

Portland State University

**PDXScholar**

---

Institute for Sustainable Solutions Publications  
and Presentations

Institute for Sustainable Solutions

---

2018

# Natural Resource Access Rights and Wrongs: Nontimber Forest Products Gathering in Urban Environments

Susan Charnley  
*USDA Forest Service*

Rebecca J. McLain  
*Portland State University, mclainrj@pdx.edu*

Melissa R. Poe  
*University of Washington*

Follow this and additional works at: [https://pdxscholar.library.pdx.edu/iss\\_pub](https://pdxscholar.library.pdx.edu/iss_pub)



Part of the [Environmental Policy Commons](#), and the [Environmental Studies Commons](#)

**Let us know how access to this document benefits you.**

---

## Citation Details

Charnley, S., McLain, R. J., & Poe, M. R. (2018). Natural Resource Access Rights and Wrongs: Nontimber Forest Products Gathering in Urban Environments. *Society & Natural Resources*, 1-17.

This Article is brought to you for free and open access. It has been accepted for inclusion in Institute for Sustainable Solutions Publications and Presentations by an authorized administrator of PDXScholar. Please contact us if we can make this document more accessible: [pdxscholar@pdx.edu](mailto:pdxscholar@pdx.edu).



# Society & Natural Resources

## An International Journal

ISSN: 0894-1920 (Print) 1521-0723 (Online) Journal homepage: <http://www.tandfonline.com/loi/usnr20>

# Natural Resource Access Rights and Wrongs: Nontimber Forest Products Gathering in Urban Environments

Susan Charnley, Rebecca J. McLain & Melissa R. Poe

To cite this article: Susan Charnley, Rebecca J. McLain & Melissa R. Poe (2018) Natural Resource Access Rights and Wrongs: Nontimber Forest Products Gathering in Urban Environments, *Society & Natural Resources*, 31:6, 734-750, DOI: [10.1080/08941920.2017.1413696](https://doi.org/10.1080/08941920.2017.1413696)

To link to this article: <https://doi.org/10.1080/08941920.2017.1413696>



Published online: 11 Jan 2018.



Submit your article to this journal [↗](#)



Article views: 74



View related articles [↗](#)



View Crossmark data [↗](#)



# Natural Resource Access Rights and Wrongs: Nontimber Forest Products Gathering in Urban Environments

Susan Charnley<sup>a</sup>, Rebecca J. McLain<sup>b</sup>, and Melissa R. Poe<sup>c</sup>

<sup>a</sup>USDA Forest Service, Pacific Northwest Research Station, Portland, OR, USA; <sup>b</sup>Institute for Sustainable Solutions, Portland State University, Portland, OR, USA; <sup>c</sup>Sea Grant Program/NOAA Northwest Fisheries Science Center, University of Washington, Seattle, WA, USA

## ABSTRACT

This article uses research about non-timber forest products (NTFP) gathering in Seattle, Washington, USA to examine how people gain access to natural resources in urban environments. Our analysis focuses on gathering in three spaces: parks, yards, and public rights of way. We present a framework for conceptualizing access, and highlight cognitive mechanisms of access associated with foragers' internal moral judgments about harvesting. Key findings are: (1) internal moral calculations about whether it is right or wrong to harvest a particular NTFP in a particular place are an important but previously unacknowledged mechanism governing resource access; and (2) these calculations may help prevent over-harvesting of NTFPs, which are common pool resources, in urban environments where social and environmental conditions lend themselves to a de facto situation of open access. Our findings suggest that voluntary codes of conduct may be the best way to manage NTFP access in cities.

## ARTICLE HISTORY

Received 9 February 2017  
Accepted 24 October 2017

## KEYWORDS

Access; common pool resources; foraging; nontimber forest products; tenure; urban forestry

## Introduction

Space devoted to urban land uses has increased globally over the past few decades owing to rural–urban migration and population growth and is predicted to continue along this trajectory for the foreseeable future (Fragkias et al. 2013). As urban areas expand, new megaregions are emerging consisting of multiple loosely connected cities with pockets of rural space in between (Pickett and Zhou 2015). Heterogeneity characterizes these new landscapes in which urban and rural are increasingly intermingled (Pickett and Zhou 2015). As these hybrid urban–rural landscapes grow, and rural people move to urban areas bringing customary natural resource uses with them (Schlesinger, Drescher, and Shackleton 2015; Mollee, Pouliot, and McDonald 2017), foraging in urban ecosystems—believed to be a global phenomenon (Shackleton et al. 2017)—is likely to increase.

Research on urban ecosystems documents the importance of subsistence activities such as fishing (Pitchon and Norman 2012), nontimber forest products<sup>1</sup> (NTFP) gathering (Hurley et al. 2015; McLain et al. 2014), and urban agriculture (Nordahl 2009) to diverse urban residents. The social, cultural, and economic benefits of harvesting natural resources in urban environments have also been documented (e.g., Poe et al. 2014; Kaoma and

Shackleton 2015; Schlesinger, Drescher, and Shackleton 2015; Shackleton et al. 2015; Mollee, Pouliot, and McDonald 2017; Synk et al. 2017). The ability of urban dwellers to use natural resources depends on their ability to gain access to them.

Research on natural resource access comes mainly from rural areas, especially outside of the United States; literature on access to natural resources in urban environments is scant. To fill this gap, we draw on research about NTFP gathering in Seattle, Washington, USA to address the following questions:

1. Where do people gather NTFPs in urban environments?
2. What tenure arrangements govern access to these spaces?
3. How do urban foragers gain access to desired products?
4. Does the nature of access to NTFPs in urban versus rural areas differ as a result of different social and environmental conditions?

Understanding natural resource access in urban environments is important for several reasons. Natural resource use plays a significant role in the lives of many city dwellers (Nordahl 2009; Davenport, Shackleton, Gambiza 2012; McLain et al. 2012; Clark and Nicholas 2013; Poe et al. 2013). When rural, indigenous, and immigrant populations move to urban areas, they may recreate traditions of natural resource use there (Wehi and Wehi 2009; Hurley and Halfacre 2011) and continue to rely on wild resources for part of their livelihoods and for food security (Schlesinger, Drescher, and Shackleton 2015; Mollee, Pouliot, and McDonald 2017). As urbanization brings about spatial changes in resource availability and changes in land ownership and management, resource access may shift, compelling harvesters to adapt (Hurley et al. 2013; Schlesinger, Drescher, and Shackleton 2015; Shackleton et al. 2017). Understanding where and how urban foragers gain access to natural resources, and the abundance and spatial distribution of valued resources (e.g., Hurley and Emery 2017) can inform policy and planning to help foragers maintain access in the face of change. Furthermore, engaging them in management can promote resource stewardship (Krasny and Tidball 2009; Wehi and Wehi 2009) and connection with nature (Poe et al. 2014).

This paper proceeds by first conceptualizing a framework for access. It then reviews the literature on natural resource access in urban environments, and access to NTFPs in rural America, to situate the study. We present original research to address our key questions and conclude by highlighting its policy implications. Main findings are that (1) internal moral calculations about whether it is right or wrong to harvest a particular NTFP in a particular place are an important but previously unacknowledged mechanism governing resource access; and (2) these calculations may help prevent overharvesting of NTFPs, which are common pool resources, in urban environments where social and environmental conditions lend themselves to a *de facto* situation of open access.

## Access

We follow Ribot and Peluso (2003, 155) in defining access as “the ability to benefit from things.” We distinguish “conditions” of access (variables that influence one’s ability to benefit from natural resources) and “mechanisms” of access (strategies people use to gain, maintain, and control access to resources) (Table 1). Conditions and mechanisms of access may change over time, with resource users responding by renegotiating terms of

**Table 1.** Conditions and mechanisms of access.

Conditions of access	Variables (examples)	Associated mechanisms of access (examples)
Ecological	Resource condition, distribution	Environmental restoration, cultivation
Physical	Infrastructure, barriers, physical condition of user	Maintain roads, unlock gates
Technical	Technology, skills	Purchase needed equipment, obtain training
Legal/political	Laws, policies, rules (customary or de jure)	Apply for permit, establish property rights
Social	Kinship, social identity	Marriage, negotiation, join group
Economic	Labor, markets, capital	Share harvest with landowner, purchase, invest labor
Cognitive	Knowledge, values, ethics	Develop ecological knowledge, weigh moral values about right and wrong

access, obtaining access to alternate gathering sites, harvesting new products, and so on. Our findings from this study lead us to propose one condition of access (cognitive) and one mechanism of access (internal moral calculations that influence decisions about access and associated actions) that have not been highlighted in the literature on access to date.

### Access to Natural Resources in Urban Environments

Information about access to natural resources in urban environments is limited, comes mainly from North America and Europe, and focuses largely on the urban commons and urban NTFP gathering. One set of literature concerns mechanisms of access to land for gardening and food production. These range from the highly formal to the informal, but share in common the investment of labor in land as a means of securing access rights. Formal mechanisms are exemplified by the “allotment garden” system, common in European cities, whereby municipalities demarcate land to which residents can obtain leases for garden plots (Colding and Barthel 2013). At the other end of the spectrum are grassroots approaches in which city residents self-organize to create individual or collective gardens by investing labor in vacant public or private spaces over which access rights are nebulous and without legal authority (Carpenter 2009; Adams, Hardman, and Larkham 2015). Related literature identifies social negotiations (with restaurant owners and diners, begging) (Downey 2016), and scavenging in dumpsters for food considered “waste” (Carolsfeld and Erikson 2013) as additional mechanisms of resource access in cities.

Territorialism is another mechanism of access, whereby individuals establish individual or collective property claims to public or unused urban space located near their private property (constituting a provisional, not legal, claim) (Blomley 2004). This mechanism can entail establishing real or symbolic barriers around a space, creating an area of influence, or engaging in surveillance of the space, and can be formal or informal. Such strategies are not without controversy. Whether people claim rights of access to urban space through formal or informal processes, doing so may exclude others. For example, the creation of an urban community greenway in Vancouver, British Columbia through public gardening by local residents in previously undeveloped space was undertaken in part as a means of preventing prostitutes and drug users, among others, from occupying it (Blomley 2004).

In the case of urban NTFP gathering, people’s own property and home plots can be an important harvest site (Kaoma and Shackleton 2014; Gianotti and Hurley 2016; Mollee, Pouliot, and McDonald 2017), meaning access is gained by virtue of living on or owning

property. However, other harvest sites—both public and private—are also important, especially as plot sizes shrink closer to urban centers or among poorer city dwellers. Thus another mechanism of access is for foragers to develop social relationships, and negotiate access arrangements, with those who own property where desired NTFPs grow (Hurley et al. 2013). When this property changes hands, foragers must establish social relationships with the new land owners or managers to maintain access to resources there. Alternatively, if undeveloped space traditionally used for harvesting becomes developed (displacing desired NTFPs), foragers must seek access to new harvesting sites, which may require building new social relationships (Hurley et al. 2013). Another common access mechanism to urban NTFPS is to enter public open space (such as parks) surreptitiously and harvest illegally (Arora 2008; Hurley et al. 2015). Alternatively, people gain access to urban NTFPs by purchasing rather than collecting them (Schlesinger, Drescher, and Shackleton 2015), though this mechanism may be difficult for the urban poor. Despite the fact that foraging and gathering have been acknowledged as important components of the urban “foodscape” (Roe, Herlin, and Speak 2016), scant attention has been paid to how harvesters gain access to NTFPs in cities.

Given our interest in how the nature of access to NTFPs differs in urban versus rural areas, and our focus on the American city of Seattle, we also reviewed the literature on access to NTFPS in rural America. The results are summarized in Table 2; we return to them in the Discussion. As Table 2 indicates, documented mechanisms of access to NTFPs in cities and in rural America have some commonalities (illegal harvest, social networks) and some differences.

## Methods

We grounded our analysis of urban NTFP access in an empirical ethnographic study in Seattle. We collected data through semistructured interviews with 55 adult NTFP foragers and 18 land managers/conservation leaders during 2010 through 2011 (Table 3). We conducted all interviews in English; interviewees were native speakers or very fluent. Interviews lasted approximately 1.5 h and each interview was audio-recorded and transcribed. The interviews elicited information about the use of plants and fungi, harvesting motivations, harvesting site locations, NTFP access mechanisms, and demographic information. For example, we asked interview participants: “who owns the land where you gather? Are there any barriers you encounter there?”, and other questions about possible restrictions, concerns, and steps taken to gain permission to gather. We also

**Table 2.** Access mechanisms to NTFPs in rural America.

Mechanism	Source
Permits, leases, fee-based systems	Alexander and Fight (2003), Lynch and McLain (2003), Ginger et al. (2012)
Indigenous, customary, or folk law based on norms, rights, or privileges that develop over time are sanctioned by the community, and are enforceable	Fortmann (1990), Goodman (2002), Hufford (2006), Hurley et al. (2013)
Illegal harvest	Lynch and McLain (2003), McGraw, Souther, and Lubbers (2010)
Social networks	Emery and Pierce (2005), Robbins, Emery, and Rice (2008)
Environmental manipulation to enhance species populations	Carroll (2014), Senos et al. (2006)

NTFP, non timber forest product.

**Table 3.** Forager characteristics ( $n = 55$ ).

Age	23–83 (median = 43)
Gender	Female = 35 (64%) Male = 20 (36%)
Race	White, non-Hispanic = 47 (85.4%) Asian American = 3 (5.4%) Mixed Native American ancestry = 2 (3.6%) White, Hispanic = 1 (1.8%) African American = 1 (1.8%) No data = 1 (1.8%)
Country of origin	USA = 47 (85.5%) Outside USA = 2 (3.6%) No data = 6 (10.9%)
Annual household income	<\$20,000 = 11 (20%) \$20,000–\$49,000 = 14 (25.5%) \$50,000–\$99,000 = 14 (25.5%) \$100,000–\$190,000 = 9 (16.4%) No data = 7 (12.7%)

asked foragers how much they collected, but it was difficult to obtain adequate data on quantities, especially because many foragers harvested numerous and seasonally-varied products. Interviews were supplemented with data obtained through participant observation of foraging walks, organized fruit harvesting events, fruit orchard rehabilitation and forest restoration projects, and urban agriculture and forestry policy meetings. Archival material reviewed included municipal laws and regulations governing trees and vegetation, state case law governing trees, urban forest commission meeting minutes, planning documents, and technical reports.

We used a multipronged purposive sampling strategy to identify potential gatherers. In addition to distributing flyers to botanical shops and garden centers, we circulated information to permaculture groups, native plant and mushroom clubs, and basket weaving guilds. We also obtained names of potential gatherers through snowball sampling of interviewees. Gatherers interviewed were selected for diversity of neighborhoods where they resided, types of spaces they harvested in, products gathered, income, and gender. Managers and conservation leaders were selected through a purposive sampling strategy so as to include managers of city parks and rights of way (ROW), municipal officials responsible for urban food and forestry policies, and conservation leaders active in ecological restoration and fruit harvesting programs. Interview data were coded and analyzed thematically using AtlasTi, a qualitative analysis program.

### Results: Access to NTFPs in Seattle, Washington

Urban foragers harvested products in many different spaces (Table 4). Parks and yards were the most common sources of NTFPs, followed by forests and public ROWS. Few foragers harvested in spaces likely to be polluted, such as railroad corridors, industrial zones, and freeway underpasses. Cemeteries were least frequently mentioned. Most foragers harvested products from more than one space: 76% obtained products from 9 or more categories, and 33% from 14 or more. We focused our analysis on three spaces that were frequently used, possible to infer tenure over fairly accurately, and the most data-rich in our interviews. These are parks, yards, and public ROWS, of which there are four types: sidewalks, planting strips, alleyways, and road edges.

**Table 4.** Harvesting spaces and number of foragers using them ( $n = 55$ ).

Harvesting space	Number of foragers
Parks	54
Yards/gardens	51
Forests/woods	50
Edges	45
Sidewalks	41
Former orchards/farmland	38
Planting strips	37
Shorelines	36
School/business campuses	34
Sides of roads	34
Empty lots	34
Wetlands/meadows	33
Alleys	29
Prairies/fields	28
Community gardens	19
Along railroad tracks	17
Industrial areas	14
Under freeway	13
Cemeteries	8

Products harvested from these spaces varied. Products from native species such as Oregon grape (*Mahonia aquifolium*), salal (*Gaultheria shallon*), salmonberry (*Rubus spectabilis*), and thimbleberry (*Rubus parviflorus*) were more frequently gathered in parks. Parks with heritage orchards were popular for fruits and nuts such as apples, pears, cherries, chestnuts, and walnuts. Yards provided diverse foraged products, including berries, nuts, flowering vines, greens, herbs, wild mushrooms, fruits, and various types of wood. Within ROWS, berries and mushrooms were often associated with road edges; flowering vines and grapes were only mentioned for alleyways; and fruits were usually collected from planting strips, and herbs from cracks and sidewalk edges. In Seattle, NTFP gathering is not commercially oriented, and most foraged products are not destined for commodity markets.

### City Parks

Seattle has 465 city-owned parks and natural areas covering more than 6200 acres, or roughly 11% of the city's land surface (City of Seattle 2014). Trees cover roughly 80% of Seattle's naturalized parks and 25% of its developed parks (Ciecko et al. 2012). Resource availability was a major reason foragers harvested in city parks. Parks, particularly those managed as natural areas, were perceived as having species uncommon in residential areas, such as native species, wild mushrooms, and products such as Himalayan blackberry (*Rubus armeniacus*). Many foragers believed products harvested in parks were less likely to be contaminated. Foragers also described intangible benefits of foraging in parks, viewing them as "bridges" that connected them to a wild place within the city, as "sanctuaries," or as "places of refuge from the everyday."

### Tenure Rules and Access Mechanisms

At the time of the study, removing or damaging any plant or plant part (e.g., fruits, leaves) was prohibited in all city parks under Section 12.070 of Seattle's Park and Recreation Code. Violations could result in fines of up to \$5000, imprisonment of up to one year, or both, as well as payment of compensation for damages. The ordinance does not explicitly mention



fungi, lichen, or mosses, but has been interpreted to apply to them in many parks. Section 18.12.042 of Seattle's Park and Recreation Code gives the Superintendent authority to issue permits for several activities otherwise prohibited, but this authority was rarely applied to foraging. Despite Seattle Parks and Recreation Department's (SPRD's) prohibition on NTFP harvesting, all but one of the 55 foragers interviewed had foraged in city parks. Two had obtained permission to remove vegetation, but both also foraged there without permission. Consequently, all foragers who gathered in city parks did so illegally, at least sometimes.

Most foragers interviewed had limited knowledge of the foraging rules in city parks. Of the 49 foragers who described their knowledge of park rules, 19 did not know or were unsure about the rules. Several of these were willfully ignorant, preferring not to inquire. Seventeen knew that gathering was prohibited, yet still did so. Thirteen foragers described rules that differed from the actual ones. Many respondents voiced frustration about the lack of signage explaining the rules, and inconsistencies in how park employees interpreted them.

The prohibition on harvesting in parks was minimally enforced, although some foragers described citizen surveillance whereby other park users challenged them about the legality of their activities. Only four foragers had had negative encounters with park personnel while harvesting illicitly, and none had received citations. Some park employees provided positive reinforcement by turning a blind eye to certain harvesting activities, or actively encouraging harvesting, assuring foragers it was okay to pick certain products. Some foragers reported verbal agreements with park managers to harvest certain species, such as non-native invasives. Others had established long-term relationships with SPRD to rehabilitate the park system's long-neglected fruit and nut trees, and cultivate other wild edible products, with the goal of increasing foraging opportunities.

Examples of nonenforcement suggest that agency employees were divided over whether foraging should be encouraged, ignored, or sanctioned. However, even managers supportive of foraging in city parks voiced concerns about legalizing it. Their primary concerns were how to balance foraging with other park uses, prevent large-scale and unsustainable foraging practices, and structure a foraging-friendly system in which enforcement would be feasible. Several foragers expressed similar reservations, with concern centering on whether the broader population would have the knowledge, skills, and ethics to harvest sustainably.

### ***Moral Calculations***

Despite limited enforcement of the ordinance prohibiting NTFP harvesting in parks, many foragers felt guilty or afraid of being caught harvesting there, causing some to refrain from taking large quantities, influencing the times of day when people foraged, or prompting harvest in inconspicuous locations. A variety of moral judgments also guided foragers' decisions about what NTFPs to harvest, how much to take, harvest methods, and where to harvest in parks (Table 5). Most foragers believed it was acceptable to harvest abundant products. For example, a blackberry picker foraging in areas where they were plentiful stated: "[T]here would be no concern to me about how many I collected because I couldn't possibly collect enough to impact the wildlife." Another common sentiment was that products that regenerate quickly were acceptable to harvest. For example, one forager believed harvesting large quantities of nettles (*Urtica dioica*) was okay because "people can mow a lawnmower over them and they'll come back."

**Table 5.** NTFP access rights and wrongs in Seattle city parks.

Rights: Harvesting NTFPs is okay if	Wrongs: Harvesting NTFPS is not okay when
The species is common and present in abundance	It is perceived to be unsustainable
Harvest quantities are limited, when appropriate	It damages the species/product
Negative ecological impacts are minimal	It is cared for
It is perceived as ecologically beneficial	It is done in small parks or parks with high concentrations of users (with exceptions)
They will otherwise go to waste	
They are being neglected	
The species recovers quickly	
The species is unwanted	
It does not harm the product	
They grow in a disturbed area	
They grow in large parks	

NTFP, non timber forest product.

Foragers' perceptions about whether park managers or users valued an NTFP also guided their decisions. Foragers avoided harvesting NTFPs in places that were clearly cared for, such as formal gardens, community gardens, or recently established restoration areas. In contrast, fruit in neglected orchards was considered available for harvest, as were fallen fruit, nuts, or branches that would otherwise go to waste or attract pests. Miner's lettuce (*Claytonia perfoliata*) growing in regularly mowed grassy areas was considered "fair game" since it was already slated for destruction. Likewise invasive, non-native, and weed species such as Himalayan blackberries and nettles were typically considered unwanted and acceptable to harvest.

Other moral judgments guided foragers' decisions about harvest quantities and techniques. Many foragers described self-imposed quantity limitations, particularly when harvesting native or noninvasive plants. A few applied quantity restrictions to invasive species, native or not. Foragers also described using harvest techniques that minimize harm to plants, such as harvesting only from the base of lavender (*Lavendula* spp.) plants. Some viewed harvesting as beneficial to plants, and therefore justified.

Other foragers paid close attention to site conditions and potential impacts on individual plants. One common judgment was that NTFP harvesting was acceptable around already disturbed spaces, such as parking lots, paved trails, or pathways. Even when harvesting abundant and rapidly growing plants like dandelions (*Taraxacum* spp.) or nettles, one said, "You try to look at an area and ... think about what might be sustainable and also what might help improve the area." This statement indicates that foragers care for the products they harvest and the surrounding environment, a sentiment echoed by most study participants. Indeed, 91% of foragers interviewed described stewardship practices such as timing harvests to minimize impacts on individual plants, harvesting only a portion of the products available, weeding, transplanting, and spreading seeds and spores.

## Yards

Single- and multi-family residential lots occupy nearly two-thirds of Seattle's land area (56 and 11% respectively), where more than 80% of trees are non-native, and grass lawns are the dominant ground cover (Ciecko et al. 2012). Yards were nearly as important as parks as foraging sites because of the ready availability of desirable products and limited competition for them. Foragers often harvested in yards near their homes. Many gathered small amounts of products, such as rosemary (*Rosmarinus officianalis*) and lavender, from yard edges opportunistically while walking to work, school, or local parks. The major risk

perceived with foraging in yards was that products might be contaminated from previous land uses, herbicide use, or dog urine.

### *Tenure Rules and Access Mechanisms*

Private landowners in Seattle have strong legal backing for exercising control over their property and the vegetation growing there. In Washington State, case law rather than statutory law addresses rights to trees, tree products, and other vegetation (Merullo 2010). As a general principle, landowners own the trees and vegetation on their land. However, trees or vegetation extending into a neighbor's yard are considered a nuisance, giving neighbors the right to prune them to the property boundary, assuming doing so causes no material damage (Merullo 2010). Washington case law does not speak to neighbors' rights to harvest overhanging fruit, nuts, or other products, and neither case law nor statutory law explicitly address harvesting fungi on private property. Branches overhanging sidewalks or alleyways belong to the owner of the property on which the tree or shrub is located, but are deemed a public nuisance under Seattle Municipal Code ordinance 10.52.30, obligating the landowner to trim them. Theft and trespass laws further protect landowners' rights to plants and fungi, but are unlikely to deter foragers because the low value of most NTFPs does not warrant prosecution.

A total of 93% of foragers interviewed harvested products from private yards other than their own. Often foragers approached friends or neighbors to gain access, but many also harvested in strangers' yards. Foragers had little trouble obtaining permission from landowners, and most did so at least some of the time, especially if a resident was at home. A common response from landowners was, "Yeah, take as much as you like." Although some foragers made good-faith efforts to obtain harvest permission by knocking on doors or leaving notes, asking permission from residents who are often absent was considered impractical. One forager described "hassle factor" of locating someone to ask permission from, particularly for opportunistic harvesting involving small quantities. The hassle factor was particularly strong for abandoned properties such as vacant lots or foreclosed homes. Fenced yards or yards with "no trespassing" signs were typically viewed as off limits to NTFP harvesting.

Harvesting in neighbors' or friends' yards without permission was considered acceptable only if the forager had obtained permission in previous years and was confident that the owner did not want the products. In exchange for granting access, many foragers gave token gifts to property owners, such as crafts, baskets of fruit, jams, or sauces made from the products gathered. A few foragers obtained access to yards by participating in community fruit harvesting programs. These provide foragers access to fruits and nuts located in private yards in exchange for donating a portion harvested to a local food bank. One forager summed up the experience of many who chose to harvest in private yards: "[T]hat's my favorite place to harvest because it's easy ... usually what I want, people don't want." Enforcement of laws governing access to yards depended heavily on citizen surveillance by watchful neighbors or passers-by. Some foragers modified their schedules to pick early in the morning or at dusk, when they were less likely to be noticed.

### *Moral Calculations*

Foragers' feelings of guilt and fear influenced when, where, what, and how much foragers harvested from yards. Their moral judgments also guided decisions about when it was okay to harvest without permission (Table 6). The most common (mentioned by 90% of

**Table 6.** NTFP access rights and wrongs in yards.

Rights: Harvesting NTFPs is okay if	Wrongs: Harvesting NTFPs is not okay when
They are abundant	It involves blatant trespassing
Harvest quantities are small	Harvest quantities are large (unless permission is obtained)
They appear unwanted	They occur in a backyard (unless the home is vacated)
They will otherwise go to waste	A yard has a fence around it
They extend into a public right of way	A yard has a no trespassing sign
They occur at a yard's edge	
They are in the yard of an abandoned or empty home	
The landowner gives permission	

NTFP, non timber forest product.

foragers) was their perception of whether residents wanted the product. Common indicators that they did not included the presence of fallen, overripe, or rotting products, and neglected trees or bushes. In the minds of many foragers, waste and neglect of NTFPs weakened landowners' claims to those products. One reasoned: "... my theory with fruit is that if it's in somebody's yard—if it's hitting the ground, it's fair game—you've lost your ownership over it, because you're letting it go to waste." Foragers who harvested in yards without permission generally took small amounts. For larger amounts, most preferred to ask permission. Product abundance was also a factor.

Product abundance, condition, and neglect were generally insufficient to trigger decisions to harvest illicitly from yards, however. Many foragers were reluctant to trespass on private property and restricted their harvesting to the edges of front yards or to products overhanging public ROWs. Foragers considered illicitly harvesting in backyards (fenced or not) acceptable only if properties were abandoned, homes were temporarily empty, or products were growing outside of a fence or into public ROWs.

**Public Rights of Way**

About 14,000 acres, or 26% of Seattle's land area, are managed as public ROWs (City of Seattle 2013). Four categories—sidewalks, planting strips (narrow strips of vegetation that separate sidewalks from city streets), alleyways, and road edges—are considered here. An estimated 180,000 trees line the city's streets and boulevards (City of Seattle 2013). The Seattle Department of Transportation (SDOT) maintains roughly 40,000 of these; adjacent property owners are responsible for the remaining 140,000. A total of 74% of foragers interviewed harvested in one or more ROWs. Sidewalks and planting strips were the most common, followed by road edges, with alleyways least common. Although ease of access to products made ROWs attractive as foraging sites, this advantage was somewhat offset by widespread concerns about contaminants from car exhaust, herbicides and pesticides, dog or human urine, and physical safety in areas with heavy vehicular traffic.

**Tenure Rules and Access Mechanisms**

The laws applicable to trees and vegetation in Seattle's ROWs vary depending upon who holds title to the land and who planted the tree or established the vegetation. Usually the adjacent property owner holds the underlying title and retains a limited right to plant trees and vegetation in the ROW, with SDOT exercising regulatory authority under section 15.43 of the Seattle Municipal Code over location, species, size, and maintenance requirements. The ordinance is silent about residents' rights to harvest fruit, leaves, or bark

from their street trees. Where the city (usually SDOT) has planted trees, it is responsible for maintenance. Under Chapter 10.52.30 of the Seattle Municipal Code, owners and occupants of adjacent property are responsible for keeping public ROWs clear of vegetation that impedes pedestrian or vehicular traffic. Since ROWs are public, even when the underlying title is private, trespass laws do not apply; however, state theft law (Revised Code of Washington 9A.56 Theft and Robbery) would apply.

Tenure rights to NTFPs in ROWs are nebulous because most foragers do not know who holds legal title to these spaces or whether NTFP harvest is allowed, and lack of enforcement. For example, many foragers were uncertain about whether NTFPs located in planting strips containing vegetation maintained by adjacent property owners belonged to the owners or the public. Some foragers believed that planting strips were public, making it permissible to harvest there without asking permission from adjacent property owners. Others categorized planting strips as private gardens and avoided them. Watchful homeowners, neighbors, and passers-by were the chief enforcers of perceived ownership claims by adjacent property owners to NTFPs located in ROWs.

### **Moral Calculations**

Foragers' feelings of guilt or fears of having their harvesting activities questioned by others constrained foraging in ROWs. In addition, internal moral judgments guided harvesting in ROWs and were similar across the four types (Table 7). Roughly two-thirds of foragers considered whether the perceived owner wanted an NTFP growing in a ROW when deciding if harvesting was acceptable without asking permission. For example, one harvested ginkgo seeds (*Ginkgo biloba*) in planting strips because "nobody wants those." Another had no qualms about harvesting chicory (*Cichorium intybus*) in alleyways—a species that many urban residents consider a weed—but was much more careful about harvesting cultivated plants from alleyways or parking strips. The phrase "intentionally cultivated" highlights an important distinction many foragers made between plants in ROWs that were wanted such as tomatoes in a garden, and plants considered weeds, or untended fruit trees.

Many foragers removed small amounts of NTFPs from ROWs without asking permission. Motivations for limiting harvest quantities were unclear, but likely entailed reduced risk of antagonizing adjacent property owners. Moral judgments about a product's location within a ROW also influenced harvest decisions. Fruits, nuts, or other NTFPs that overhung sidewalks or streets or had fallen to the ground were typically considered available. Where they encountered fallen products, some foragers felt it was acceptable to harvest products remaining on the tree. Others preferred to ask permission of the adjacent property owner.

**Table 7.** NTFP access rights and wrongs in ROWs.

Rights: Harvesting NTFPs is okay if	Wrongs: Harvesting NTFPs is not okay when
They overhang streets or sidewalks	A product is intentionally cultivated, or in a private garden (except fruit trees)
Harvest quantities are small	A product is tended by the adjacent property owner
They appear unwanted by adjacent property owners	
The product has fallen to the ground	
They are on public property	
The adjacent property owner gives permission	
There is no ecological damage	

NTFP, non timber forest product; ROW, rights of way.

## Discussion

Interviews with urban foragers in Seattle identified several important mechanisms of access to NTFPs (Table 8). These mechanisms varied by type of space and may not be comprehensive; they emerged from interviews with foragers exhibiting specific demographic characteristics. Underlying these mechanisms, and adding to them, were harvesters' moral calculations about whether it was right or wrong to harvest a given product from a given space. Moral calculations came into play whether harvesting was legal or sanctioned, illegal, or when tenure was unclear. Some moral judgments were consistent across all three spaces and centered around harvesters' perceptions of whether products were wanted, product or species abundance, harvesting judiciously, and minimizing damage to individual plants or site-level populations. Other moral judgments were specific to each of the three spaces. Park-specific judgments were oriented toward ecological considerations, particularly not causing ecological harm; yard and ROW-related judgments were socially oriented and emphasized treating private property respectfully. Often foragers weighed several moral judgments simultaneously in their harvest decisions.

Despite some similarities, we found key differences between NTFP access in urban and rural America (Table 2). Formal agreements such as permits, leases, and fee-based systems are common in rural areas on public and some private lands. Although permit systems exist for Seattle city parks, they were rarely used. In rural areas, systems of legal pluralism may prevail in which regulatory systems governing NTFP access co-exist with indigenous, customary, or folk institutions. Long-term, locally-sanctioned customary systems of access to NTFPs were not apparent in Seattle. Social networks are another important mechanism of access to NTFPs on public and private lands in rural America, where NTFPs are often obtained through traditional social relationships with friends, family, scientists, or land managers through formal or informal arrangements. In Seattle, access to resources in yards often entailed obtaining permission from landowners, and access in city parks was sometimes gained through communication with park employees. Illegal harvesting is another mechanism of access to NTFPs on public and private lands in rural areas, that is also found

**Table 8.** Mechanisms of access to NTFPs in Seattle.

Space	Mechanism
City park	Formal agreements (e.g., permits)
	Informal agreements with authorities
	Environmental stewardship activities (e.g., weeding, spreading seeds)
	Enhancement projects (e.g., fruit tree rehabilitation, edible landscape projects)
	Illegal harvesting
Yards	Opportunism
	Moral calculations
	Request permission from property owner
	Participate in community fruit harvesting programs
	Illegal harvesting
	Opportunism
Rights of way	Exchange (e.g., return items made from products harvested)
	Moral calculations
	Request permission from adjacent property owner or public ROW manager
	Illegal harvesting
	Opportunism
	Moral calculations

NTFP, nontimber forest product; ROW, rights of way.

in Seattle city parks, yards, and ROWs (though perhaps unintentional). Environmental manipulation to enhance the availability of desired resources is a mechanism found both in rural America and Seattle.

Rural NTFP harvesting is also influenced by a set of ethical principles. Emery and Ginger (2014) identify five such principles adopted by many rural harvesters: (1) gather where the targeted NTFP is abundant; (2) do not take all the leaves, seeds, or fruits available; (3) keep disturbance to a minimum; (4) avoid harvesting endangered species; and (5) do not take more than you need. The literature on NTFP access in rural and urban areas has not addressed moral calculations as a self-regulating mechanism of access in detail.

Despite some commonalities, we suggest that key differences in environmental and social conditions shape the nature of access to NTFPs in cities compared to rural areas. From an environmental standpoint, most urban residents have small if any NTFP endowments because they do not own or rent enough land (small urban lots, apartments); thus they depend on obtaining NTFPs from other properties. Land ownership in cities is highly heterogeneous at small scales, with ecologically mixed mosaics of small parcels (Downey 2016). Thus, desired species may occur in low densities and in a variety of microhabitats that fall under multiple tenure systems, complicating access.

From a social standpoint, the challenge in urban areas stems from a need for access to a broad range of spaces. Rules of access (formal and informal) to space are highly variable and negotiable from one private property to the next (e.g., from yard to yard down a residential street); are vague in places where ownership is unclear (e.g., public ROWs); and are rarely posted (e.g., parks, church, and school grounds). This situation poses a dilemma for foragers who may be unsure of tenure rules in any given parcel. It may also be challenging to negotiate access to NTFPs with numerous and diverse property owners, many of whom may be strangers. Moreover, access through social networks is likely underdeveloped in urban areas owing to relatively rapid land use change and development, and resident turnover. Gathering in city parks—potentially less complicated—is typically prohibited. Where they exist, laws and regulations pertaining to foraging are rarely enforced and lawsuits are impractical. Informal mechanisms such as citizen surveillance operate, but can be circumvented. These circumstances lend themselves to creating a *de facto* situation of open access to urban NTFPs, which are predominantly common pool resources: it is difficult to exclude people from using them, and resource use by one person can subtract from the welfare of other users (Ostrom 1990).

Unsustainable use of common pool resources in open access situations may be prevented by establishing private, state, or common property regimes in which rules governing resource access, use, and management are developed and enforced through sanctions (Ostrom 1990; Ostrom et al. 2002). In Seattle, we found another response to *de facto* open access: internal self-regulation, specifically, foragers' feelings of guilt or fear about being seen harvesting in places where it was illegal or tenure was uncertain, and internal moral judgments about access rights and wrongs. Another type of environmental ethic—the moral right to food—also influenced observance of tenure rules. Thus we posit that moral judgments are an important access mechanism in urban environments and may contribute to sustainable resource use in the absence of effective formal regulatory institutions. Foragers indicated that many of the NTFPs they sought were fairly abundant. The degree to which this abundance is due to beneficial supply/demand ratios, lack of commercial sale, self-regulation by foragers, or other variables is unknown. Despite a lack of

research on how urban foraging affects biodiversity and species abundance, researchers in the field observe that foragers generally remove small amounts of products, several of which are seasonal, regrow after harvesting, or reproduce annually (Shackleton et al. 2017), which likely minimizes impacts.

## Conclusion

Trends toward urbanization, land use and ownership change, privatization of public land in cities (Colding et al. 2013), and regulations that make NTFP harvesting illegal in many public spaces could dramatically alter NTFP access in urban environments, with negative consequences for foragers. Seattle's Urban Forest Stewardship Plan (City of Seattle 2013) recognizes a role for foraging in Seattle's urban forests, but does not specify how NTFP access should be managed. An important implication of our findings is that tighter controls on access—i.e., enforcing harvest prohibitions in city parks, or neighborhood surveillance programs—may not be needed, and could exclude people unnecessarily. Such controls could also undermine the many benefits associated with urban foraging. Moreover, given the diversity of circumstances associated with each product and space, imposing a set of formal rules over urban gathering would likely be impractical. Internal moral judgments, by contrast, take into account multiple aspects of a harvesting situation, and are more flexible. This form of self-regulation may help ensure future access to NTFPs—both ecologically (by sustaining populations of desired species) and socially (harvesting is more likely to be allowed if it is done sustainably).

Instead, developing voluntary foraging “codes of conduct” based on the internal moral judgments common among urban foragers—as exist in Scotland and England (English Nature 1998; Dyke and Emery 2010)—may be an effective approach to sustainable urban NTFP harvesting. Such codes of conduct could be articulated through participatory processes to capture variance in moral calculations among urban foragers having different social, cultural, and economic backgrounds. Codes of conduct could be disseminated through venues like education programs in parks, organized foraging groups, and stewardship programs. To make this approach viable, more research is needed about the variables that reinforce internal moral judgments and cause them to persist, how these judgments vary by social group, and the means by which they are transmitted. Should voluntary codes of conduct be ineffective for sustainable NTFP harvesting, then a regulatory approach could be considered.

Increased understanding of how natural resource access operates in cities and how it can be maintained will help support efforts to expand food production in urban ecosystems, help strengthen human connections with nature in cities, and sustain the many social and environmental benefits associated with urban natural resource use. Cognitive mechanisms of access may help regulate harvesting in open access situations, providing a foundation upon which urban NTFP governance institutions might be built.

## Note

1. NTFPs are plants, plant parts (e.g., leaves, fruits), plant exudates (e.g., resins), and fungi that are harvested from forested places. In urban environments they include wild, cultivated, and feral species, native and non-native.



## Acknowledgments

Joyce Le-Compte Mastenbrook and Lauren Urgenson helped conduct interviews. Lee Greer helped edit the manuscript. Kendra Wendel assisted with manuscript preparation. Marla Emery and Patrick Hurley contributed toward shaping the research design. We thank three anonymous reviewers for their comments, which helped improve the manuscript.

## Funding

This research was funded by U.S. Department of Agriculture, Forest Service, Pacific Northwest Research Station Joint Venture Agreements PNW 10 JV 11260489-024 and PNW 09 JV 11261975-056, and Contracts AG-046W-P-12-0054 and AG-046W-P-12-0061. The Institute for Culture and Ecology provided in-kind funding support.

## References

- Adams, D., M. Hardman, and P. Larkham. 2015. Exploring guerrilla gardening: Gauging public views on the grassroots activity. *Local Environment* 20 (10):1–16. doi:10.1080/13549839.2014.980227.
- Alexander, S. J., and R. Fight. 2003. Managing access to nontimber forest products. In: *Compatible forest management*, eds. R. A. Monserud, R. W. Haynes, and A. C. Johnson, 383–400. Dordrecht, Netherlands: Kluwer Academic Publishers.
- Arora, D. 2008. California Porcini: Three new taxa, observations on their harvest, and the tragedy of no commons. *Economic Botany* 62 (3):356–75. doi:10.1007/s12231-008-9050-7.
- Blomley, N. 2004. Un-real estate: Proprietary space and public gardening. *Antipode* 36 (4):614–41. doi:10.1111/j.1467-8330.2004.00440.x.
- Carolsfeld, A. L., and S. L. Erikson. 2013. Beyond desperation: Motivations for dumpster diving for food in Vancouver. *Food and Foodways* 21 (4):245–66. doi:10.1080/07409710.2013.849997.
- Carpenter, N. 2009 *Farm city: The education of an urban farmer*. New York, NY: Penguin Books.
- Carroll, C. 2014. Shaping new homelands: Environmental production, natural resource management, and the dynamics of Indigenous State practice in the Cherokee Nation. *Ethnohistory* 61 (1): 123–47. doi:10.1215/00141801-2376105.
- Ciecko, L., K. Tenneson, J. Dilley, and K. W. Wolf. 2012. *Seattle's forest ecosystem values: Analysis of the structure, function, and economic benefits*. Seattle, WA: Green Cities Research Alliance.
- City of Seattle Department of Neighborhoods. 2014. P-Patch community gardening program information sheet. <http://www.seattle.gov/neighborhoods/p-patch-community-gardening/about-the-p-patch-program> (accessed 28 July 2017).
- City of Seattle Urban Forestry Commission. 2013. *Urban forest stewardship plan*. Seattle, WA: City of Seattle.
- Clark, K. H., and K. A. Nicholas. 2013. Introducing urban food forestry: A multifunctional approach to increase food security and provide ecosystem services. *Landscape Ecology* 28 (9):1649–69. doi:10.1007/s10980-013-9903-z.
- Colding, J., and S. Barthel. 2013. The potential of “Urban Green Commons” in the resilience building of cities. *Ecological Economics* 86:156–66. doi:10.1016/j.ecolecon.2012.10.016.
- Colding, J., S. Barthel, P. Bendt, R. Snep, W. van der Knaap, and H. Ernstson. 2013. Urban green commons: Insights on urban common property systems. *Global Environmental Change* 23 (5): 1039–51. doi:10.1016/j.gloenvcha.2013.05.006.
- Davenport, N. A., C. M. Shackleton, J. Gambiza. 2012. The direct use value of municipal commonage goods and services to urban households in the Eastern Cape, South Africa. *Land Use Policy* 29 (3):548–57. doi:10.1016/j.landusepol.2011.09.008.
- Downey, G. 2016. Being human in cities: Phenotypic bias from urban niche construction. *Current Anthropology* 47 (13):S52–64. doi:10.1086/685710.

- Dyke, A., and M. R. Emery. 2010. NTFPs in Scotland: Changing attitudes to access rights in a reforestation land. In: *Wild product governance: Finding policies that work for non-timber forest products*, eds. S. A. Laird, R. J. McLain, and R. P. Wynberg, 135–154. London: Earthscan.
- Emery, M. R., and A. R. Pierce. 2005. Interrupting the telos: Locating subsistence in contemporary US forests. *Environment and Planning A* 37 (6):981–93. doi:10.1068/a36263.
- Emery, M. R., and C. Ginger. 2014. Special forest products on the Green Mountain and Finger Lakes National Forests: A research-based approach to management. General Technical Report NRS-131. U.S. Department of Agriculture, Forest Service, Northern Research Station, Newtown Square, PA.
- English Nature. 1998. The wild mushroom picker's code of conduct.
- Fortmann, L. 1990. Locality and custom: Non-aboriginal claims to customary usufructuary rights as a source of rural protest. *Journal of Rural Studies* 6 (2):195–208. doi:10.1016/0743-0167(90)90006-t.
- Fragkias, M., B. Günerap, K. C. Seto, and J. Goodness. 2013. A synthesis of global urbanization projections. In *Urbanization, biodiversity and ecosystem services: Challenges and opportunities: A global assessment*, eds. T. Elmqvist, 1–21. Dordrecht, Netherlands: Springer.
- Gianotti, A. G., and P. T. Hurley. 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* 57:555–63. doi:10.1016/j.landusepol.2016.06.019.
- Ginger, C., M. R. Emery, M. J. Baumflek, and D. E. Putnam. 2012. Access to natural resources on private property: Factors beyond right of entry. *Society and Natural Resources* 25 (7):700–15. doi:10.1080/08941920.2011.633596.
- Goodman, E. C. 2002. Nontimber forest products customary claims. In *Nontimber forest products in the United States*, eds. E. T. Jones, R. J. McLain, and J. Weigand, 393–412. Lawrence, KS: University of Kansas Press.
- Hufford, M. 2006. Molly mooching on Bradley Mountain: The aesthetic ecology of Appalachian morels. *Gastronomica* 6 (2):49–56. doi:10.1525/gfc.2006.6.2.49.
- Hurley, P. T., and A. C. Halfacre. 2011. Dodging alligators, rattlesnakes, and backyard docks: A political ecology of sweetgrass basket-making and conservation in the South Carolina Lowcountry, USA. *GeoJournal* 76 (4):383–99. doi:10.1007/s10708-009-9276-7.
- Hurley, P. T., and M. R. Emery. 2017. *Locating provisioning ecosystem services in urban forests: Forageable woody species*. New York City, USA. *Landscape and Urban Planning* 168.
- Hurley, P. T., B. Grabbatin, C. Goetcheus, and A. Halfacre. 2013. Gathering, buying, and growing sweetgrass (*Muhlenbergia sericea*): Urbanization and social networking in the sweetgrass basket-making industry of lowcountry South Carolina. In *African ethnobotany in the Americas*, eds. R. Voeks and J. Rashford, 153–73. New York, NY: Springer.
- Hurley, P. T., M. Emery, R. McLain, M. Poe, B. Grabbatin, C. Goetcheus, C. Isenhour, G. McDonogh, and M. Checker. 2015. Whose urban forest? Plant foraging and the political ecology of urban nontimber forest products. In *Sustainability in the global city: Myth and practice*, eds. M. Checker, C. Isenhour, and G. McDonogh, 187–12. New York, NY: Cambridge University Press.
- Kaoma, H., and C. M. Shackleton. 2014. Collection of urban tree products by households in poorer residential areas of three South African towns. *Urban Forestry & Urban Greening* 13:244–52. doi:10.1016/j.ufug.2014.02.002.
- Kaoma, H., and C. M. Shackleton. 2015. The direct-use value of urban tree non-timber forest products to household income in poorer suburbs in South African towns. *Forest Policy and Economics* 51:104–12. doi:10.1016/j.forpol.2015.08.005.
- Krasny, M. E., and K. G. Tidball. 2009. Community gardens as contexts for science, stewardship, and civic action learning. *Cities and the Environment (CATE)* 2 (1):267. doi:10.15365/cate.2182009.
- Lynch, K. A., and R. J. McLain. 2003. Access, labor, and wild floral greens management in western Washington's forests. General Technical Report GTR-PNW-585. U.S. Department of Agriculture, Forest Service, Pacific Northwest Research Station, Portland, OR.
- McGraw, J. B., S. Souther, and A. E. Lubbers. 2010. Rates of harvest and compliance with regulations in natural populations of American ginseng (*Panax quinquefolius* L.). *Natural Areas Journal* 30 (2):202–10. doi:10.3375/043.030.0207.

- McLain, R. J., P. T. Hurley, M. R. Emery, and M. R. Poe. 2014. Gathering “wild” food in the city: Rethinking the role of foraging in urban ecosystem planning and management. *Local Environment* 19 (2):220–40. doi:10.1080/13549839.2013.841659.
- McLain, R., M. Poe, P. T. Hurley, J. Lecompte-Mastenbrook, and M. R. Emery. 2012. Producing edible landscapes in Seattle’s urban forest. *Urban Forestry & Urban Greening* 11 (2):187–94. doi:10.1016/j.ufug.2011.12.002.
- Merullo, V. D. 2010. *Developments in Washington arboriculture law: Cases and statutes of interest*. Columbus, OH: TreeandNeighborLaw.com.
- Mollee, E., M. Pouliot, and M. A. McDonald. 2017. Into the urban wild: Collection of wild urban plants for food and medicine in Kampala, Uganda. *Land Use Policy* 63:67–77. doi:10.1016/j.landusepol.2017.01.020.
- Nordahl, D. 2009. *Public produce: The new urban agriculture*. Washington, DC: Island Press.
- Ostrom, E. 1990. *Governing the commons: The evolution of institutions for collective action*. New York, NY: Cambridge University Press.
- Ostrom, E., T. Dietz, N. Dolsak, P. C. Stern, S. Stonich, and E. U. Weber, eds. 2002. *The drama of the commons*. Washington, DC: National Academy Press.
- Pickett, S. T. A., and W. Zhou. 2015. Global urbanization as a shifting context for applying ecological science toward the sustainable city. *Ecosystem Health and Sustainability* 1 (1):5. doi:10.1890/ehs14-0014.1.
- Pitchon, A., and K. Norman. 2012. Fishing off the dock and under the radar in Los Angeles County: Demographics and risks. *Bulletin, Southern California Academy of Sciences* 111 (2):141–52. doi:10.3160/0038-3872-111.2.141.
- Poe, M. R., J. LeCompte, R. McLain, and P. Hurley. 2014. Urban foraging and the relational ecologies of belonging. *Social and Cultural Geography* 15 (8):901–19. doi:10.1080/14649365.2014.908232.
- Poe, M., R. J. McLain, M. Emery, and P. T. Hurley. 2013. Urban forest justice and the rights to wild foods, medicines, and materials in the city. *Human Ecology* 41 (3):409–22. doi:10.1007/s10745-013-9572-1.
- Ribot, J. C., and N. L. Peluso. 2003. A theory of access. *Rural Sociology* 68:153–81. doi:10.1111/j.1549-0831.2003.tb00133.x.
- Robbins, P., M. Emery, and J. L. Rice. 2008. Gathering in Thoreau’s backyard: Nontimber forest product harvesting as a practice. *Area* 40 (2):265–77. doi:10.1111/j.1475-4762.2008.00794.x.
- Roe, M., I. S. Herlin, and S. Speak. 2016. Identity, food and landscape character in the urban context. *Landscape Research* 41 (7):757–72. doi:10.1080/01426397.2016.1212324.
- Schlesinger, J., A. Drescher, and C. M. Shackleton. 2015. Socio-spatial dynamics in the use of wild natural resources: Evidence from six rapidly growing medium-sized cities in Africa. *Applied Geography* 56:107–15. doi:10.1016/j.apgeog.2014.11.013.
- Senos, R., F. K. Lake, N. Turner, and D. Martinez. 2006. Traditional ecological knowledge and restoration practice. In: *Restoring the pacific northwest*, eds. D. Apostol and M. Sinclair, 393–26. Washington, DC: Island Press.
- Shackleton, C. M., P. T. Hurley, A. C. Dahlberg, M. R. Emery, and H. Nagendra. 2017. Urban foraging: A ubiquitous human practice overlooked by urban planners, policy, and research. *Sustainability* 9 (10):1884. doi:10.3390/su9101884.
- Shackleton, S., A. Chinyimba, P. Hebinck, C. Shackleton, and H. Kaoma. 2015. Multiple benefits and values of trees in urban landscapes in two towns in northern South Africa. *Landscape and Urban Planning* 136:76–86. doi:10.1016/j.landurbplan.2014.12.004.
- Synk, C. M., B. F. Kim, C. A. Davis, J. Harding, V. Rogers, P. T. Hurley, M. R. Emery, and K. E. Nachman. 2017. Gathering Baltimore’s bounty: Characterizing behaviors, motivations, and barriers of foragers in an urban ecosystem. *Urban Forestry & Urban Greening* 28:97–102. doi:10.1016/j.ufug.2017.10.007.
- Wehi, P. M., and W. L. Wehi. 2009. Traditional plant harvesting in contemporary fragmented and urban landscapes. *Conservation Biology* 24 (2):594–604. doi:10.1111/j.1523-1739.2009.01376.x.