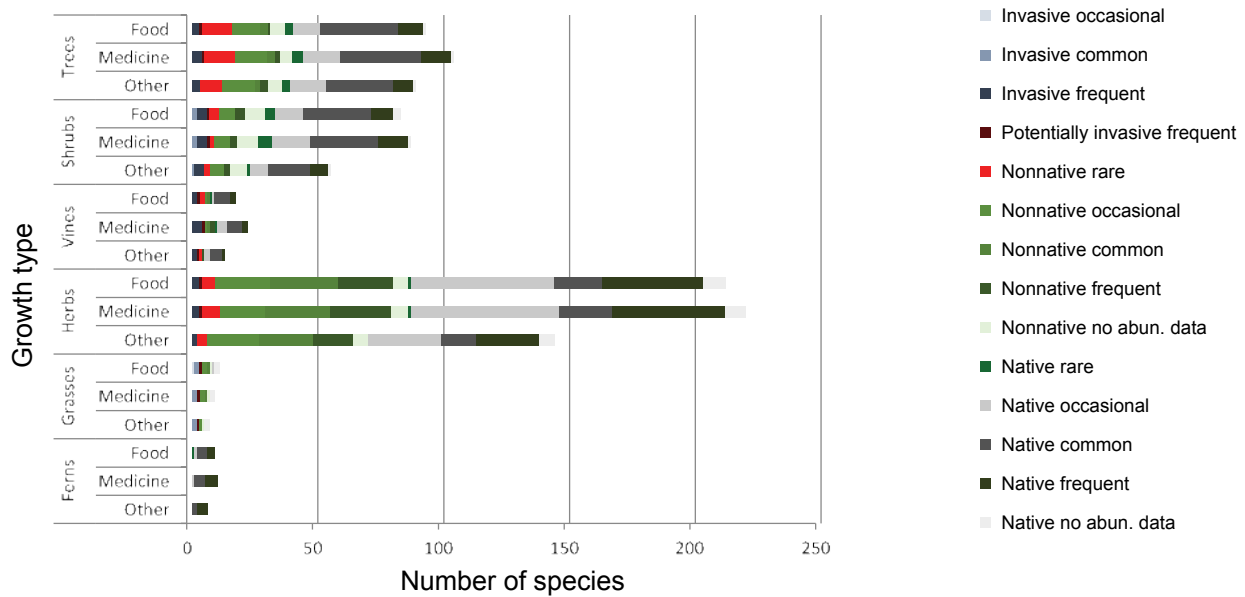


Figure 5.1—Potentially forageable species found in New York City by growth type, types of use, status, and abundance. Status and abundance in the region as per the New York Metropolitan Flora Project. (Source: Brooklyn Botanic Garden 2016.)

a dominant reason for harvesting, but some collect raw materials for basketry and other NTFPs and a minority sell items harvested from city parks and other areas.

These qualitative studies point to particular urban spaces, such as city parks, institutional campuses, vacant lots, and cemeteries, as key sites that support the forest, shrub, and understory vegetation that create opportunities for NTFP harvest in cities. Parks and recreational trails are particularly important to NTFP harvesters in the Philadelphia area, e.g., with social meet-up groups regularly organizing hikes in parts of the city’s parks to learn about useful species and their NTFP values (Hurley et al. 2015). Importantly, limited observations suggest the reactions of municipal governments to these practices may differ markedly. Whereas Seattle policymakers have worked to embrace some aspects of foraging (Floberg et al. 2013), including through new policy language in the city’s stewardship plan, managers in the Philadelphia area see NTFP harvesting activities as a threat to park resources (Hurley et al. 2015).

The harvesting of NTFPs is not limited to urban areas, but also takes place in suburban areas (Hurley et al. 2015, Robbins et al. 2008). Drawing on qualitative interviews with “Wild Foodies,” research in the Philadelphia metropolitan area suggests that parks, greenways, and trails, as well as institutional

campuses, are key to NTFP opportunities. However, as with the urban context, the legality of foraging within parks in the Philadelphia metropolitan area spans a spectrum, ranging from the harvest of berries and nuts in limited quantities for personal use, principally on lands managed by the Commonwealth of Pennsylvania (e.g., state game lands, state parks) to outright prohibition in county, municipal parks, and on private land trust reserves (Hurley et al. 2015).

Many formerly rural portions of the country are rapidly urbanizing at densities ranging from urban to exurban (Brown et al. 2005). Research is generally lacking on the status of NTFPs in rural areas experiencing diverse types of urbanization. A major exception is the work on sweetgrass (*Muehlenbergia sericea*, *M. capillaris*, or *M. filipes*)³ basketry among African Americans living in the South Carolina lowcountry (see Grabbatin et al. 2011; Hart et al. 2004; Hurley et al. 2008, 2012). This work highlights similarities in the situation of rural NTFP users with regard to stable NTFP supplies in other areas of the country (Emery 2002), including the extent to which changing patterns of land tenure, ownership, and management play roles in shaping access to key NTFPs. For sweetgrass basketmakers in the greater Charleston area, urbanization has meant changes in patterns of supply for and access to the three key materials that are traditionally harvested from area forests and *de facto*

³ Note: The common name “sweetgrass” is used to refer to *Muhlenbergia filipes*, not to be confused with *Hierochloa odorata* (Alpine sweetgrass).

resource commons: blades of sweetgrass, palmetto fronds (*Sabal palmetto*), and longleaf pine needles (*Pinus palustris*). Decades of suburban development have contributed to a decline in the ecological conditions that produced relatively abundant supplies of sweetgrass.

Some key questions have emerged about the social justice aspects of continued access to NTFPs that support cultural and material relationships to forested ecosystems in urban environments. Indeed, urban forested ecosystems are key to the cultural and material practices of diverse peoples who have been marginalized within natural resource and land use decisionmaking processes. The cases of African American basketmakers in the greater Charleston area of the South Carolina lowcountry (Hurley et al. 2008) as well as American Indians in the Seattle area (McLain et al. 2012) illustrate social justice dimensions raised by questions of access to NTFPs in United States cities. Similar issues are at play in other areas of the country, where the traditional relationships of native peoples to plants for material needs and cultural uses are seen as potentially out of place in urbanizing areas (Matthewson 2007). Longstanding uses may be threatened by regulatory dynamics on public lands and changes to social-ecological dynamics on private lands, including those uses that support household economies and food security. Changes in ownership patterns, land use, and land management, however, represent opportunities for and challenges to the continuation of these practices (Grabatin et al. 2011, Hurley et al. 2013, Poe et al. 2014). For example, the inclusion, principally, of sweetgrass and, to a lesser extent, other species associated with sweetgrass basketry within ornamental landscape plantings in the common areas of residential and commercial development in the Greater Mt. Pleasant, SC, area has contributed resource supplies to these livelihood users. Likewise, new efforts within Seattle to incorporate NTFP foraging perspectives into local policy documents as well as to develop new food forests and public urban orchards suggest proactive efforts to deal with the needs and desires of NTFP users.

Quantitative research on NTFP harvesting in urban areas confirms qualitative work, while suggesting that issues related to access and land-use change may extend to more than just distinct cultural groups. In the survey

carried out by Robbins et al. (2008), most respondents were Caucasian, college-educated, in the highest income brackets, and lived in the city. Robbins and coauthors concluded that NTFP harvesting is a practice that transcends socioeconomic background and involves diverse individuals entering environments around them to gather products for their own purposes, directly using and consuming plants. Further, the authors note that “in the absence of significant Federal lands in the New England region, moreover, this body of gatherers is harvesting from private lands, roadsides, city parks, and other areas” (Robbins et al. 2008, p. 272).

Continued research on urban and suburban NTFPs needs to focus on shifting perceptions of urban forests and green spaces. Most analyses are qualitative and limited to a small number of cities, primarily in the Eastern United States. Most focus on species being harvested and their uses, the people engaged in harvesting and their motivations, and identifying where harvesting occurs (Community Resources 2000; Hurley et al. 2015; Jahnige 2002; McLain et al. 2012, 2014; Poe et al. 2013, 2014). Urban and suburban harvesting present an important and emerging area for research on NTFPs in the United States.

5.6 Key Findings

- In some regions of the United States, as much as 16–36 percent of people have harvested NTFPs for primarily personal use.
- People of all ages, incomes, and ethnicities harvest NTFPs outside of formal markets, whether harvesting on public or private land.
- Harvesting, preparing, and using NTFPs connect people directly and materially to forests and are sources of social and cultural capital.
- NTFPs are harvested in landscapes from urban to wildland environments.
- Including diverse harvesters in forest management decisions may enhance the long-term sustainability of NTFPs.

5.7 Key Information Needs

- National baseline data on NTFP harvesters are needed as a basis for monitoring NTFP use in an era of changing climate.
- Enhanced understanding is needed to address barriers to participation in NTFP management planning for diverse harvesters, particularly those least likely to participate in formal consultation processes.
- Additional information is needed to understand the social, ecological, and governance implications of foraging in (sub)urban landscapes.

5.8 Conclusions

The research reviewed in this chapter suggests a number of conclusions about the social dimensions of NTFP harvesting in the United States. First, NTFPs provide social and cultural capital and economic capital. Studies on harvester demographics demonstrate that many people gather NTFPs outside of formal markets (Butler 2008, Cordell et al. 2012). Harvesting, preparing, and using NTFPs connect people directly and materially to forests (Emery et al. 2006, Robbins et al. 2008). Second, data show that harvester demographics cross social categories of age, gender, ethnicity, and income.

Continued research on harvester populations across the United States is high priority. Also there is an urgent need to examine variation in NTFP knowledge and stewardship practices among harvesters. Governance structures will function best when they are grounded in realities of NTFP gathering systems. This will include recognizing and accommodating people who gather and use NTFPs outside of formal economic markets, while being informed by labor and economic structures of formal NTFP markets. Resource users are in direct contact with forest resources and local knowledge may bolster the effectiveness of management on public and private lands.

Opportunities exist to increase the effectiveness of NTFP monitoring and management by enhancing communication and cooperation between stakeholders and land managers. Special attention will be needed in such efforts to reach out to populations frequently absent from natural resource decisionmaking processes.

5.9 Literature Cited

- American Herbal Products Association (AHPA). 2006. Good agricultural and collection practice for herbal raw materials. Silver Spring, MD: American Herbal Products Association.
- Anderson, J.A.; Blahna, D.J. 2000. Fern gathering on the San Bernardino National Forest: Cultural versus commercial values among Korean and Japanese participants. *Society and Natural Resources*. 12: 747–762.
- Ballard, H.L. 2004. Impacts of harvesting salal (*Gaultheria shallon*) on the Olympic Peninsula, Washington: harvester knowledge, science, and participation. Berkeley: University of California, Berkeley. Doctoral dissertation.
- Ballard, H.L.; Fernandez-Gimenez, M.E.; Sturtevant, V.E. 2008. Integration of local ecological knowledge and conventional science: a study of seven community-based forestry organizations in the USA. *Ecology and Society*. 13(2): 37.
- Ballard, H.L.; Huntsinger, L. 2006. Salal harvester local ecological knowledge, harvest practices and understory management on the Olympic Peninsula, Washington. *Human Ecology*. 34: 529–547.
- Barron, E.S.; Emery, M.R. 2009. Protecting resources: Assessing visitor harvesting of wild morel mushrooms in two National Capital Region parks. *Natural Resources Tech. Rep. NPS/NCR/NCRO/NRTR—009/002*. Washington, DC: U.S. Department of the Interior, National Park Service. 52 p.
- Barron, E.S.; Emery, M.R. 2012. Implications of variation in social-ecological systems for the development of U.S. fungal management policy. *Society and Natural Resources*. 25: 996–1011.
- Baumflek, M.J.; Emery, M.R.; Ginger, C. 2010. Culturally and economically important nontimber forest products of northern Maine. *Gen. Tech. Rep. NRS-68*. Newtown Square, PA: U.S. Department of Agriculture, Forest Service, Northern Research Station. 74 p.
- Berkes, F.; Colding, J.; Folke, C. 2000. Rediscovery of traditional ecological knowledge as adaptive management. *Ecological Applications*. 10: 1251–1262.
- Brown, D.; Johnson, K.; Loveland, T.; Theobald, D. 2005. Rural land-use trends in the coterminous United States, 1950–2000. *Ecological Applications*. 15: 1851–1863.
- Burkhart, E.P.; Jacobson, M.G.; Finley, J. 2012. A case study of stakeholder perspective and experience with wild American ginseng (*Panax quinquefolius*) conservation efforts in Pennsylvania, U.S.A.: limitations to a CITES driven, top-down regulatory approach. *Biodiversity and Conservation*. 21: 3657–3679.
- Butler, B.J. 2008. Family forest owners of the United States, 2006. *Gen. Tech. Rep. NRS-27*. Newtown Square, PA: U.S. Department of Agriculture, Forest Service, Northern Research Station. 72 p.
- Butler, B.J.; Hewes, J.H.; Dickinson, B.J. [and others]. 2016. USDA Forest Service National Woodland Owner Survey: national, regional, and state statistics for family forest and woodland ownerships with 10+ acres, 2011–2013. *Res. Bull. NRS-99*. Newtown Square, PA: U.S. Department of Agriculture, Forest Service, Northern Research Station. 39 p.
- Charnley, S.; Fischer, A.P.; Jones, E.T. 2007. Integrating traditional and local ecological knowledge into forest biodiversity conservation in the Pacific Northwest. *Forest Ecology and Management*. 246: 14–28.
- Community Resources. 2000. The bounty of the urban forest: the uses and values of urban nontimber forest products. <http://www.urbanforestrysouth.org/resources/library/the-bounty-of-the-urban-forest-the-uses-and-values-of-urban-nontimber-forest-products/file>. [Date accessed: February 11, 2013].

- Cordell, H.K.; Betz, C.J.; Mou, S.H.; Gormanson, D.D. 2012. Outdoor recreation in the Northern United States. Gen. Tech. Rep. NRS-100. Newtown Square, PA: U.S. Department of Agriculture, Forest Service, Northern Research Station. 74 p.
- Dick, R.E. 1996. Subsistence economies: freedom from the marketplace. *Society & Natural Resources*. 9: 19–29.
- Emery, M.R. 2001a. Social values of specialty forest products to rural communities. In: Josiah, S.J., ed. *Proceedings of the North American Conference on Enterprise Development through agroforestry: farming the forest for specialty products*. Minneapolis, MN: Center for Integrated Natural Resources and Agricultural Management (CINRAM), University of Minnesota: 25–32.
- Emery, M.R. 2001b. Who knows? Local nontimber forest products knowledge and stewardship practices in northern Michigan. *Journal of Sustainable Forestry*. 13: 123–139.
- Emery, M.R. 2002. Space outside the market: implications of NTFP certification for subsistence use. In: Shanley, P.; Pierce, A.; Laird, S.; Guillen, A., eds. *Tapping the green market: management and certification of NTFPs*. London: Earthscan: 302–312.
- Emery, M.R.; Barron, E.S. 2010. Using local ecological knowledge to assess morel decline in the U.S. Mid-Atlantic region. *Economic Botany*. 64: 205–216.
- Emery, M.R.; Ginger, C. 2014. Special forest products on the Green Mountain and Finger Lakes National Forests: a research-based approach to management. Gen. Tech. Rep. NRS-131. Newtown Square, PA: U.S. Department of Agriculture, Forest Service, Northern Research Station. 51 p.
- Emery, M.R.; Ginger, C.; Chamberlain, J. 2006. Migrants, markets, and the transformation of natural resources management: galax harvesting in western North Carolina. In: Furuseh, O.J.; Smith, H., eds. *Latinos in the new South and the transformation of place*. Burlington, VT: Ashgate: 69–88.
- Emery, M.R.; Ginger, C.; Newman, S.; Giammusso, M.R.B. 2003. Special forest products in context: gatherers and gathering in the Eastern United States. Gen. Tech. Rep. NE-306. Newtown Square, PA: U.S. Department of Agriculture, Forest Service, Northeastern Research Station. 59 p.
- Emery, M.R.; Pierce, A.R. 2005. Interrupting the telos: locating subsistence in contemporary U.S. forests. *Environment and Planning A*. 37: 981–993.
- Emery, M.R.; Wrobel, A.; Hansen, M.H. [and others]. 2014. Using traditional ecological knowledge as a basis for targeted forest inventories: paper birch (*Betula papyrifera*) in the U.S. Great Lakes Region. *Journal of Forestry*. 112: 207–214.
- Everett, Y. 2001. Participatory research for adaptive ecosystem management: a case of nontimber forest products. *Journal of Sustainable Forestry*. 13: 335–357.
- Fisher, A.H. 2002. Making peace in the berry patch: the 1932 handshake agreement and the promise of cultural use zones. In: Jones, E.T.; McLain, R.J.; Weigand, J., eds. *Nontimber forest products in the United States*. Lawrence, KS: University of Kansas Press: 293–299.
- Floberg, J.; Small, J.; Bradley, G. [and others]. 2013. City of Seattle 2013 urban forest stewardship plan. Seattle, WA: City of Seattle Urban Forestry Commission. 78p.
- Fortmann, L.; Ballard, H. 2011. Sciences, knowledges, and the practice of forestry. *European Journal of Forest Research*. 130: 467–477.
- Gabriel, N. 2006. Urban nontimber forest products in Philadelphia. Philadelphia: Temple University. M.S. thesis.
- Gianotti, A.G.S.; Hurley, P.T. 2016. Gathering plants and fungi along the urban-rural gradient: uncovering differences in the attitudes and practices among urban, suburban, and rural landowners. *Land Use Policy*. 57: 555–563.
- Grabbatin, B.; Hurley, P.T.; Halfacre, A. 2011. “I still have the old tradition”: the co-production of sweetgrass basketry and coastal development. *Geoforum*. 42: 638–649.
- Hart, Z.; Halfacre, A.; Burke, M. 2004. Community participation in preservation of Lowcountry South Carolina sweetgrass (*Muhlenbergia filipes* [M. A. Curtis] J. Pinson and W. Batson) basketry. *Economic Botany*. 58: 161–171.
- Headley, C.; Wilmsen, C. 2010. Matsutake mushroom harvesters influence land management in central Oregon. *United Forest Voice*. Spring: 1–2.
- Hembram, D.; Hoover, W.L. 2008. Nontimber forest products in Daniel Boone National Forest region—Economic significance and potential for sustainability. In: Jacobs, D.F.; Michler, C.H., eds. *Proceedings of the 16th Central Hardwoods Forest Conference; 2008 April 8–9; West Lafayette, IN*. Gen. Tech. Rep. NRS P-24. Newtown Square, PA: U.S. Department of Agriculture, Forest Service, Northern Research Station: 148–156.
- Hurley, P.; Emery, M.R.; McLain, R. [and others]. 2015. Whose urban forest? Plant foraging and the political ecology of urban forests. In: Isenhour, C.; Checker, M.; McDonough, G., eds. *Sustainability in the global city*. New York: Cambridge University Press: 187–212.
- Hurley, P.; Grabbatin, B.; Goetcheus, C.; Halfacre, A. 2013. Gathering, buying, and growing sweetgrass (*Muhlenbergia sericea*): urbanization and social networking in the sweetgrass basket-making industry of lowcountry South Carolina. In: Voeks, R.; Rashford, J., eds. *African ethnobotany in the Americas*. New York: Springer-Verlag: 153–174.
- Hurley, P.; Halfacre, A.; Levine, N.; Burke, M. 2008. Finding a “disappearing” resource: using grounded visualization to explore urbanization impacts on sweetgrass basket-making in Greater Mt. Pleasant, South Carolina. *The Professional Geographer*. 60(4): 1–23.
- Jahnige, P. 2002. The hidden bounty of the urban forest. In: Jones, E.T.; McLain, R.J.; Weigand, J., eds. *Nontimber forest products in the United States*. Lawrence, KS: University Press of Kansas: 96–107.
- Jones, E.T. 2002. The political ecology of wild mushroom harvester stewardship in the Pacific Northwest. Amherst: University of Massachusetts-Amherst. Ph.D. dissertation.
- Jones, E.T.; Lynch, K. 2002. The relevance of sociocultural variables to nontimber forest product research, policy, and management. In: Jones, E.T.; McLain, R.J.; Weigand, J., eds. *Nontimber forest products in the United States*. Lawrence, KS: University Press of Kansas: 26–51.
- Jones, E.T.; McLain, R.J.; Weigand, J., eds. 2002. *Nontimber forest products in the United States*. Lawrence, KS: University Press of Kansas. 445 p.
- Love, T.; Jones, E.; Liegel, L. 1998. Valuing the temperate rainforest: wild mushrooming on the Olympic Peninsula Biosphere Reserve. *Ambio*. 9: 16–25.
- Matthewson, M. 2007. California Indian basketweavers and the landscape. In: Li, J., ed. *To harvest, to hunt: stories of resource use in the American West*. Corvallis, OR: Oregon State Press: 40–57.
- McLain, R.; Hurley, P.; Emery, M.R.; Poe, M. 2014. Gathering “wild” food in the city: rethinking the role of foraging in urban ecosystem planning and management. *Local Environment*. 19: 220–240.
- McLain, R.; Poe, M.; Hurley, P. [and others]. 2012. Producing edible landscapes in Seattle’s urban forest. *Urban Forestry & Urban Greening*. 11: 187–194.
- McLain, R.J. 2002. Business as usual: the exclusion of mushroom pickers in wild mushroom management in Oregon’s national forests. In: Jones, E.T.; McLain, R.J.; Weigand, J., eds. *Nontimber forest products in the United States*. Lawrence, KS: University Press of Kansas. 375–385.
- McLain, R.J.; Alexander, S.J.; Jones, E.T. 2008. Incorporating understanding of informal economic activity in natural resource and economic development policy. Gen. Tech. Rep. PNW-GTR-755. Portland, OR: U.S. Department of Agriculture, Forest Service, Pacific Northwest Research Station. 53 p.

- McLain, R.J.; Lynch, K. 2010. Managing floral greens in a globalized economy: resource tenure, labour relations and immigration policy in the Pacific Northwest, USA. In: Laird, S.A.; McLain, R.J.; Wynbeerg, R.P., eds. *Wild product governance: Finding policies that work for nontimber forest products*. London: Earthscan: 267–285.
- National Forest System Land Management Planning of 2012; 36 CFR Part 219.
- Peck, J.E.; Christy, J.A. 2006. Putting the stewardship concept into practice: commercial moss harvest in northwestern Oregon, USA. *Forest Ecology and Management*. 225: 225–233.
- Pilz, D.; Ballard, H.L.; Jones, E.T. 2006. Broadening participation in biological monitoring: handbook for scientists and managers. Gen. Tech. Rep. PNW-680. Portland, OR: U.S. Department of Agriculture, Forest Service, Pacific Northwest Research Station. 131 p.
- Pilz, D.; Norvell, L.; Danell, E.; Molina, R. 2003. Ecology and management of commercially harvested chanterelle mushrooms. Gen. Tech. Rep. PNW-576. Portland, OR: U.S. Department of Agriculture, Forest Service, Pacific Northwest Research Station. 83 p.
- Poe, M.; LeCompte, J.; McLain, R.J.; Hurley, P. 2014. Urban foraging and the relational ecologies of belonging. *Social & Cultural Geography*. 15(8): 901–919.
- Poe, M.R.; McLain, R.J.; Emery, M.R.; Hurley, P.T. 2013. Urban forest justice and the rights to wild foods, medicines, and materials in the city. *Human Ecology*. 14: 409–422.
- Price, D.M.; Kindscher, K. 2007. One hundred years of *Echinacea angustifolia* harvest in the Smoky Hills of Kansas, USA. *Economic Botany*. 61: 86–95.
- Richards, R.T.; Creasy, M. 1996. Ethnic diversity, resource values, and ecosystem management: Matsutake mushroom harvesting in the Klamath bioregion. *Society and Natural Resources*. 9: 359–374.
- Robbins, P.; Emery, M.R.; Rice, J. 2008. Gathering in Thoreau's backyard: Nontimber forest product harvesting as practice. *Area*. 40: 265–277.
- Saechao, F.; Wilmsen, C. 2012. Huckleberry harvesting—is it the American dream? *The Chronicle*. September 11.
- Schlosser, W.E.; Blatner, K.A. 1995. The wild edible mushroom industry of Washington, Oregon, and Idaho—a 1992 survey. *Journal of Forestry*. 93: 31–36.
- United Nations. 1987. *Our common future—Brundtland report*. Oxford, UK: Oxford University Press.
- Watson, K. 2010. *Tupelo forests and honey production along the Apalachicola River of Northwest Florida: livelihood preservation and forest conservation in a changing rural landscape*. Tallahassee: Florida State University. Ph.D. dissertation.
- Welch, C. 2006. A war in the woods. *Seattle Times*. June 6. http://seattletimes.com/html/localnews/2003042206_salal06m.html. [Date accessed: September 26, 2014].