

The Bounty of the Urban Forest
The Uses and Values of Urban Non-Timber Forest Products

This Working paper is
Produced by:
Community Resources
*A Nonprofit Organization Promoting Community Stewardship
to Restore Our Urban Environment*

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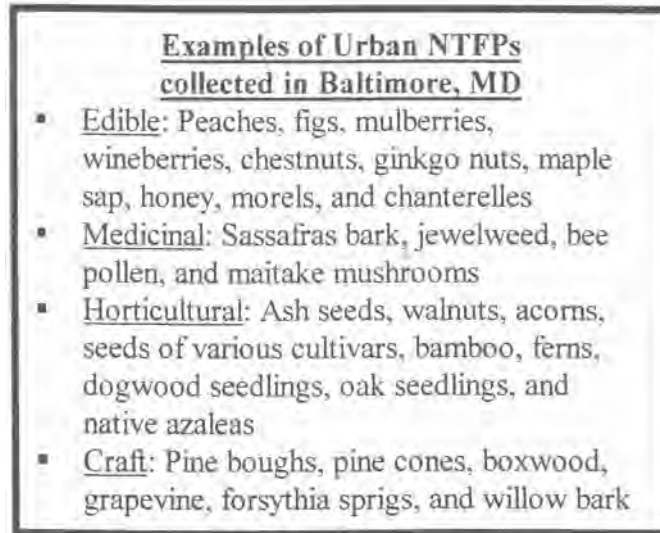
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INTRODUCTION

Typical lists of the benefits of urban trees and forests include beauty, increased property values, reduced noise pollution, air and water filtration, cooling effects, and reduced energy costs (Moll and Young, 1992; McPhearson, Nowak and Rowntree, 1994; USDA Forest Service, R8-FR 17). However, many urban residents also collect and use a variety of Non-Timber Forest Products (NTFPs) from urban trees, open spaces, and forests. These products represent significant and important values of the urban forest that many policy makers, urban land managers, and city residents tend to completely overlook.

Defining Urban NTFPs:

Definitions of the urban forest are, of course, a matter of debate. They range from those that include all elements (biotic, abiotic, and social) that interact within our urban ecosystems, to those that include only large, closed-canopy-forested areas. We define the urban forest as *the trees, other associated plants, and associated animals that grow and interact within our cities.*



Urban Non-Timber Forest

Products we define as *any (non-timber) product collected, cultivated, or derived from the urban forest.* For the purposes of this study in Baltimore, we narrowed this definition so that did not include animals or animal products (except for honey and pollen), wood products, or products specifically cultivated in gardens.

Why Care about Non-Timber Forest Products?

Within just the past 10 years, NTFPs have become increasingly recognized for the important cultural, subsistence, and market values that they add to the overall value of rural forests and individual households worldwide, and for the micro-enterprise opportunities that they represent. Around the globe, NTFPs are relied upon for household income, food, construction supplies, and materials for ceremonial purposes (FAO, 1995). Poor households in particular rely on these products for their livelihood, partly because they tend to have more access to forests than to other resources. These resources are also especially important as a buffer during times of economic hardship or lulls in agricultural production when they can provide important resources and income (Guijt, 1995; FAO, 1995).

Economically, the value of sustainably harvested NTFPs in tropical forests can often outweigh the value of other land uses such as logging, farming, or grazing (Peters, Gentry and Mendelsohn, 1989; Balick and Mendelsohn, 1995; Grimes, et. al., 1994). Even in North American forests, NTFPs have been shown to provide significant additional income and even opportunities for small

entrepreneurs (Thomas and Schumann, 1993; Shelly and Lubin, 1995; Emery, 1998.). Indeed. NTFP markets have grown an estimated 20% in the last three to five years, and the U.S. herbal market is growing at an annual rate of 13%-15% (Chamberlain, Bush and Hammett, 1998; Hammett, personal communication).

Despite the documented values and growing markets of NTFPs, no study has explored the current uses or potential values of NTFPs specifically from the urban forest. The United Nations (UN) "Annotated Bibliography of Urban Forestry in Developing Countries," contains no annotations specifically discussing or valuing NTFPs. The UN Non-Wood Forest Products (NWFP) database contains no citations related to urban areas.

Over 70% of Americans live in our urban areas. Over 50% of the population lives in one of our 40 largest cities. The UN estimates that by 2010, more than half of the world's population will be urban. In addition, many of America's poor and minority residents live in our urban cores.

Although many environmental professionals and mainstream Americans may overlook the importance of urban NTFPs, they represent important resources for a variety of ethnically and socially diverse groups and individuals. By ignoring these resources, we undermine the values that different social groups place on the urban forest. We also under-sell the potential value our urban forests, as a whole, to both policy makers and the general public. Unless we recognize urban forest product collection as an important activity, we will fail to develop and implement appropriate management strategies to sustain the productivity and health of these vital urban resources.

METHODS

During 1998, Community Resources launched this project entitled, "Exploring the Value of Urban Non-Timber Forest Products." Our investigation focused on forest product collection in Baltimore, MD, but we also collected information from four other major U.S. cities. We designed our methods to collect a relatively broad amount of information efficiently, drawing primarily on methods detailed in Emery, 1998, and to a lesser extent, on previous NTFP studies in tropical forests (Godoy, et. al., 1993; Grimes, et. al., 1994). These included the following basic methods:

Semi-Structured Interviews:

We contacted 20 urban forestry professionals, environmental educators, and other individuals with knowledge of urban forest uses in Philadelphia, PA; Washington, D.C.; New York, NY; and Boston, MA. We identified these people through our network of contacts in other cities. Through telephone interviews with these individuals, we gathered information about the forest product collection in their cities.

In Baltimore, we conducted over 80 face-to-face, semi-structured interviews with key individuals. These individuals included urban forestry and other environmental professionals, community leaders, forest product collectors, artisans, and vendors. We identified and selected these key informants using three approaches:

- Networks and contacts: we identified potential interviewees based on our networks of individuals involved in community and urban forest stewardship activities;
- Observations: we identified a number of forest product collectors by observing collection sites and farmers markets during the appropriate seasons;
- Snowball contacts: from each person interviewed, we asked who else we should contact.

Interviews with these individuals were semi-structured, but open-ended. Notes were usually taken during each interview, but always edited for clarity and entered into a database, immediately following the interview. Interviews included a brief introduction to our project, our purpose and our definitions of urban forest products with general examples. We then asked about products individuals might collect, products they knew were collected by others, collection locations, uses, markets, prices, processing, collection times, tree or plant yields, and collection issues. We followed up many interviews with return visits to gain additional information.

Market observations:

We visited local farmers markets and local grocery stores throughout 1998 and 1999. In addition, we made periodic visits to specialty wholesale and retail vendors where products were likely to be sold. We recorded prices and units for products sold at all of these markets.

Additional information collection methods used:

We also used the following additional methods to compliment and help verify the information gained through interviews and market observations:

- Observation of Collection: We observed collection and evidence of collection during the normal course of our activities in and around Baltimore. This included finding collectors in parks, yards, or on the streets, and observing as they collected, and traveling with individuals as they collected fruits, greens, or mushrooms.

- **Production Estimates:** Upon finding products in the field, we estimated the production of a particular tree, plant, or groups of trees or plants. Total yields were estimated through visual counting and we averaged these estimates with estimates for tree and plant yields as reported by the collectors themselves.
- **Product Collections:** During 1998 and 1999, we collected 23 products in Baltimore. We timed each collection, and counted and weighed the harvest. Our information on collection times were averaged with reported and observed collection times, and the information on weights and numbers were used to help convert units between numbers, weights, and volumes reported. This information was critical since collection times, yields, and market prices are often given in different units.
- **Published information:** We reviewed available literature including books, journal articles, and information published on the World Wide Web.

Data management:

We entered all data into collector, plant, and market observation databases using MSWorks for subsequent analysis and reporting.

THE CASE STUDY SITE

Baltimore, Maryland (76°30', 39°15') lies on the western shores of the largest estuary in the world, the Chesapeake Bay. Like many eastern U.S. cities, Baltimore has undergone rapid demographic and economic changes over the past two decades. These changes have resulted in significant urbanization and deforestation of the counties surrounding Baltimore. Baltimore City's population has decreased from approximately 1.2 million to less than 675,000 during the past 30 years. This has been the result of a predominantly middle-class migration and has led to a significant reduction in the tax base of the city, deforestation of the surrounding counties, an aging and dilapidated housing stock, and an abundance of abandoned houses and properties. Baltimore is approximately 65% African American, 33% Caucasian, 1% Asian and 1% Hispanic, with additional diversity within each of these groups.

Geologically, Baltimore lies on the border of two geologic and physiographic provinces—the Piedmont and the Atlantic Coastal Plain. The topography of the city is largely controlled by fluvial erosion associated with the temperate and humid climate of the mid-Atlantic coast. Rainfall and runoff is generally uniform throughout the year. An average annual precipitation is about 109 cm./yr., and the greatest rainfall intensities occur in the summer and early fall. Precipitation from this period is about 10% higher than during the remaining three seasons of the year. Severe droughts are rare. The proximity of large bodies of water and the inflow of southerly winds contribute to relatively high humidity during much of the year. The city is drained through three local streams, which flow, eventually, into the Chesapeake Bay.

Baltimore City is within U.S.D.A. Zone 7. The vegetation within Baltimore City has changed drastically since it was first settled. Few original stands of forest remain in the Baltimore area. Farmers have cultivated most of the land since early settlement, including many of the parks within the City's limits. By 1929, only about 30% of the forest cover remained, and these forested areas were located primarily on steep slopes and non-arable lands and held almost exclusively by farmers. A 1994 forest survey of Baltimore County and City by the Maryland Forest Service estimated that coniferous forests and deciduous forests constituted only 21.3% (1.9% and 19.4%, respectively) of the Baltimore City and County area. Currently, urban forest types range from single street trees, to yard trees and other landscaped areas, to vacant lots, to closed canopy forest areas.

RESULTS

The Products:

Through our interviews and observations, we documented 163 urban forest products in Baltimore. These are forest products that grow in Baltimore City or County and could be collected. Of these, we documented at least 103 products from 78 species that are currently collected and used by individuals within Baltimore City (See Table 1 and Table 2). Our interviews with individuals in other cities suggest that this number of products is not unique to Baltimore. Through only a handful of phone interviews, we documented 57 products known to be collected in Philadelphia, PA. and 26 fruits and nuts known to be collected in Boston, MA.

The 103 currently collected urban NTFPs in Baltimore include edible products (43%), medicinal products (8%), horticultural or nursery products (31%), and decorative and craft products (18%).

Table 1: Urban NTFPs Collected in Baltimore (# products in each type)

Edible Products (44)	Medicinal Products (8)	Horticultural / Nursery Products (11)	Craft / Decorative Materials (19)
· Fruits / berries (16)	· Barks (2)	· Seeds for propagation (20)	· Decorative greens (6)
· Nuts (6)	· Leaves / herbs (3)	· Bamboo and vines for garden props (2)	· Seeds, seedpods, and cones (3)
· Edible greens (7)	· Bee products (2)	· Various shade-tree leaves used for compost	· Vines (4)
· Edible roots (2)			
· Maple sap (2)	· Medicinal mushrooms (1)	· Transplant stock (9) (seedlings, moss, and perennials used for landscaping)	· Barks (4)
· Honey (3)			· Cut tree flowers (2)
· Mushrooms (8)			

Collected Products



Greektown, a small urban community, is known for its many fig trees (above) and its plentiful grapevines (left).



In one of Baltimore's largest forested park areas we found oyster mushrooms growing on this old fallen log.



One of three pear trees found growing, undisturbed, in the front yard of this urban resident.

Table 2: List of Currently Collected Forest Products in Baltimore City

<u>Products</u>	<u>Product Types</u>	<u>Species</u>	<u>Uses</u>
Apple (various varieties)	fruit	<i>Malus pumila</i>	edible
Apricot	fruit	<i>Prunus armeniaca</i>	edible
Arbor Vitae	decorative green	<i>Thuja occidentalis</i> L.	craft
Ash, Green	seed	<i>Fraxinus pennsylvanica</i>	nursery
Ash, White	medicinal bark	<i>Fraxinus americana</i>	craft
Ash, White	seed	<i>Fraxinus americana</i>	nursery
Azalea (native)	seedlings	<i>Azalea</i> sp.	nursery
Bamboo	garden prop	various species	craft
Bee product - Pollen	bee product		medicinal
Bee product - Propolis	bee product		medicinal
Birch, River	bark	<i>Betula nigra</i> L.	edible
Bittersweet	vine	<i>Solanum dulcamara</i>	craft
Blackberries	fruit	<i>Rubus fruticosus</i>	edible
Blueberries	fruit	<i>Vaccinium angustifolium</i>	edible
Box Elder	sap	<i>Acer negundo</i>	edible
Boxwood	decorative green	<i>Buxus sempervirens</i>	craft
Buckeye	seed	<i>Aesculus glabra</i>	nursery
Catalpa	seed	<i>Catalpa speciosa</i>	nursery
Cedar, Eastern Red	bark	<i>Juniperus virginiana</i>	craft
Cedar, Eastern Red	decorative green	<i>Juniperus virginiana</i>	craft
Cherry	fruit	<i>Prunus</i> sp.	edible
Cherry	flowers	<i>Prunus</i> sp.	craft
Chestnut, Chinese	nut	<i>Castanea mollissima</i>	edible
Chicory	edible root	<i>Cichorium intybus</i>	edible
Cress	edible green	<i>Barbarea verna</i>	edible
Dandelion	edible green	<i>Taraxacum officinale</i>	edible
Dandelion	edible root	<i>Taraxacum officinale</i>	edible
Dogwood, Flowering	seed	<i>Cornus florida</i>	nursery
Dogwood, Flowering	seedlings	<i>Cornus florida</i>	nursery
Dogwood, Kousa	seed	<i>Cornus Cusa</i>	nursery
Elderberries	fruit	<i>Sambucus canadensis</i>	edible
Fern	seedlings	various species	nursery
Fig	fruit	<i>Ficus carica</i>	edible
Fig	seedlings	<i>Ficus carica</i>	nursery
Forsythia	flowers	<i>Forsythia</i> sp.	craft
Ginkgo	nut	<i>Ginkgo biloba</i>	edible
Grape	edible green	<i>Vitis</i> spp.	edible
Grape	decorative vine / prop	<i>Vitis</i> spp.	craft
Grape	fruit	<i>Vitis</i> spp.	edible
Hazelnuts (Filberts)	nut	<i>Corylus maxima</i>	edible
Holly	decorative green	<i>Ilex opaca</i>	craft
Honey (Locust)	honey	<i>Robinia pseudoacacia</i>	edible
Honey (Tuliptree)	honey	<i>Liriodendron tulipifera</i>	edible
Honey (Linden)	honey	<i>Tilia cordata</i>	edible
Honeysuckle	vine	<i>Lonicera caprifoliaceae</i>	craft
Horse Chestnut	seed	<i>Aesculus hippocastanum</i>	nursery
Kudzu	decorative vine	<i>Pueraria lobata</i>	craft
Lambs quarters	edible green	<i>Chenopodium album</i>	edible
Leaf Compost	compost	various shade trees	nursery
Magnolia	cone	<i>Magnolia acuminata</i>	craft
Magnolia	decorative green	<i>Magnolia acuminata</i>	craft

Maple, Japanese Red	seed	Acer palmatum	nursery
Maple, Japanese Red	seedlings	Acer palmatum	nursery
Maple, Sugar	sap	Acer saccharum	edible
Maple, Sugar	seed	Acer saccharum	nursery
Moss	seedlings	various species	nursery
Mulberry	fruit	Morus nigra	edible
Mullein	medicinal green	Verbascum thapsus	medicinal
Mushrooms, Chanterelle	mushroom	Cantharellus spp.	edible
Mushrooms, Chicken Woods	mushroom	Laetiporus sulphureus	edible
Mushrooms, Maitake	mushroom	Grifola frondosa	edible/med
Mushrooms, Morel	mushroom	Morchella spp.	edible
Mushrooms, Oyster	mushroom	Pleurotus ostreatus	edible
Mushrooms, Puffball	mushroom	Calvatia gigantea	edible
Mushrooms, Shaggy Mane	mushroom	Coprinus comatus	edible
Mushrooms, Shitake	mushroom	Lentinula edodes	edible
Oak, Chestnut	seed	Quercus prinus L.	nursery
Oak, Sawtooth	seed	Quercus accutissima	nursery
Oak, Red	seed	Quercus rubra	nursery
Oak, Red	seedlings	Quercus rubra	nursery
Oak, various	bark	Quercus sp.	craft
Oak, various	nut	Quercus sp.	edible
Oak, White	seed	Quercus alba	nursery
Oak, White	seedlings	Quercus alba	nursery
Osage Orange	fruit	Maclura pomifera	medicinal
Paw Paw	fruit	Asimina triloba	edible
Paw Paw	seed	Asimina triloba	nursery
Peach (various varieties)	fruit	Prunus persica	edible
Pear (various varieties)	fruit	Pyrus communis L.	edible
Persimmon	fruit	Diospyros virginiana	edible
Persimmon	seed	Diospyros virginiana	nursery
Plantain	edible green	Plantago major	edible
Pokeweed	edible green	Phytolacca americana	edible
Raspberries	fruit	Rubus strigosus	edible
Red Bud	edible flower	Cercis canadensis	edible
Red Bud	seed	Cercis canadensis	nursery
Sassafras	medicinal bark	Sassafras albidum	medicinal
Sassafras	seed	Sassafras albidum	nursery
Spicebush	medicinal green	Lindera benzoin	medicinal
Sweetgrass	medicinal green		medicinal
Sycamore	seed	Platanus occidentalis	nursery
Tuliptree	seed	Liriodendron tulipifera	nursery
Violets	edible green	Viola spp.	edible
Virginia Pine	cone	Pinus virginiana	craft
Walnut, Black	nut	Juglans nigra	edible
Walnut, Black	seed	Juglans nigra	nursery
Walnut, English	nut	Juglans regia	edible
White pine	cone	Pinus strobus	craft
White pine	decorative green	Pinus strobus	craft
Willow	bark	Salix alba	craft
Willow	medicinal bark	Salix alba	medicinal
Wineberries	fruit	Rubus phoenicolasius	edible
Yew	seedlings		nursery

Total:

103

How Do People Use Urban NTFPs?

Personal Consumption:

The vast majority of urban NTFP collection is for personal use. For example, individuals may pick pears or cherries from their yards or from a park when they find them in season.

Homeowners may search for a particular transplant, such as ferns, moss, or a native azalea, when they are enhancing the landscape of their yards. People harvest decorative materials, such as grapevine, pine cones, or teasels for personal flower arrangements or holiday decorations.

Many collectors take special family trips to collect berries or nuts when they are available. In particular, we observed many families collecting Chinese chestnuts, ginkgo nuts, and blackberries for personal consumption. Edible products, in particular, tend to be collected mostly for personal consumption.

Gift Giving:

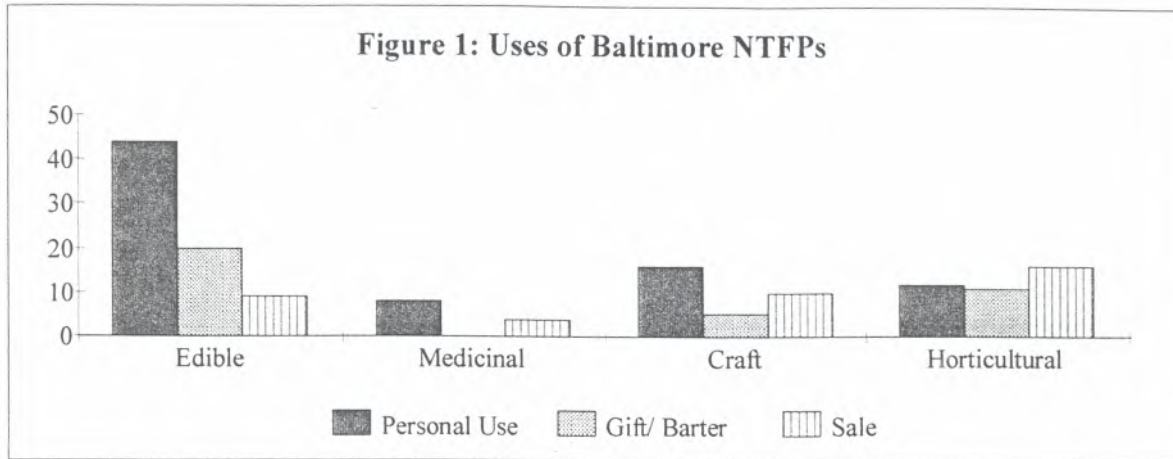
We also found that products collected for personal consumption are sometimes given as gifts. Many collectors will readily share the bounty of what they collect with neighbors or friends, and many will collect products specifically to make gifts. We encountered people giving away jars of pears they have canned, or handmade cone wreath as gifts to family and friends. This gift giving seems to play an important role in both strengthening social networks and in promoting urban forest product collection.

Fund Raiser / Supplemental Income:

A third use for urban NTFPs is for periodic fundraising. Both organizations and individuals use urban NTFPs in this way. For example, the "holiday greens sale" is a common fundraiser for churches, senior centers, garden clubs, and other similar organizations. Various individuals also make holiday wreaths and other natural decorations to supplement their cash around Christmas time. Several environmental non-profit organizations use seedling sales at festivals as a fundraising strategy. We also met beekeepers who keep bees, largely as a recreational activity, but who will also sell their product locally to offset costs.

Raw and Processed Market Sale:

Finally, some collectors do bring urban NTFPs to various markets for sale. Some vendors bring collected products as a part of their inventory at local farmers markets. For example, we found one vender in the Baltimore farmers market who regularly had collected nuts or cones, and another vendor whose sells only mushrooms including a wide variety of woodland mushrooms. Other collectors may sell products to various retail vendors including grocers or specialty craft stores. Some individuals will even sell collected products directly to restaurants or other consumers.



Collection Locations:

Urban NTFPs are collected from a wide variety of sites that span a range of urban forest types. They are collected from both privately and publicly owned property and from a range of highly managed to unmanaged sites.

Generally, urban collection sites include:

Street trees: these are publicly owned and managed, trees planted in sidewalks and grass strips along city street. These include a variety of nut and seed producing trees.

Yard trees and plants: these are privately owned and highly managed plants grown in front, side, or back yards. These often include fruit trees and they are often exotic and ornamental.

Vacant lots: these are publicly, privately, or community owned lots. They can either be managed or wholly unmanaged and "abandoned." Species collected from lots often include a variety of perennial greens and some fruits.

Open-grown park trees: these are publicly owned and managed, single-trees grown in open park areas. These often include fruit and nut producing trees, and as well as a variety of evergreen species providing decorative greens and cones.

Open-grown trees on institutional properties: these are similar to open-grown park trees, except that they are privately owned and managed often by large businesses and institutions, including business parks, cemeteries, schools, and colleges.

Roadside / forest edge plants: these are both publicly and privately owned, and often unmanaged plants that grow along roadsides and forest edges. Products collected from roadsides can include berries, vines, and medicinal plants. Many of these urban roadside species tend to be invasive.

Closed-canopy forest plants: these include trees, shrubs, and herbs that grow in both publicly and privately owned, and usually unmanaged, forest areas. Among other species, these include a variety of woodland mushrooms.

Uses for Urban NTFPs



In this home the collector has gathered sticks and twigs to make these unique coasters.

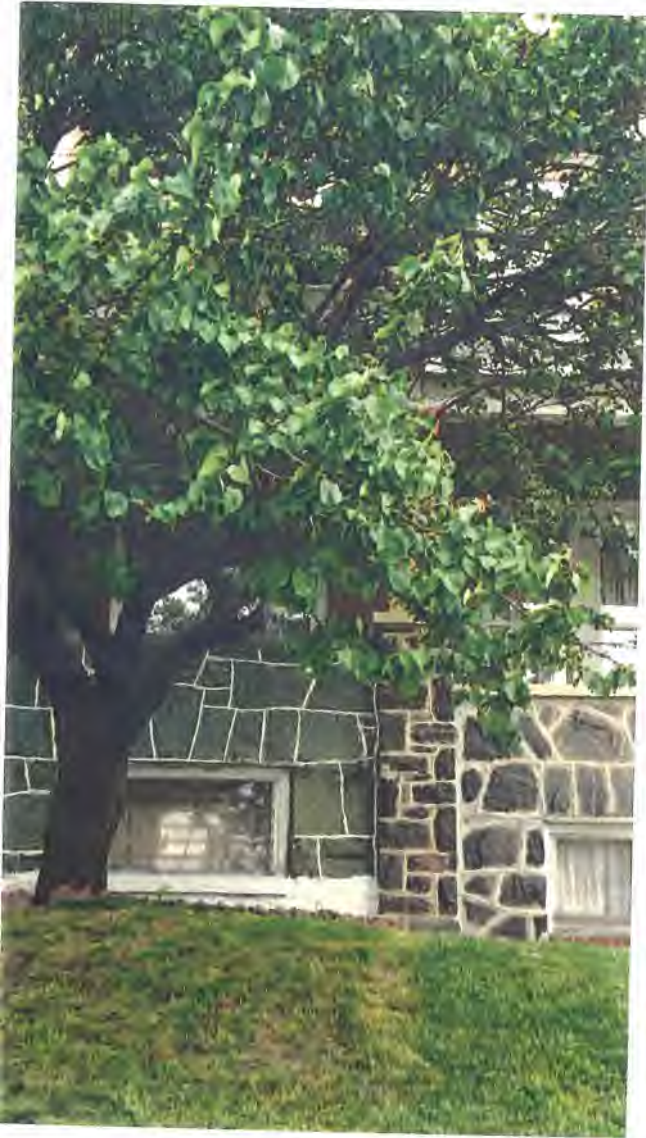


At one of Baltimore's open markets you will find a collector who sells his woodland mushrooms.



Many people collect NTFPs for crafts. This wreath is made from different species of pine cones and horse chestnuts.

Urban Collection Locations



Apricots grow in clusters in the front yard of a home located in Baltimore's Greektown.



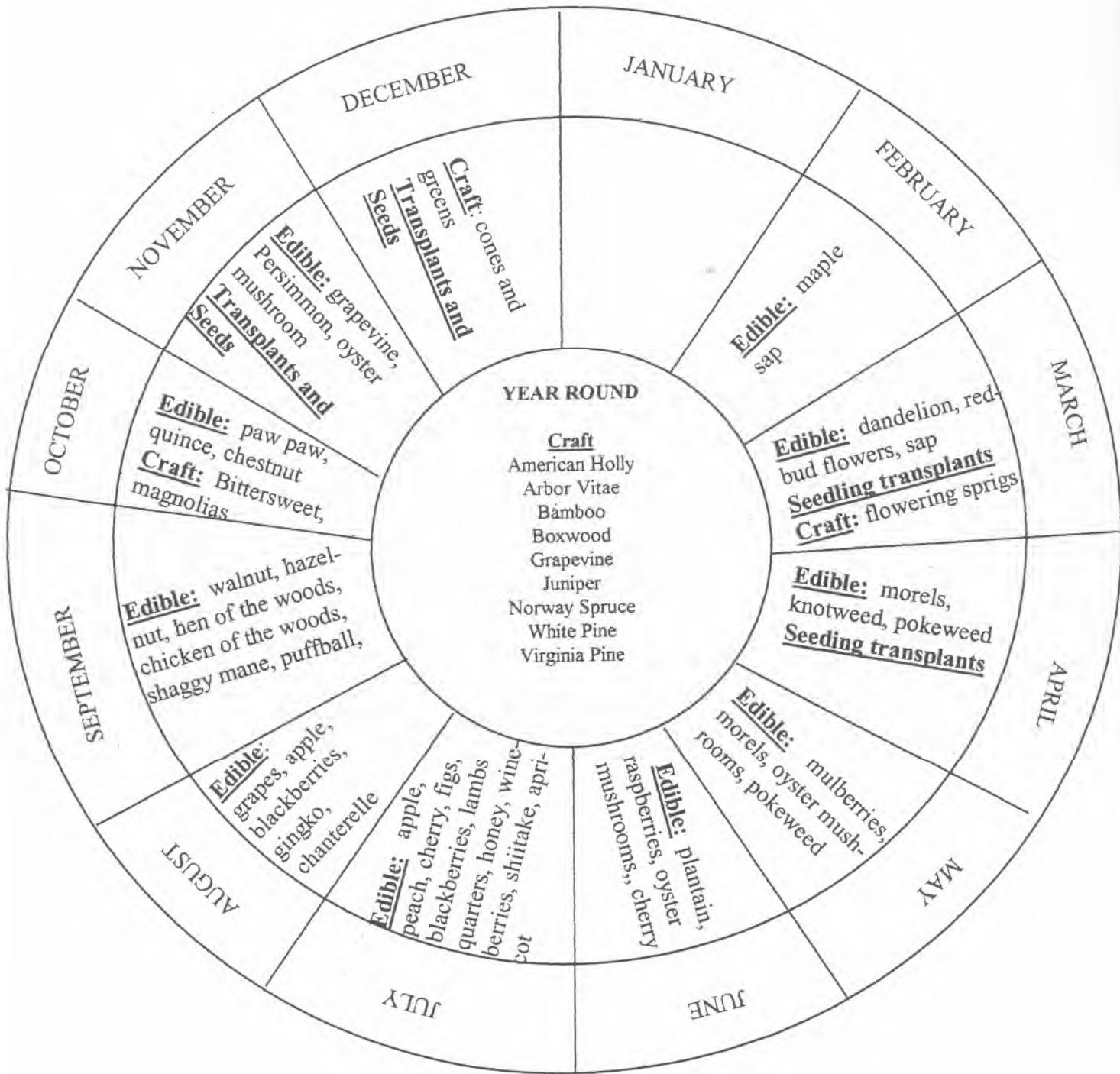
One collection location is this productive, urban garden where residents harvest peaches and vegetables.



Along many roadsides you can find wineberries, just like in this picture.

Seasonality of Collection:

The figure below depicts the seasons in which major NTFPs are available in Baltimore.



The Collectors

Women wash ginkgo nuts in a local urban stream just minutes away from the street trees — where they were collected.



A child collects some vine, from the small patch of woods near her home, to make a wreath.



This family comes to the nearby park to collect chinese chestnuts. This park is known throughout the city for its chestnut trees.



The Collectors:

Collectors of urban forest products are, in many ways, "invisible." Urban NTFP collection is rarely recognized as a formal activity. In fact, many of the people who gather urban NTFPs don't even recognize themselves as "collectors." In addition, collecting is a hard activity to observe. Collectors may seem as though they are just taking a stroll, and signs of collection are rarely obvious.

While our investigations in Baltimore, MD and other cities were not specifically designed to answer the question "who collects," we do know that urban forest product collectors come from a wide diversity of socio-economic, age, gender, and ethnic groups and institutions. The individuals we interviewed came from families making less than \$10,000 per year, as well as from families making more than \$100,000 per year. We interviewed individuals from a variety of ethnic backgrounds, including African-American, Anglo-American, Italian-American, Greek-American, Korean-American, and Native-American. We observed collection by individuals from a diversity of ages from under 5 to 65 years. We discovered that not only individuals, but also institutions are involved in collecting including community organizations, non-profit organizations, city agencies, and state agencies. In short, urban collectors come from inner-city communities and suburban developments, from poor neighborhoods and wealthy neighborhoods and from probably every ethnic group that resides within a given city.

The products that an individual collects are often highly influenced by socio-economic and cultural heritage. There is anecdotal evidence that collection is particularly important for certain immigrant populations, especially eastern European, north Asian, and Southeast Asian immigrants. We suspect that individuals with a more recent connection to a rural lifestyle (for example, first generation migrants to cities) are more likely to collect than long term urban dwellers, however, this is certainly not always the case. In our interviews with Baltimore residents, we discovered many urbanites who were "re-discovering" collection as a new connection to the urban natural world, and many recent migrants who were wary of urban collection.

A few people use collection of urban forest products as a significant contribution to their livelihood strategies. There are examples from numerous communities of individuals—artisans, entrepreneurs and nature enthusiasts—who generate a significant portion of their income through urban NTFP collection. In most of these cases, these individuals are adding value, through artistry, processing, education, and tourism, to the urban NTFPs that they collect.

The Value of Urban NTFPs

Through our investigations we discovered that urban NTFPs provide many different types of benefits including economic, recreational, nutritional, educational, and cultural benefits. One of the most important aspects of the values provided by NTFPs is that they accrue directly to the collectors who, as we note above, represent a wide diversity of individuals. Whereas stormwater benefits of trees are captured by governments (and indirectly, taxpayers), and energy benefits are captured by property owners, NTFP benefits can be captured by anyone from any neighborhood—wealthy or poor, renter or owner, taxpayer or welfare recipient.

Direct Economic Value for Personal Use:

We quantified the direct economic benefits to collectors using methods outlined in Godoy and Lubowski, 1992 and Participatory Valuation of Wild Resources (TIED, 1998). Since the majority of these forest products are collected for personal use we first calculated the direct economic value to the collector for personal use for the 60 products for which we had sufficient information (see Appendix A). We calculated the Net Product Value per product unit as (Net Product Value = Farmers Market or Discount Market Price - Collection Costs). Collection costs we calculated using average collection times, processing times and any special equipment costs per product unit. Times were translated to costs by multiplying by the minimum wage of \$5.50 per hour. We then calculated the Annual Tree Value as: (Annual Tree Value = Net Product Value * Estimated Annual Tree Yield).

These values demonstrate that urban forest products can and do provide significant economic value to those who collect them. In addition, they represent a significant additional value for urban product-producing trees. The estimated annual economic value from product-producing trees ranges from \$4/ year for an average mulberry tree to over \$100 / year for average apricot, Chinese chestnut, and peach trees. The average annual value for product-producing trees quantified in this study is \$50 / tree / year. This compares to other urban tree benefits as follows:

Table 3: Comparison of Urban Tree Values

<u>Urban Tree Values</u>	<u>Range of per</u>	<u>Valuable Trees</u>	<u>Source</u>
NTFPs	\$4 - \$103 / year	Product-producing trees only	-This study
Energy Savings	\$1 - \$32 / year \$17 - \$25 / year	Street and yard trees shading southern walls and windows only	-American Forests, 1995
Pollution Control	\$0.04 - \$2 / year	All urban trees	-McPherson, Nowak, and Rowntree, 1994
Carbon Sequestration	\$0.03 - \$2.25 / year	All trees	-McPherson, Nowak, and Rowntree, 1994

We then calculated potential per acre values that could be captured from NTFPs. We selected three one-acre sites to sample, one in a high-density residential area, one in an open park area, and one in a forested park area. These sites were not chosen to be representative, but rather were selected to illustrate the range of per acre values that could be captured from the urban forest. We surveyed each site, identified product-producing plants, and calculated potential values for

each site. For fruit producing trees, we assumed that a collector would collect and use roughly 50% of the estimated annual fruit yield. For plants that would have to be destructively harvested (i.e., grapevine) or removed (i.e. transplants) we valued only 10% of the individuals (an NTFP collection norm). We calculated per acre values as:

Table 4: Potential* Per Acre Values from Urban NTFPs:

Site	Per Acre Potential Value	Types of products
Closed-canopy forest - Leakin Park	\$91 / acre / year	transplants, grapevine, mushrooms, berries
Open park area - Leakin Park	\$602 / acre / year	chestnuts, pine boughs, cones, walnuts
High density residential - Greektown	\$943 / acre / year	peach, apple, pears, grapes, figs, greens

* It is important to note that the values reported here are potential values. Urban NTFPs only have value if they are collected and used. It is also important to reiterate that the above sites may not be representative of the urban forest as a whole, but they do suggest the range and order of magnitude of potential urban NTFP values per acre.

Potential Inventory versus Actual Collection:

Other NTFP studies have documented that there is often a significant difference between the available products for collection in the forest (the potential inventory), and the products that are actually collected and used from the forest on an annual basis (the flow or actual collection) (Godoy and Lubowski, 1992). Studies in tropical forests suggest that the actual collection is only 2.5% - 3.5% of the potential inventory. We suspect that, in urban areas, the percentage of inventory actually collected is likely to be higher than this as a result of the more limited resources and the higher population density. However, our observations suggested that collection is still likely to be a small percentage of potential inventory (perhaps 5%-15%). Our observations also suggest that this highly product dependant. For example, perhaps as much as 80% of available Chinese chestnuts are actually harvested, whereas less than 1% of available black walnuts (which are abundant and time consuming to process) are likely to be collected. It is important to note that although average annual collection may be a relatively small percentage of potential inventory, in times of economic distress, collection rates may rise significantly.

Additional Benefits:

In addition to the direct economic value of urban NTFPs for personal use, NTFPs and NTFP collection can provide nutritional, educational, cultural, and recreational benefits to collectors.

Nutritional Benefits:

Urban NTFPs are collected and consumed fresh. This also means that locally collected products tend to taste much better than store bought items (we can attest to this personally). Urban NTFPs also represent a diversity of products, many of which are difficult to find in stores. Products like fresh figs, berries, apricots, mushrooms, and nuts, are excellent sources of different vitamins, minerals, and proteins, while being very low in fat. Finally, most urban NTFPs are grown without any chemical inputs and are thus organic. While there are some concerns about various forms of

urban pollution, some of which might have serious health and environmental justice implications, our investigation suggests that these are often more perceptual than actual problems.

Educational and Cultural Benefits:

Searching for, collecting, and using forest products builds a greater understanding of the natural environment and exposes young people to the environment. This educational value is particularly important in our cities where many residents do not have a good understanding of the natural world or feel any connection to it, especially as it relates to our food supply. Urban NTFP collection can help build and strengthen this connection. Collection is often a multi-generational activity in which older family members teach younger family members about the natural world, their family history, and their heritage. Finally, many NTFPs are collected in conjunction with holidays or special events (i.e., chestnuts, grape leaves, pine cones), and occasionally, these culturally important products are not available in local stores.

Recreational Value:

Who does not enjoy chancing upon a patch of ripe berries? Or picking apples to take home for a pie? Or bringing in fresh cut blossoms to decorate the house? For many, collecting is fun. People will travel 30 or 40 miles just to find a "pick-your-own" place. Collecting is an activity often shared with family and friends. There is significant recreational value in collecting and in bringing home the harvest. This recreational value is evidenced by the rising popularity of people like Martha Stewart who emphasizes natural crafts and collection. Since these forest products are perceived to be scarcer in the city, and urban dwellers chance upon them less often, this recreational value is often greater for many urban residents.

POLICY AND MANAGEMENT ISSUES

Lack of Collector Empowerment:

As noted above, a wide variety of both ethnically and socio-economically diverse individuals are involved in urban forest product collection. Unfortunately, policy makers, urban land managers, and even the general public rarely (if ever) recognize the importance of these products. This is often true of NTFPs around the world, and is due to a number of complex factors.

- Forest product collection is decentralized. Collection sites are often hidden and variable, and there are no centralized markets or information venues.
- Many forest product collectors do not want others to know about their sites or activities as it might jeopardize their collection.
- Collectors of these products are often disenfranchised and minority individuals who have little or no voice in policy making or urban forest management.
- In urban areas, forest products are generally considered to have little uses or value.

This results in a lack of understanding and support for urban forest product collection. NTFP collectors are rarely considered as a stakeholder group in urban forest management. Public and institutional land managers rarely, if ever, manage for forest products. Collectors, thus, end up without a voice in important decisions that affect the products that they use and value.

Collectors have no Voice:

Collectors are not even asked to the table. Along Windsor Mill Road in Gwynns Falls / Leakin Park in Baltimore grow 15 old Chinese chestnut trees. Every fall dozens of Asian, Italian, and African American collectors come to these trees from as far as 30 miles away to collect chestnuts. These are some of the most valuable trees in the city. Recently, the Department of Public works held public hearings to discuss widening Windsor Mill Road. This widening would mean the loss of all 15 chestnut trees. Motorists, neighborhood residents, traffic engineers, and parks groups were all invited to the meetings. The collectors of these nuts were not even considered. They had no voice in the decision. Their use of the trees did not count.

Uncertainties, Conflicts, and Risks:

There are a number of uncertainties or risks associated with urban collection, especially collection from non-collector-owned lands. Many people list health risks as a concern, and these are addressed below. A second uncertainty is related to the natural variability in supply of urban forest products. In 1999, for example, Baltimore experienced a significant summer drought. This resulted in lower production of many fruits, nuts, and mushroom species. Similarly, excessive heat or cold can effect the availability and condition of many urban forest products. Though this leads to variability and uncertainty, most collectors anticipate this as a part of the reality of collecting natural products. There are also a number of conflicts that arise involving collection. For some products, collectors compete with one another for supply. There are cases of products being "poached" even from private yards. There are also cases of product producing species being removed or damaged by both private and public property managers to hinder collection. For example, in Baltimore public agencies have spraying strategies to discourage the collection of

holiday greens.

Health Issues:

Many people raise the question of health risks associated with collecting or eating urban NTFPs.

Some of the concerns include:

- Air pollution caused by car exhaust or other emissions that is then deposited on edible products
- Lead and other heavy metals that exist in soil from old lead paint, car exhaust, or dumping
- Toxic chemicals that may end up in or on plants from spraying or industrial contamination
- Poisoning as a result of eating misidentified products, especially mushrooms

Some of the general guidelines suggested to avoid health risks include:

- Wash or peel all products before eating them
- Don't collect within 50 feet of a major roadway
- Don't collect along railroad rights-of-way
- Don't collect plants from waterways unless you have the water tested
- Collectors should know their collection sites and become familiar with the activities that occur on them
- Always be sure about your plant identification, know which parts of plants are edible and when, and be careful you collect only the plant you intend

These concerns having been raised, the general consensus among many people involved in urban collecting is that these risks are probably minimal, and that urban NTFPs are, in general, probably healthier than store-bought products because they are fresher and organically grown. Our interviews, including a phone interview with a member of the Maryland State Chemist's Office, suggest that:

- Roadside collecting is probably not a major concern. Roadside spraying rarely occurs. Defoliating chemicals are occasionally used to control vegetation, but evidence of recent defoliation is easily identifiable. In Maryland, roadside sprays tend to be the same herbicides used in organic farming. Lead has been out of gasoline for years, and urban dwellers breathe auto emissions all the time. Basic breathing in a city is probably a more serious health risk than eating products with deposition on them.
- Lead and other heavy metals are not generally stored in fruits or nuts, and some plants won't take lead up at all. Eating roots can be an issue because lead-contaminated soil may remain on the root, but peeling should address this. Collecting leafy greens from vacant lots may pose a lead threat if there is lead in the soil.
- Carcinogenic chemicals are sometimes used to clear railroad rights-of-way. These pose serious health risks to collectors in these areas.
- Careful identification of all collected plants is always important.

Advantages of Urban NTFPs:

Although it may seem counterintuitive, our investigation suggests that urban NTFP collection may actually have some advantages over rural NTFPs from the same region. These may include:

- **Season Extension:** As a result of urban "heat island" effects, urban forest products are often available two to three weeks earlier in the spring and later in the fall than they would be in adjacent rural areas. For example, cherries in Baltimore come into season about two weeks before other local cherries. This means that they are available when market prices are relatively high.
- **Diversity:** The urban forest contains a variety of introduced and exotic species, many of which produce products valued by a variety of ethnic groups and are not available outside of the cities. For example, ginkgo trees, Chinese chestnuts, and figs are commonly found in the urban forest, but not in rural areas.
- **Single Tree Management:** Many urban trees are managed as single trees. This means it may be relatively easy to manage urban trees for product production and collection.
- **Access to Products and Markets:** Urban NTFPs grow where a large number of people live and shop. There is very little travel time required either for collecting or selling urban forest products.
- **Collection Equals Clean-up:** Especially in private yards, property owners often want to get rid of some of the products that trees produce (especially "messy" fruits and nuts). Collecting from private yards can benefit both collectors and property owners.

Urban Wildcrafting:

We found that a number of collectors also engage in wildcrafting, or the intentional management of the forest to increase the production of certain valuable species. Wildcrafting includes a wide variety of activities from leaving sufficient seed sources for natural reproduction, to clearing away competing vegetation, to enrichment planting of desirable species. These practices can be either beneficial or detrimental to native forest diversity depending upon which species are wildcrafted, and which species might be removed. In Baltimore, we have observed some examples of wildcrafting. One individual managed a patch of wineberries in a public park near his home by removing old growth and cutting back new growth to encourage fruit production. Another individual reported that he occasionally burned some small park areas near his home to create more favorable conditions for morel mushrooms.

Micro-Enterprise Opportunities:

NTFP collection will never be big business, generate big bucks, or provide large numbers of jobs.

However, our investigations suggest that there may be some micro-enterprise opportunities, which could provide income to a small number of interested and knowledgeable individuals. We believe these opportunities include:

- **Woodland Mushroom Cultivation:** Markets for woodland mushrooms are currently growing at a fast rate, and the demand both by restaurants and consumers for fresh, quality mushrooms such as oyster, shiitake, and hen-of-the-woods is strong. Woodland mushrooms are also relatively easy to cultivate, even in urban areas, under the right conditions. As noted earlier, one individual in Baltimore has already developed a woodland mushroom enterprise. He has about 1,000 logs, sells products at the farmers markets, adds value by selling prepared mushrooms dishes and a cookbook, and generates cash both for himself and a few part-time employees. Market research on mushroom cultivation suggests that those with a small

operation (1,000 logs) can net \$10,000-\$12,000 each year.

- **Natural Crafts and Craft Products:** With the rise of the "Martha Stewart" lifestyle, natural crafts and craft materials are in higher demand. Quality items, marketed well, can garner high prices. Urban NTFP collection offers an opportunity to capitalize on this market and natural crafts can provide added income to interested artisans.
- **Seed Collection:** The nursery industry around the country has been growing at a rate of 8% per year. The demand for native and local seed sources is also growing. With this growth comes a growing demand for seed. The urban forest represents a real opportunity for seed collection. Prices paid for seed by seed companies can range from \$0.50 to \$10.00 per pound of seed. Collection is often relatively easy, there is a diversity of species, and there are often records of which species and cultivars are planted where. This suggests that there might be an enterprise opportunity for those interested and knowledgeable about seed collection.
- **Education and Eco-Tourism:** Finally, we believe that one of the most promising enterprise opportunity may exist in NTFP education and tourism. In New York, one individual teaches classes on urban foraging. Environment education centers often use forest products as an important part of their programming. A system of urban NTFP collection tours, coupled with some product sales and even a high-end meal featuring NTFPs could generate significant income and employ a small number of individuals as guides, chefs, and artisans.

Ecological Issues:

As with NTFP collection anywhere, there are serious concerns regarding sustainable harvest and over-harvest. We suspect that these concerns might be even more significant given that the ratio of people to forest is high in urban areas. Determining sustainable harvest levels for a particular product is never simple, and in urban areas where many other factors come into play, including pollution, urban "heat island" effect, invasive species, etc., it may be impossible to fully understand how collection contributes to the survival or vigor of a particular species.

On the one hand, urban forest product collection of native plants reduces seed sources and may damage plants. On the other hand, forest product collection can also be a positive form of urban forest management. Many urban NTFPs come from planted trees or shrubs. Promoting the value of these plants through collection may actually lead to more planting and better stewardship of these resources. Many other urban NTFPs come from invasive species, including mulberry, wineberry, and various vines. The collection of these species may actually reduce their invasion, and promote native forest diversity.

To better understand these issues, we suggest that urban NTFPs should be categorized into the following types:

- **Rare Species Sensitive to Harvest:** Some examples from Baltimore might include certain ferns or medicinal plants, which are rare and are destructively harvested. Harvest of such products should be restricted in urban areas.
- **Rare Species Not Sensitive to Harvest:** Examples of these might include Chinese chestnuts,

which are collected from the ground, or oyster mushrooms which return on the same log year after year. Such plants should be planted more widely by urban land managers, and/or wildcrafted by collectors to increase their abundance.

- **Common Species Sensitive to Harvest:** In Baltimore, both grapevine and holly are relatively common, but are destructively harvested. Such species should be monitored over time to insure that they are not declining, and collectors should not collect more than necessary. Such species might be replanted or wildcrafted to replace harvested products.
- **Common Species Not Sensitive to Harvest:** Examples of these include ginkgo nuts, many fruits, and most seeds for propagation. Harvest of such products probably has little impact on the species abundance and collection might even be promoted or encouraged. Such species, which are also in high demand, might also be further planted or wildcrafted.
- **Abundant / Invasive Species:** In Baltimore, include wineberries, bamboo, various vines, and mulberries. The collection of these products should be promoted and encouraged perhaps through educational or volunteer programs.

Table 5: Suggested Urban NTFP Management Matrix

	Rare Species	Common Species	Abundant / Invasive Species
Sensitive to Harvest	1) -Restrict harvest -Plant	3) -Monitor species -Plant, wildcraft	5) Promote / encourage collection
Not Sensitive to Harvest	2) -Monitor species -Plant, wildcraft	4) -Plant, and encourage collection	6) Give up

What does this Information Mean for Urban Forestry Professionals?

1) First, urban forestry professionals need to recognize the importance of NTFPs and product producing species as we describe and calculate the benefits and values of the urban forest.

2) We should recognize that collectors are stakeholders and deserve a voice in urban forest management. That these individuals represent a wide diversity of socio-economic and ethnic groups, and that collectors may or may not be represented in neighboring communities or community associations.

3) As we consider which tree species should be planted, we should seriously consider product-producing species as such species add significant value to the urban forest. A female ginkgo may not be appropriate as a street tree, but perhaps we should consider planting these species in open park areas, away from pedestrian walkways, where they might provide significant economic and cultural benefits to those who do collect and use the nuts.

4) As we work with communities to develop urban forest planting and management plans, we should consider the value and importance of NTFPs, and the individuals who can benefit from these values. Shade producing street trees on the western sides of buildings may provide energy saving benefits to home-owners, but fruit and nut producing trees in a local pocket parks, may provide important benefits to other segments of the community.

COLLECTOR STORIES

Gifts from the Heart:

There is a Native American artist who collects wood, in any form, from the park where he lives. In this park there is a stream that he passes on his daily walks. Here he finds many odd and beautifully shaped pieces of wood that have traveled down the stream. Being a person who respects nature, he only uses broken branches or twigs, and being an artist, when he spots a piece of wood, he automatically knows what he wants to use it for. Some of his works include dream catchers, tomahawk handles, and drum sets. One day in particular he found a piece of birch wood that had washed up on the side of the stream. The stream had shaped and smoothed the wood in such a way that it immediately caught his eye. He instantly knew that the piece of wood would make an excellent jewelry box. Since the wood was still wet, he molded it into the exact shape he wanted. Once the molding was finished he stitched it with cotton thread, then decorated and gave it to a family member as a gift. Usually, he would sell his art, but this time he created this box with someone special in mind.

The Value of Family:

In one of our parks there is a group of Chinese Chestnut trees where many people go to collect the nuts each year. One fall Saturday morning a Korean family of five (ages ranging from 7 years to 40) went there to collect. As a family they collected Chinese Chestnuts from the park in Baltimore and also from the private yard of an Annapolis family who had asked them to come collect the husks in order to clean the yard. Because they run their own business, during the week they are so busy that there is little time to come together. So on Saturdays they put all things aside and travel from their home in Glen Burnie to Baltimore and then to Annapolis. To them it is a chance to talk, have fun and catch up on the quality time that was missed during the week. Once they have collected what they can, they go home to clean and cook them as a family.

Memories that Last a Lifetime:

An elderly African American community leader recalled times when she was a little girl and her grandmother would send her to the nearby woods to collect pods from the Locust tree for beer and young pokeberry leaves for poke salad. During those times it was an old remedy used by many African Americans in the South to clean out the system. Of the many natural remedies she grew up with, the one that she remembers the most was one her grandmother would make from collected and boiled Ailanthus leaves mixed with corn meal and placed on a burn or wound (in a bandage). She laughed as she remembered all the old practices that were taught to her as a child that she had forgotten about until we began to question.

Fun in the Sun:

One Sunday afternoon a gentleman from Brooklyn, NY gathered some of the kids in the neighborhood to shake a mulberry tree while he stood underneath holding a large umbrella upside down. Once the umbrella had filled with fruit he and the kids went to a nearby hose to clean them and then ate what they had collected.

Building Neighborhood Togetherness:

In one of east Baltimore's inner city neighborhoods. Mr. Shorty will go to his garden to collect some of the ripest pears for his wife. She will then take the pears and make pies from scratch and preserves that she jars herself. These pies and preserves are then given to some of the residents on the block. Through this one family, the entire neighborhood has become a lot closer. Everyone on the block knows the wonderful taste of her homemade pies and preserves. Now when people see Mr. Shorty, they tend to come out to help in order to ensure that one of his wife's treats has their name on it.

To Teach a Child:

As adults our job is to teach our children things that we have learned. One father is doing just that. During the summer he takes his daughter to the nearby woods to collect wineberries. This is his way of creating a stronger bond with her as well as teaching her about her environment. While collecting he points out some of the more harmful berries and plants that she should not touch or eat, and also teaches her how to identify trees. To her, half the fun of learning while collecting is getting home to eat the teaching tool . . . the berries.

A Profitable Hobby ...

Throughout the year, Baltimore runs farmers markets where people who grow or make their own products can sell them. At one of these markets you will find "The Mushroom Man." He is the man standing at the grill with the table full of all types of woodland mushrooms. Some are imported, but he grows many in his own backyard. For him collecting started in the woods in back of his home until he decided to try to grow them on his own. At the market you can buy one of his more popular creations—the grilled Portobello sandwich, or you purchase one of his recipe books with the many ways he has found to cook and use mushrooms. For him his hobby has turned into an enjoyable business where others can also benefit.

CONCLUSION

As we strive to better understand and promote the sustainable use of our forest resources, it is important to remember that the urban forest is an important component of that resource. In conclusion, we leave you with five key points from this paper. We hope you will discuss and disseminate this information with others, and offer your feedback to us.

- 1) Significant collection of non-timber forest products occurs in U.S. urban areas.
- 2) A wide diversity of individuals is involved in collecting a great number and variety of products.
- 3) These urban NTFPs have important economic, nutritional, educational, recreational, and cultural values.
- 4) Urban land and forest planners and managers should include NTFP collectors when they work with communities, develop planting plans, or implement forest management strategies.
- 5) Further investigations are needed to better understand urban NTFP issues, such as collector conflicts, health risks, and ecological and management issues.

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Appendix A: Net Economic Values of Products Valued for Personal Use

<u>Product</u>		<u>Market Price</u>	<u>Net Value</u>	<u>unit</u>	<u>Est. Annual Tree/Plant Value</u>
Apple (various varieties)	fruit	\$3.24	\$2.54	4 pounds	\$51
Apricot	fruit	\$8.00	\$7.01	4 pounds	\$105
Arbor Vitae	decorative green	\$8.00	\$5.30	12" wreath	\$16
Ash, Green	seed	\$9.50	\$6.75	pound	\$27
Ash, White	seed	\$10.00	\$7.25	pound	\$29
Azalea (native)	seedlings	\$5.00	\$2.97	seedling	NA
Bamboo	garden prop	\$2.33	\$1.84	8' piece	NA
Blackberries	fruit	\$1.45	\$0.52	cup	\$1
Blueberries	fruit	\$1.50	\$0.51	cup	\$6
Boxwood	decorative green	\$8.00	\$5.03	12" wreath	\$5
Buckeye	seed	\$2.00	\$1.56	pound	\$19
Cedar, Eastern Red	decorative green	\$8.00	\$5.30	12" wreath	\$16
Cherry	fruit	\$2.99	\$2.00	pound	\$34
Cherry	flowers	\$8.00	\$7.01	6 sprigs	\$35
Chestnut, Chinese	nut	\$3.00	\$2.07	pound	\$103
Dogwood, Flowering	seed	\$8.00	\$2.50	pound	\$5
Dogwood, Flowering	seedlings	\$5.00	\$2.97	seedling	NA
Ewe	seedlings	\$5.00	\$2.97	seedling	NA
Fern	seedlings	\$5.00	\$2.97	one	NA
Fig	fruit	\$3.00	\$2.56	12 figs = pt	\$64
Fig	seedlings	\$5.00	\$2.97	seedling	NA
Forsythia	flowers	\$6.00	\$5.01	6 sprigs	\$15
Ginkgo	nut	\$2.00	\$1.02	pound	\$71
Grape	decorative vine / prop	\$4.00	\$3.07	12" wreath	NA
Grape	fruit	\$1.50	\$1.06	bunch	\$8
Holly	decorative green	\$8.00	\$5.30	12" wreath	\$16
Honey	honey	\$15.00	\$2.00	5 lbs	\$30 / hive
Horse Chestnut	seed	\$24.00	\$18.50	12 lbs	\$19
Magnolia	cone	\$4.00	\$2.63	25 cones	\$16
Magnolias	decorative green	\$8.00	\$5.30	12" wreath	\$27
Maple, Japanese Red	seed	\$29.93	\$25.81	10 gr	\$0
Maple, Japanese Red	seedlings	\$5.00	\$2.97	seedling	NA
Maple, Sugar	sap	\$13.00	-neg	quart (syrup)	\$0
Mulberry	fruit	\$1.45	\$0.74	cup	\$4
Mushrooms, Chicken of the Woods	mushroom	\$16.00	\$15.07	pound	\$45 / log
Mushrooms, Hen of the Woods	mushroom	\$13.50	\$12.57	pound	\$38 / log
Mushrooms, Morel	mushroom	\$40.00	\$23.50	pound	NA
Mushrooms, Oyster	mushroom	\$10.00	\$9.29	pound	\$111 / log
Mushrooms, Puffball	mushroom	\$10.00	\$9.56	pound	\$38 / patch
Oak, Chestnut	seed	\$5.50	\$4.13	pound	\$83
Oak, Red	seed	\$4.50	\$3.13	pound	\$63
Oak, Red	seedlings	\$5.00	\$2.97	seedling	NA
Oak, White	seed	\$4.00	\$2.63	pound	\$53
Oak, White	seedlings	\$5.00	\$2.97	seedling	NA
Paw Paw	seed	\$7.80	\$5.99	.25 lbs	\$6
Peach (various varieties)	fruit	\$3.96	\$2.88	4 pounds	\$58
Pear (various varieties)	fruit	\$3.44	\$2.73	4 pounds	\$55
Persimmon	fruit	\$2.99	\$1.62	pound	\$24
Pokeweed	edible green	\$1.00	\$0.29	pound	NA
Raspberries	fruit	\$2.20	\$1.21	cup	\$2