

Critical Food Forest Scan & Ideas for a Food Forest in Peterborough

Includes: Final Report

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Summary/Abstract

This document is a compilation of research reports written by students in the Environmental Resource Studies/Science (ERTS) 3160H class at Trent University in the winter of 2014. The research was completed in conjunction with GreenUP, Trent Centre for Community-Based Education (TCCBE), and Taylor Mackey (a graduate student research assistant in Trent's Sustainability Studies program). The students looked critically at urban food forests around the world and made suggestions for designing a food forest in Peterborough. These reports will help inform this process alongside a report written by Taylor Mackey as part of his research assistanceship: *An Urban Food Forest for Peterborough: Planting for Our Future*.

An urban food forest is an area in a city or town where trees, and often other plants, are intentionally planted for food production. These urban food forests often attempt to mimic natural ecosystems. Currently urban forests are generally considered valuable solely for the ecosystem services they provide, such as stormwater management. In the past these urban forests were often managed for the products they produced, rather than just the services they could provide.

There is increasing interest in creating edible landscapes in urban areas. Some are starting to see urban forests as more than something that can clean the air or reduce the stormwater runoff. Some are starting to see the potential to create areas that can provide these services as well as produce food for human consumptions, as well as a host of other benefits. Most of the studied urban food forests focus on food security. Urban food forests have the potential to provide the same services as our current urban forests, but also produce food (and perhaps increase biodiversity in the process).

Acknowledgements

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CFICE is an action research project that aims to strengthen Canadian non-profits, universities, colleges and funding agencies to build more successful, innovative, resilient, and prosperous communities (www.thecommunityfirst.ca).

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Food Forest Research – Final Report - April 10, 2014

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Introduction

The proposed food forest being undertaken by Peterborough GreenUP and Ecology Park has the potential to address a variety of issues facing our food system, our urban environment, and our community engagement with natural resource management. The project would provide the opportunity to develop educational programming around food security issues, ecosystem restoration and adaptation to environmental invasions, as well as providing a public space for people to connect to nature and the source of their food.

With the increasing “supermarketization” of our food system, we are becoming more and more alienated from the source of our food (Haroon). Within a relatively short period of human history, we have gone from being directly and intimately connected to the plants and animals that feed us, to being so far removed that much of the food found in supermarkets bears no resemblance to the plants and animals from which they are derived. Some researchers have suggested that this disconnection is a key factor in many of the health and environmental issues we struggle with today (Source?). In response to this state of affairs, there is a growing movement in western culture to find ways to refamiliarize ourselves with how our food is grown. Home and community gardens, rooftop gardening, gleaning, foraging, and the expansion of farmer’s markets are some of the ways people are closing the gap between their food and their plates.

Here in Peterborough, Ecology Park is striving to add local food engagement and education to their already impressive list of projects addressing environmental problems and promoting sustainable practices. With an emphasis on youth education and community empowerment, Ecology Park is hoping to incorporate food security into its programming with the development of a Food Forest. This project aims to utilize the principles of permaculture to create a self-sustaining, relatively “wild” edible landscape that will encourage biodiversity, provide gleaning opportunities to community members, and help to rehabilitate the area after the removal of the current stand of ash trees.

The following report strives to provide illustrative models for Food Forest development by investigating existing or in-development Food Forests in North America. These examples provide a window into the successes and challenges Ecology Park might face in putting the initiative into motion. By considering the frameworks of other Food Forest projects and anticipating potential barriers, our local initiative stands a better chance of success.

Project Descriptions

One of the Food Forest projects that I researched was the Community Urban Food Forest (CUFF), spearheaded by a group called Permaculture Ottawa (PO). Discussions around this project began in March 2012 and the projected site of CUFF is an area called Greens Creek, which is located near Tauvette Street, a residential area close to several schools and on a major bus route. Though still in the planning phases, and undergoing delays due to staff changes and site agreement challenges, this project is aiming to be up and running. The plan is to combine a variety of perennial plants with elements of an orchard ecosystem. One of the major benefits this project hopes to have is the management of water in the ecologically sensitive area around the

Creek, in terms of retaining rainwater and filtering runoff from nearby residential and farming settlements. Another goal is to provide information to the community members about edible species that are also shade-tolerant, in order to demonstrate that food can be grown in a variety of light conditions, and to encourage residents to take part in local food production, regardless of their own property's characteristics.

Another Food Forest project located in Seattle, the Beacon Food Forest Permaculture Project (BFF), was created with an aim to foster an edible urban space that provides a gathering site for the community in order to grow food and encourage local ecosystem restoration. BFF began in 2009 as a final project for a student completing a permaculture design course. The site is situated on 7 acres about 2.5 miles from downtown Seattle. As of this year, phase one is expected to be underway, which will involve 2 of the 7 acres. The plan is projected to include an edible arboretum, a berry patch, a nut grove, a community garden, a gathering plaza and a kid's area. The schematic site plan (Figure 1) came out of the design course undertaken by four students of permaculture design and lent a significant degree of legitimacy and leverage when the organization presented the project to the city.



Figure 1: Beacon Food Forest Site Plan

Source: <http://www.beaconfoodforest.org/>

Political and Social Factors of Food Forestry

Much has been written about the global food system and the negative social, economic and environmental impacts it imparts (Sources). The key contributors to this impact are our growing reliance on foods grown across the world and the carbon intensity of both agricultural practices and the transporting system required to distribute the food to our plates, the declining food security of the world's impoverished communities, in both the Global South and the North; and the eclipsing of the basic human right to food with the ever-increasing commodification of the food system. The principles of permaculture and agro-forestry endeavor to provide an alternative to this downward spiral of food insecurity and ecological degradation. The goal of CUFF in Ottawa is to advocate sustainability and social justice through the development of their permaculture project. This dedication to food justice is reflected in their partnership with

another organization called Just Food, a non-profit initiative focused on addressing hunger and the social effects of alienation from our food supply. These two groups plan to team up and create a pilot project for future “edible spaces” in the Ottawa area. They hope to demonstrate to the public, the potential for local, sustainable and healthy food to be within reach, and to inspire other urban agriculture projects to take hold.

For the co-creators of BFF, the political and social motivations for taking on this project were to address the environmental degradation caused by large-scale agriculture, to encourage local-level ecosystem restoration, and to provide accessible and nourishing food for both human and non-human species in the area. Like the CUFF project, BFF aligns itself with the principles of permaculture, which focuses on propagating native species and creating an ecosystem that mimics the local woodland areas. As well, food security for the local community is a crucial driver of this and other projects like it. BFF is located in the heart of a multi-cultural, working-class neighbourhood, and while the creators intend to charge a small fee for annual use of garden plots, provisions will be made for gleaners and foragers to help themselves to the harvest.

Management Practices: The Principles of Permaculture and Agro-Forestry

While each project takes its own unique approach to food production and ecosystem management, many of them take the principles of permaculture as their central framework. This method of growing was conceptualized in Australia in the mid-1970s by ecologist Bill Mollison and his student David Holmgren in an attempt to address the growing awareness of the destructive nature of our food system (Mukute, 2009). According to this approach, agricultural spaces are recognized as unique ecosystems that can be designed and encouraged to thrive according to natural laws and patterns (Holmgren, 2007). The design principles of permaculture are complex, but at their core, they emphasize the importance of mimicking nature and promoting efficiency by allowing natural energy systems to do the heavy lifting. In this sense, plants, insects, wildlife, water bodies, and soil microorganisms are given the space and resources to develop into a productive self-perpetuating ecosystem requiring as little human input and intervention as possible (Millington, 2002).

Permaculture Ottawa: Community Urban Food Forest (CUFF)

General Contact: info@permacultureottawa.ca

Coordinator: Sarah Levesque Walker – samalewa@gmail.com

Mission/Vision:

Project Description:

Projected Phases of Development:

1. Planning, visioning, site observation, establishing social networks and community partners, asking what stakeholders want to see, finding resources, determining long-term goals – duration: 1 year
2. Continued site observation (wind, sun, precipitation, animal and human traffic, micro-climates), detailed site mapping, begin designing the garden to ensure as little need for external inputs and labour as possible – duration: 1 year (overlapping with phase 1)

3. Implementation – planting of soil-building features, perennials that will be central features (contour swales, rain water collection pond, N fixing plants and trees, fruit trees and bushes and deep mulch – duration: 5 months (full summer)
4. Reflection, additions and maintenance – pruning (and mulching with the plant waste), harvest anything that community doesn't use, addition of plants that repel any unforeseen pests - ongoing

Challenges:

- So far, the biggest issue facing this project is the site location and setting up a long-term lease.
- In the early days, getting approval from the city was a concern as the government is heavily invested in industrial agriculture.
- Another issue appears to be having continuous forward motion on this project. The coordinator only recently returned from maternity leave, and it seems the project has been more or less on hold.
- Ensuring access to water, depending on the final site, may prove to be an issue. It seems that irrigation is going to be required, which adds an element of complication to the project.

Liability

Liability insurance is a key issue and definitely something to look into.

Some strategies gleaned from the PO meeting minutes:

- Planning observation parties – ongoing working groups designed around visits to the projected site to take note of its biophysical characteristics (wind, sun, precipitation, human and animal traffic, insects, etc)
- Building a strong volunteer force – this can be done through skill-development workshops, social events to build community and solidarity, and research working groups
- Creation of databases for suitable plants for the area, skills required, tips and advice for successful propagation and plant development, etc.
- Soil analysis for determining appropriate site design

Beacon Food Forest Permaculture Project

Contact: Co-founders, site managers:

Jacqueline Cramer – j.cramer@beaconfoodforest.org

Glenn Herlihy – g.herlihy@beaconfoodforest.org

Mission/Vision:

Project Description:

Project Launch:

- The project began with scouting a location. The 7 acres that were chosen for the site belong to Seattle Public Utilities (SPU) as ratepayer land. The site is surrounded by a city water reservoir with highly protected water quality. The first step of this phase involved a great deal of observation and interaction with the community in the area.
- The next step involved creating a strong support network through outreach and education. This step would secure both a solid volunteer base as well as possible funding and resource outlets.
- Next, the project was introduced and promoted to the larger community in order to generate “buzz” and secure further support.
- Negotiations with the landlord began next, and involved official tours of the area and meetings with the SPU personnel. In order to commit, this group wanted to see official design plans, long-term maintenance plans, as well as proof of community support. This step also involved application for a grant to fund the hiring of a landscape architect. The grant application also required proof of community support, so the BFF team set up tabling events and gathered a mailing list of more than 400 supporters. As well, connections with potential collaborators were established. In 2010, a grant was received and site design and promotion were undertaken.
- With the help of the official site design and the proof of community support, land use agreements were undertaken with SPU in earnest.
- Outreach continues to be an ongoing priority for the project. Support has come from high schools and elementary schools, church groups, hospitals, and rotary clubs. Work parties have always been well attended as a result of this attention to gathering community support. This was done through a continuous building of mailing lists and providing updates through a newsletter.

Funding

The BFF is funded through various grants including a City Fruit and ACT Trees grant, a Sustainable Path Foundation grant and a Neighbourhood Matching Fund grant. Volunteers prepare the applications for these grants and research into possible funding sources is ongoing. In addition to formal funding, BFF relies on donations of cash, plants and tools, and food from the community.

Demographic:

The food forest is located in the heart of a multi-cultural working-class neighbourhood. While the plan is to provide garden plots for individual use at a cost of \$10/year, provisions will be made for “foragers” to help themselves to the harvest.

Current State of the Project:

Last May, there was work being done on hardscaping, water supply and the building of plant beds. Although the BFF website has not been updated as far as where the development stands now, their current calendar can be viewed, and shows ongoing planning, education and outreach events.

Preliminary Observations:

My initial impression is that the greatest obstacle to developing a food forest is negotiating the site. This includes getting approval from the city, acquiring permits and insurance, and

negotiating a land rental agreement. Since the Ecology Park site is already established, this step should prove to be much less complicated. Research into permits and liability insurance will still be required, and deciding on the site location within the park remains to be settled.

It also seems that securing the support of both funding sources and community members to build a strong volunteer and advocacy network is crucial to the success of a project like this. As well, having a dedicated and focused core of leadership driving the project forward will help give the project the required momentum, something that appears to be a challenge for CUFF.

Finally, the organizers at Beacon Food Forest stressed the importance of having a professional site schematic to give potential supporters a visual incentive and to lend legitimacy to the project. This may be something Ecology Park should consider early in the development, once a site has been delineated.

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Food forest gardens: A report addressing the benefits of the establishment of food forests in communities

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ERSC 3160H**

Introduction

Most agricultural activities today involve the planting of monocultures (a single species) for harvest on a large scale. These monocultures have very low biodiversity and often require a lot of maintenance in order to remain productive. Usually a wide array of pesticides, herbicides and fertilizers are used to insure that the yields of these agricultural systems remain high. However, there are environmental impacts associated with this use of these chemicals for agriculture. These impacts include a reduction in biodiversity, the eutrophication of nearby aquatic ecosystems and unsustainability due to the need for reapplication of fertilizers and pesticides year after year.

A food forest is a garden modeled after a forest ecosystem comprised of edible plant species that positively interact with each other in a way that maximizes the productivity of the ecosystem. Scientists call these gardens ‘multistrata systems’. These are not new and there are thousands of square miles of such gardens, particularly in tropical Asia and Africa, Central America and temperate and subtropical China. They are a form of permaculture that provides many ecological benefits to adjacent landscapes and they are sustainable. They can be established in an urban setting, providing many social benefits including healthy food alternatives, community togetherness, local food security, employment opportunities and even health benefits like stress reduction.

This report will provide information on the purpose of food forests, how they function, the ecosystem services they provide and the social benefits associated with them, making reference to places that have begun to establish community food forests in an effort to bring communities together and increase local food security and sustainability. This research is meant to provide background information and develop a framework for the establishment of a food forest garden in Ecology Park located in Peterborough, Ontario.

What is a Food Forest?

A food forest is a garden that is modelled on the structure of a young natural forest ecosystem, comprised of mainly edible plants. Food forests can yield a wide variety of products, including fruits, nuts, seeds, vegetables, salad crops, herbs, spices, sap products, etc. They are made up of multiple layers and utilize as much horizontal and vertical space as possible. This efficient use of space increases both the biodiversity and productivity of the food forest ecosystem. The planting of a food forest is a complex process because one needs a thorough understanding of the way in which species interact in order to make sure that the forest is productive and sustainable. Food forests can be established wherever there is a suitable piece of land, on either a large or small scale, depending on its intended purpose. For this reason, many communities have started to grow food forests in urban spaces as a

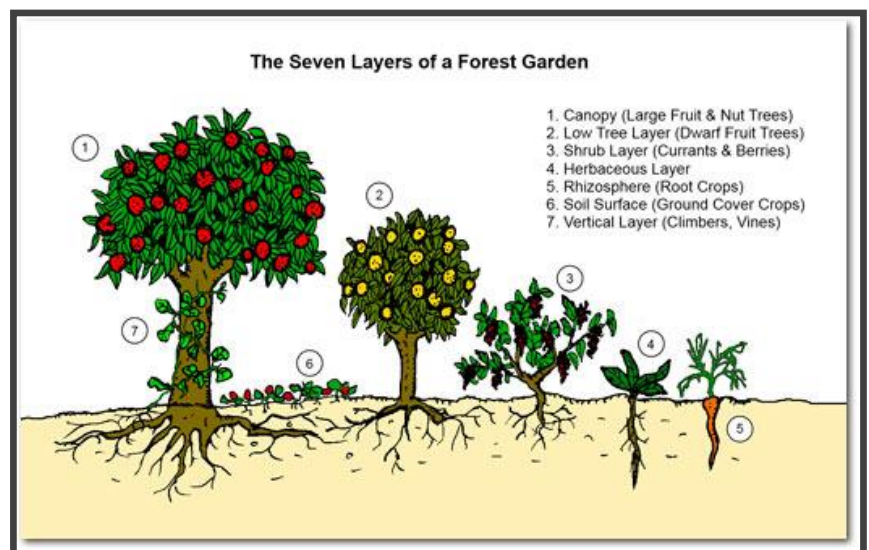


Figure 1: The Seven Layers of a Forest Garden

way of producing food locally and increasing food security.

Basic Characteristics of a Food Forest

A food forest may contain large trees, small trees, shrubs, herbaceous perennials, herbs, root crops and climbers, all planted in a way that maximizes the positive interactions and minimizes negative interactions between species, with fertility maintained mainly by the plants themselves. A food forest is normally made up of seven layers (Figure 1).

The canopy layer is the uppermost layer and is made up of tall trees (typically large fruit and nut trees). Between the canopy layer trees, there is a layer of low-growing fruit trees. Between all of the small trees are shrubs, which are mainly currants and berries. Filling the remaining space is the herbaceous layer, which is comprised of the culinary and medicinal herbs as well as forage species for wildlife. The remaining space is occupied by ground cover plants. These form a living mulch that protects the soil, reduces water loss to evaporation, and prevents the growth of weeds. The root zone is the lowermost layer, which is made up of root crops, such as potatoes, carrots, ginger, etc. The last vertical layer is occupied by climbers and vines, which can be run up trees or any other vertical support. This category includes grapes, climbing beans, as well as any other berry that can climb and grow well in the given conditions. All of the plant species in a food forest are mixed, so there is a lot of diversity, and each species is grown close to many others in ways that are mutually beneficial. The food forest must be designed with a very open, broken tree canopy so as to allow sufficient light to reach all of the layers so that they are all productive.

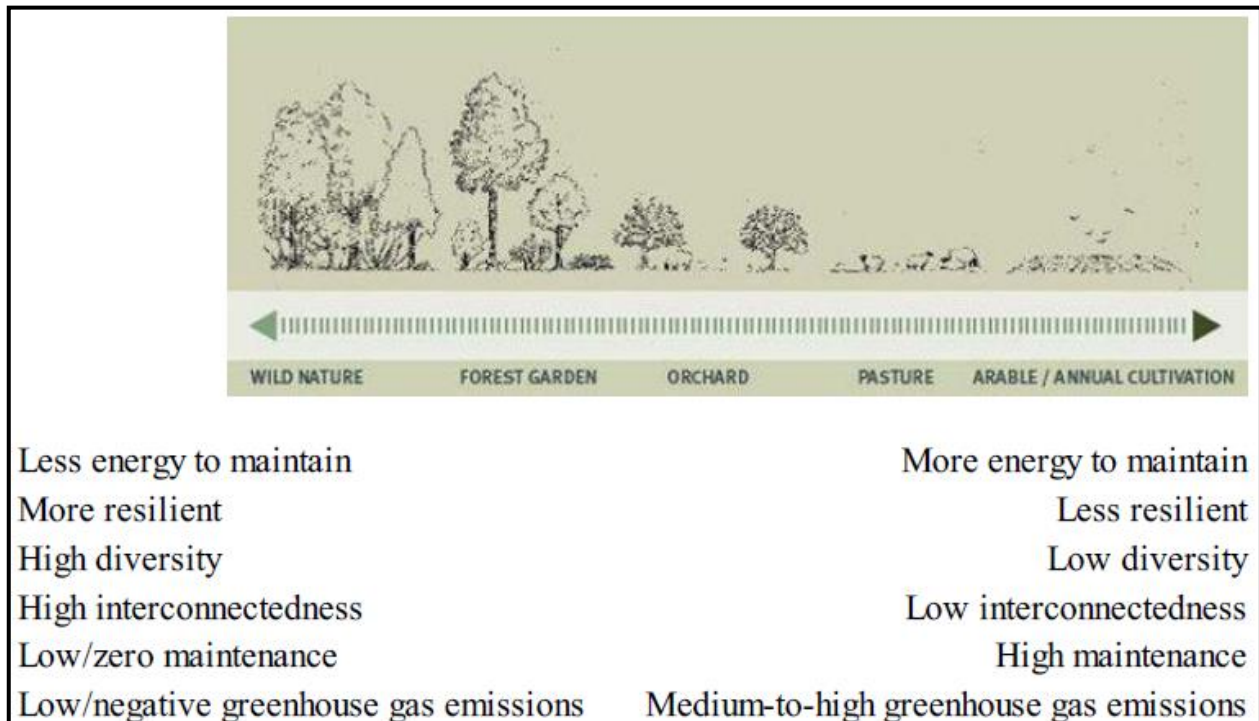


Figure 2: Figure illustrating the level of effort needed to maintain various food production systems and other environmental differences between these systems.

Efficiency and Sustainability

Food forest systems are an excellent way to grow and cultivate food and products because they are so efficient and are sustainable. In a moist temperate climate, the climax community for vegetation is a forest (basically, if you do nothing to a piece of land, it will eventually become a forest; this is because the forces of nature are actively moving the land towards this higher successional stage). The further one's agricultural system is from a woodland, the more energy it takes to maintain and the more disturbed and distant the system is from a long-term sustainable biological state (Crawford, 2010). So arable fields or annually cultivated ground take the most energy, pastureland takes less, and orchards even less. A natural forest ecosystem takes no human energy to maintain. Food forest gardens lie between orchard systems and natural woodland, and form some of the lowest-energy-input systems for producing useful products (Figure 2).

The biological efficiency of any agricultural system is defined as the ratio of energy outputs over energy inputs (Crawford, 2010). Because forest gardens are low-input systems, this makes them highly efficient. In terms of outputs, they can range from low to high, depending on how the forest was designed and what its intended use is. Tree-based systems can yield high amounts of products, as is evident when one looks at the productivity of an apple orchard.

The plants in a food forest ecosystem are mainly perennial, which gives the system its long-term nature and offers sustainability because plants don't need to be re-planted year after year. Trees and shrubs need little maintenance apart from occasional pruning. As well, little effort needs to be put into weeding when there is sufficient ground cover from soil surface plants because there is no space for weeds to establish themselves.

The system is self-fertilizing because of nitrogen-fixing plants and other plants that are good at making nutrients available to other plants, and because of the very efficient nutrient cycling that develops in a forest-like system. The best way to provide nitrogen to a food forest ecosystem is through the use of trees and shrubs that are nitrogen fixers. This is because many low herbaceous perennials like clover are not very shade tolerant. The drawback from this is that not all nitrogen-fixing trees may be fruit bearing, however they may still serve other purposes like attracting bees and supplying habitat for other species. Nitrogen-fixing trees are known to fix nitrogen at rates similar to better-known herbaceous perennials such as clovers and trefoils (Crawford, 2010). Often the ecological benefits from these trees outweigh the loss of productive space in the food forest (assuming the nitrogen-fixing tree does not bear fruit). Nitrogen makes its way into the soil through a number of processes dependent on its source: via leaf fall, fine root turnover and nitrogen-fixing fungi. Most nitrogen is insoluble and adds to the nitrogen reservoir in the soil of the food forest which is gradually made available to other plants.

The physical design of the food forest can help to ensure that there is an adequate supply of nutrients for each plant species (by the placement of nitrogen-fixing plants, and of comfrey mulch). However, in an established functioning forest garden, nutrients will cycle through natural processes and there should be sufficient nutrients for all of the plants in the forest. These processes are carried out by the network of mycorrhizae that form in time beneath a perennial plant system. These symbiotic fungi are critical parts of a healthy food forest that cycles nitrogen and other nutrients in ecosystems and makes them available to various plants (Crawford, 2010).

These characteristics of a food forest promote ecological sustainability because chemical fertilizers aren't needed, especially when the forest is fully established.

Since most crops in a forest garden are perennial, they don't need replanting every year. Therefore, the soil in a food forest ecosystem is relatively undisturbed (except during the harvest of plants that grow underground), because the soil does not need to be tilled like other arable agricultural systems. Leaving the soil undisturbed is very beneficial for the soil structure/function and is consequently very beneficial for all the plants growing in it. The soil is maintained in moist conditions suitable for plant growth because it is covered by plants at most times. In addition, the health of the ecosystem is promoted by the use of plants that attract predators of pests, and plants that reduce the prevalence of disease in the forest. These characteristics contribute to the resiliency and the sustainability of the food forest system.

Resilience to Stress

Forest-based systems are one of the most resilient food production systems in the face of environmental stress. The more species that can be mixed together, the more resilient the system and garden. This is attributed to the fact that pests and diseases cannot disperse from plant to plant as easily as when there is a high diversity of plant species. This is because different species rarely share the same pests and diseases, and different species utilize different ecological niches. However, sometimes, for example when cross-pollination is required, similar species do need to be close and this will need to be taken into account when designing the forest.

The structure and diversity of a food forest ensures good resilience to the impacts of environmental stresses such as climate change and the increased frequency of extreme weather events that accompany global warming. Food forests will also show resistance in response to the stress created by invasive species like the Emerald Ash Borer or European Buckthorn, two species that both stand to negatively impact the ecological integrity of ecosystems in the Peterborough region.

Ecological Benefits

Food forest systems have a lot of environmental benefits. The trees and soils sequester carbon dioxide from the atmosphere. They do not produce a large amount of greenhouse gas emissions relative to other agricultural systems where heavy machinery is required. The coverage of soil by surface plants helps to maintain soil structure. Therefore, food forests help to prevent flooding and erosion because the soils do not become oversaturated and rain can percolate through the canopy. They are also excellent for wildlife, the complex multilayered forest structure and the diversity of plants providing many niches for insects and small animals. Food forest systems can also act as ecological corridors which help to promote biodiversity not only in the food forest itself but also in the adjacent landscapes. A recent invertebrate study by Crawford (2010) found that there was a higher diversity of species in a food forest garden compared to that of a planted native woodland of the same age. This finding can most likely be attributed to the high diversity of plant species in a food forest ecosystem.

Social Benefits

Food forests provide many benefits for communities in which they are established. In urban settings, they encourage communities to get involved in outdoor activities and increase the sense of community togetherness. They are a source of healthy food and when established on

public land can be a relatively cost-free alternative to shopping at a grocery store. The products of a food forest can also be used to support local food banks and other services that provide food for the less wealthy. This also helps to increase local food security which is increasingly important as populations continue to rise and food (especially healthy food) becomes more expensive. The establishment of a food forest also provides learning opportunities for the public where people can learn about growing their own food and caring for a forest garden, which also is a way to increase food security in the future. There are even employment opportunities that can be made available following the creation of a food forest.

Food forests also provide excellent learning opportunities for children. Many children today do not realize where the food they eat comes from and when they visit a food forest they have a chance to learn about food systems and why it is so important to grow one's own food. When a food forest is established, there are many learning opportunities created for children of all ages. Schools can plan field trips and attend workshops and tours at food forests to learn more about different plant species and their uses, pollinators, gardening and much more. Learning about food forests and other greenspaces in urban settings reconnects children to nature and motivates them to go outside and preserve and protect these places for the future. There are even health benefits associated with being outdoors. Richard Louv has coined the term "nature deficit disorder", which describes how one's health can actually suffer from not being outdoors, with the focus being on how kids today are more obese than ever before and spend far too much time in front of a screen instead of outdoors in nature. Therefore, the establishment of an edible food forest has many benefits besides being a source of local food production.

The Hendryx Street Forest Garden

The Hendryx Street forest garden is an example of a food forest created in an urban setting on public land. Earth Matters is the community-based organization that helped to create this forest for the city of Nelson in British Columbia, in the hope of increasing local food security and creating more greenspace in an urban setting.

The establishment of this food forest garden has been a successful way to promote sustainability and increase local knowledge about food systems and the environment. They have done this in a number of ways, including holding interactive programs in the forest garden and offering tours for both children and adults. An example of one of the educational programs for children are tours designed with a specific theme to engage them in learning about food forest gardens. Tours at the Hendryx Street forest garden have had a fairy theme (for children around the age of 5) where the fairies would sing and tell stories while the children venture through the garden, observing wildlife and touching, smelling, tasting, listening to and looking at many different plant species. The children would even be treated to a snack of the varieties of berries and fruit that grow in the garden and iced mint tea. This is great way to help children realize where their food comes from and stimulate children's learning about forest gardens and the environment. Programs for older children at this forest involve practicing observational skills and learning about various elements of the food forest ecosystem and how they are interconnected.

Ecology Park

The addition of an edible food forest in GreenUP's Ecology Park in Peterborough, Ontario would provide many benefits, like those listed throughout this report, to the community of

Peterborough. Visitors and students would gain the ability to learn more about local food production and ecosystems. This will help to increase connectivity to food sources, and provide a number of other educational opportunities. The establishment of this forest would also represent an adaptive management strategy for coping with the threat of the emerald ash borer which has been sited around Peterborough. A large part of Ecology Park is dominated by ash forests which are susceptible to this pest and therefore their replacement with a local edible food forest would be a great alternative use of this land. The creation of a food forest ecosystem will help promote the ecological function of Ecology Park and provide many other benefits to the community of Peterborough.

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GreenUP Ecology Park Forest Garden: ERSC 3160H and GreenUP/TCCBE Research



*By Zoë Mager
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TCCBE Project for Peterborough GreenUP
April 2014*

A Brief History of Forest Gardening

Plants have existed on the Earth for 460 million years, and trees for 370 million years, (Elaides, 2011). During this time, amazing symbiotic connections have formed in this process of co-evolution, and have grown into interdependent communities of species that make up specific ecoregions. These communities of plants, animals, insects, soil biota and fungi rely on biodiversity, and countless mutually beneficial relationships and interactions to access the nutrients that each individual species requires to thrive (van der Heijden, Marcel GA, et al., 1998). When witnessing the effects that monocropping has in terms of soil fertility and plant health, it certainly becomes apparent that the efficacy of the construction of how a forest operates as a whole relies on its biodiversity, mutualism and the existence of the web of interconnections that we as humans are learning more about all the time (Stachowicz, 2001).

Humans have so often been integral parts of these systems throughout history. Indigenous agricultural techniques have long managed landscapes and tended to Forest Gardens, cultivating food systems that maximized the benefits of symbiotic relationships between species. One example of this is the Haudenosaunee planting of the three sisters, or Ahsen Nikontate'kén:'a in the Mohawk language, Kanien'kéha. Ahsen Nikontate'kén:'a are the relationship of Corn, Beans, and Squash, and when grown together, are an integral part of Haudenosaunee cosmology and are a staple part of traditional Haudenosaunee diet and culture. The relationship and interactions of these three plants themselves represents core cultural understandings and teachings of sharing and interconnectedness.

Beans are generous in their nutrient access, fixing airborne nitrogen, making it available for corn and squash, the heavy feeders. Squash plants spread their vines out, all over the ground offering protection by shading out other plants, holding in moisture in the soil, opening its beautiful flowers to attract beneficial pollinators and at the end of her life cycle, dropping leaves and increasing the nutrient density in the soil over a large area of ground. Corn requires the participation of human beings. Without human involvement, Corn would not survive on its own, and when planted in large enough numbers to create genetic diversity for pollination, it thrives, and provides a strong core for beans to climb up, reaching towards the sun's light. The high level of lysine in heritage Haudenosaunee varieties of corn, when combined with a varietal of dense beans, produces all of the amino acids necessary to make a complete protein (Mohawk 2008, 175). When grown all together, these plants nourish the earth and they nourish humans' bodies. These three plant sisters show the embodied the wisdom and knowing of co-evolution through the cumulative genetic refinement of selective breeding through countless generations. Through careful, observation, interaction and relationships developed over many, many generations, Indigenous peoples have developed inter-relationally with plant life, and refined deep understandings of how to exist reciprocally with plants.

"The [k]new science of permaculture, a system based on ecological principles of creating a sustainable Earth, is in reality applied Indigenous Science" (Cajete 2000, 140).

These understandings that have developed into another system known as Permaculture, a system of design tools and ethics, which is fundamentally based off natural patterns and observation of stable systems within balanced natural ecosystems. The principles of permaculture retrain and

remind people how to observe and interact within natural systems, and how to design mindful human habitat in ways that can allow for humans to enhance, support and exist mutualistically and reciprocally within healthy and thriving ecosystems. In order to take the most beneficial approach, and least harmful approach in lifestyle choices, Permaculture leans on intellect, intuition, and most importantly observation to create landscapes based on sustainability, whole-systems and long-term thinking. This process is made even more interesting when the design is within an urban environment where there is an abundance of resources that can be gleaned off of the urban environment (in terms of building materials and potentially labour), and there are also restrictions that come with the limitations of land, nutrients, human & animal interference, and bylaws. Urban agriculture and Forest Gardens in particular are an exciting opportunity to show people something amazing that they might not have been able to conceptualize initially. Within the examples of one of the case studies that were presented in the previous paper submission for this project, the Victoria, BC example of an urban Forest Garden, called Spring Ridge Commons, was an exemplary project that began on a compacted gravel lot used as a parking lot for school buses, and in under two decades, had been transformed into a thriving, lush, abundant Forest Garden, virtually unrecognizable from its previous state.

As many gardeners have an association with edged beds, and sparsely-placed plants in exposed weed-free soil in rows, observing the process of establishing a Forest Garden can be confusing and be perceived as disorganized, messy and/or randomly placed. It is important to understand that these systems take up to 5 years to really become stable and begin to reach optimal production. Such successful examples as Spring Ridge Commons, that provide visual feedback and an understanding of the timeline of the process are very effective and helpful in sharing this idea with others who have not experienced an established and thriving Forest Garden.

How to grow a forest garden?

There are as many ways to grow a forest garden as there are different ecosystems, and each would be very different depending on the needs and ideas of the designers and caretakers. Each plant ideally serves multiple functions, and the site is designed to maximize efficiency and potential of that particular place, including the presence or absence of water and soil nutrients, influences of how different energies move through the landscape and aim to catch and store that energy, when beneficial. By designing with a how a forest operates, sharing nutrients, building soils, supporting biodiversity, and replicating those relationships with plants that are specifically chosen for their function in relation to humans, but also in their interaction with each other, the Forest Garden, (unlike conventional gardening) grows towards stability and resiliency over time. My mentor, Oliver Kelhammer, always used to remind us to “design to recline”, that is creating a design with the idea that initially the Forest Garden will need some upkeep and training as the different species find opportunity within the space and try to take advantage of it. However, If the implementation of the design is carried out with 5, 10, and 20 years down the road integrated into it, the long term result will ideally be that the Food Forest thrives and guilds of mutually beneficial plant, animal, insect and fungal communities will replicate the longevity and resiliency of a forest.

There is a fairly commonly used method in North American permaculture designs for Forest Gardens that utilizes intercropping a guild of seven levels of as key components of a Forest Garden. These seven levels include the canopy, low-tree layer, shrub layer, herbaceous layer,

rhizosphere, and the vertical layer. There are multiple takes on this design and added to this list of suggested species for the Peterborough GreenUP Ecology Park is an edible mushroom layer. Here is a list of the seven (plus one) layers of a Forest Garden and what they consist of:

The Canopy: consisting of large fruit, nut, and other trees.

The Low-Tree Layer: mainly Dwarf fruit trees.

The Shrub Layer: made up of berries, bushes and brambles

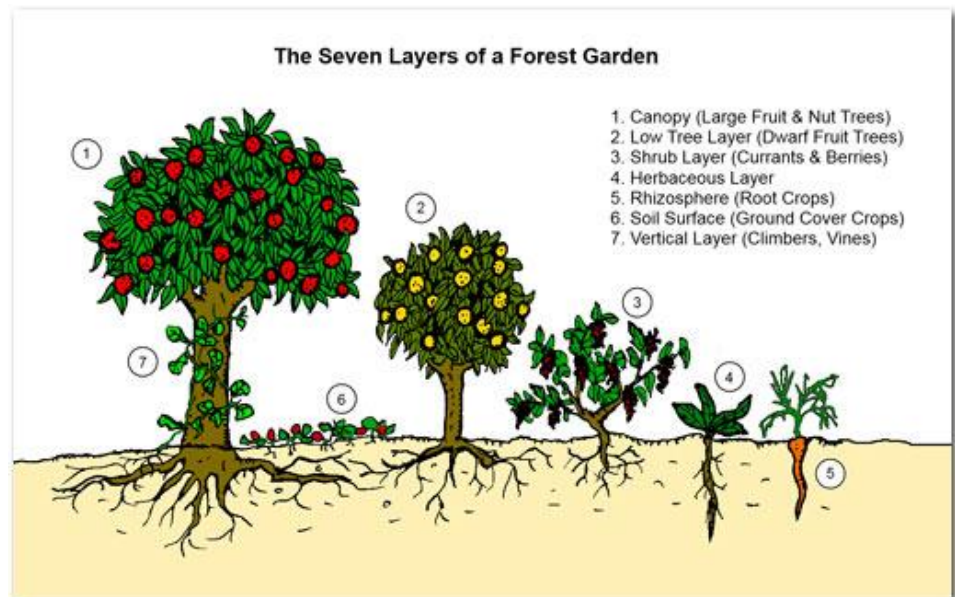
The Herbaceous Layer: including some medicinal and culinary plants, leafy greens, and pollinator attracting flowers

The Rhizosphere: which are plants that have deep taproots

The Soil Surface: consisting of ground cover crops

The Vertical Layer: Climbing plants and vines

The Edible Mushroom layer: Inoculation of logs, paths and mulch with the spores of edible an/or medicinal fungi



Identified Potential Sites:

In surveying the GreenUP Ecology Park Site through the winter and into early spring, I identified what I thought were the three best possible sites for a forest garden to potentially be installed. The factors that I based these recommendations on were as follows: good sun exposure; site not currently occupied by other infrastructure; low ground (easier access to water by root systems); accessibility factors such as: accessibility for visitors to Ecology Park, accessibility for people travelling through the park on the trail, and ease of access for volunteers and caretakers of the forest garden; proximity to toolshed; proximity to Ashburnham road; what might eventually get shaded out by the forest garden; use due to accessibility and visibility; what currently exists on that site; evenness of terrain for those with less mobility; and beauty/aesthetics. Listed for each site is a brief description, and identification of some potential benefits and challenges to each individual place. Though this is outlined as defined benefits and challenges, one rule of permaculture is that “the problem is the solution” and though there are more optimal characteristics to some sights, the excitement and core necessities of working with a permaculture mindset, is looking at potential limitations and rising to the occasion, figuring out how they could actually be used as an asset. Adapting to the particular site, and the characteristics of the space is key, not manipulating the naturally occurring dimensions into a pre-set idea of what the designer wants the space to be. Flexibility and observation are strong tools when designing to create stable, resilient systems, when designing for longevity and productivity.

Below is a brief outline of three of the identified potential sites around GreenUP Ecology park, as well as lists of plant and fungi species divided by their categorization in the 7 (+1) levels, or layers, of designing and building a Forest Garden.

The Three Sites are:

i. The Lower Meadow

On the northern half of the meadow, on the north-facing slope, is a spot that was identified as a potential site the forest garden. There is currently a meadow established there that would have to be partially taken over by some of the plantings of the forest garden species. This site has great sun exposure and very good location in terms of foot traffic, but has definite limitations in terms of space. If this site was used, it would be very important to ensure that the space was very open and that multiple wide paths traversed throughout, as having clear sight-lines is important in parks and public spaces, to help people feel safe and be able to see their children.



Benefits:

- Full sun
- Central and accessible for visitors
- Close to the path and visible to passers-by
- Close to the tool shed and the nursery
- Well-drained soil



Challenges:

- Planting over existing site (Meadow)
- Reduces the openness and takes away the sightlines
- Space limited by paths
- Potentially shading out the garden next to it

ii. The Riverside Lowlands

This area could be a site for a particular type of Food Forest. It is very beautiful and the soil is quite wet. This site was very low-lying, close to the river and with the spring melt, was quite waterlogged. It is a fairly small area, but it would be a really interesting spot to create a place where plants who “like wet feet”, could be planted, that is plants that thrive in more marshy riparian areas.

Benefits:

- Good sun exposure
- Limited space
- Close to nursery & tools for ease of caretaking
- Wet soil (for plants that like ‘wet feet’)
- Beautiful location that is quiet
- Land already cleared
- Space not being used for any other project

Challenges:

- Very wet, especially in the spring
- Potential for flooding
- Off the main path
- Out of sight and slightly out of the way from entrance
- Partially shaded out by trees

iii. The Pathside by the Bridge

On the east side of the Trail along where the river flows under Ashburnham Street was an interesting spot to locate the Food Forest. I thought that this site would be the busiest in terms of human interaction, as it is directly alongside the trail, which is arguably one of the most important factors in the creation of a Forest Garden and particularly on a demonstration site such as Ecology Park.

Benefits:

- Good sun exposure.
- Very visible off the main path (for passers-by who use the path through Ecology Park but don’t necessarily stop to visit)
- Accessible



- Creates a further sound barrier from the road
- Not currently occupied by other projects
- Potential for expansion along the path towards the entrance from the parking lot
- Likely to get more utilized because of central location
- Well-drained soil but nearby the creek
- Overhead light

Challenges:

- Narrow space along fence
- Some existing trees would have to be cut down (some could be integrated into the design)

Suggestions for perennial plants for the Forest Garden, and their some of their uses:

These plants and fungi were chosen for their adaptation to the climate and hardiness. Peterborough is zones as both 5a and 5b, plants were also chosen for their desired benefits produced, such as: food (edibles), medicinal qualities, fibre or construction material, attracting pollinators, and especially native bees,

Canopy Layer

- Alder, speckled (*Alnus rugosa*) – Nitrogen fixing, attracts pollinators
- Elderberry, Common (*Sambucus nigra*) – Edible flowers, medicinal (flowers berries), attracts pollinators
- Hazelnut, ‘Hall's Giant’ European (*Corylus avellana*) - Edible (nuts)
- Pear (*Pyrus spp.*) - Edible Fruits, Attracts pollinators
- Willow (*Salix species*) – Medicinal, weaving fibre, likes in areas near water

Low-tree layer

- Autumn Olive (*Eleagnus umbellata*) – Edible fruits
- Dwarf Apple (*Malus spp.*) - Edible fruits, early flowering for bees
- Mulberry (*Morus nigra*) – Edible berries
- Saskatoon Berry (*Amelanchier alnifolia*) - Edible berries
- Service Berry (*Amelanchier canadensis*) – Edible berries, attracts pollinators)

Shrub layer

- Black Currant (*Ribes nigrum*) - Edible berries
- Blueberry, wild or cultivated (*Vaccinium spp.*) – Edible berries
- Northern Bayberry (*Myrica pensylvanica*)- Nitrogen fixing, wax on berries is used for candle making, culinary (leaves like bay leaves)
- Raspberry (*Rubus idaeus*) – Edible berries, leaves are medicinal
- Red Currant (*Ribes silvestre*) – Edible berries

Herbaceous Layer

- Anise Hyssop (*Agastache foeniculum*)
- Asparagus (*Asparagus officinale*) - Edible

- Beebalm/Bergamot (*Monarda didyma*) – Medicinal, good for tea, flowers are edible, attracts pollinators
- Chamomile (*Chamaemelum nobile*) – Medicinal (aerial parts)
- Evening Primrose (*Oenothera biennis*) – Medicinal, early-season fodder for pollinators
- Golden seal (*Hydrastis canadensis*) – Medicinal (root)
- Good King Henry (*Chenopodium bonus-henricus*)- Edible Leaves flowers, seeds, & spring shoots
- Jerusalem Artichokes (*Helianthus tuberosus*) – Edible tuber.
- Lavender, English (*Lavandula angustifolia*) – Medicinal, culinary,
- Lemon Balm (*Melissa officinalis*) – Medicinal, attracts beneficial insects
- Lovage (*Levisticum officinale*) – Edible & medicinal
- Mint (*Mentha spp.*) – Medicinal (Leaves), culinary
- Ostrich Fern (*Matteucia struthiopteris*) – Edible fiddleheads in the spring, shade tolerant
- Rhubarb – (*Rheum x hybridum*) – Edible stalks
- Sorrel (*Rumex acetosa*) – Edible leaves
- Walking Onion (*Allium cepa proliferum*) – Edible bulbs
- Wild Thyme (*Thymus pulegioides*) – Medicinal, culinary
- Wild ginger (*Asarum canadense*) Medicinal (root)

Rhizosphere

- Burdock (*Arctium lappa*) – Edible root, medicinal
- Comfrey, Russian (*S. x uplandicum*)- Mineral Accumulator, Russian varietal is sterile & spreads by root but not seed, biomass source.
- Dandelion (*Taraxacum officinale*) – Edible greens, medicinal, mineral accumulator

Soil Surface (Ground cover)

- Bird's Foot Trefoil (*Lotus corniculatus*) – Nitrogen-fixing, attracts bees and beneficial insects
- Chinese Artichoke (*Stachys affinis*) - Edible tuber
- Daylily (*Hemerocallis x 'Hyperion'*) – Edible flowers & unopened buds
- Foam flower (*Tiarella cordifolia*) – Shade tolerant, attracts beneficial insects
- Silverweed (*Potentilla anserina*) – Bulbous storage root (end of the running roots) is edible when cooked
- Yarrow (*Achillea millefolium*) – Many medicinal uses (all parts of plant for different ailments)

Vertical Layer

- Grapes (*Vitis labrusca*) – Edible fruit
- Ground Nut (*Apios americana*) - Nitrogen-fixing, edible tubers
- Hardy Kiwi (*Actinidia kolomikta*) – Edible fruits

Edible Mushroom Layer

On logs:

- Maiake (*Grifola frondosa*) - Edible, medicinal
- Shiitake (*Lentinula edodes*) – Edible, medicinal

In Mulch and/or cardboard:

- Morel (*Morchella esculenta*) - Edible
- Oyster (*Pleurotus ostreatus*) - Edible

In conclusion:

My recommendation for a site, if one had to be chosen, would be the third site outlined, next to the path, by the bridge. This site not only offers space to grow and expand along the trail, but would also likely be the most utilized as it has closest proximity to the most foot traffic in the area. Accessibility and visibility is very important, in this endeavor, to help visitors to Ecology Park gain interest in learning about Forest Gardening, urban agriculture, food security and permaculture. Creating accessibility to food and medicine, that community members from all walks of life are invited to directly participate in and helps themselves to, while acting as beneficial participants within ecosystems, is direct resistance to the industrialization of food systems that see so many going hungry, and so much food being wasted. Within a forest, and a Forest Garden, the concept of waste becomes obsolete, because all components are either being harvested and utilized by the human caretakers of the space, or are cycled back into the system as nutrients. Designing and creating a community garden serves as a provider of foods and medicines and fibres for it's human participants, but as well, becomes a space to support the growth of social cohesion and cultural continuity. This strengthening act widens those ecological communities' beneficial relationships and mutualism to encompass humans once again and strengthen our relationships both to the non-human natural world, as well as our relationships to each other in the collaborative efforts of building community by making food free and accessible for everyone.

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Final Paper - Nadine Mulrooney
For: Marcy Adzich, Peterborough GreenUP
ERSC 3160HW
10 April 2014

Afghan Tree Project (Afghanistan Somsortya)

Political and Social Factor Which Affected Development

The Afghan Tree Project is a fundraising campaign run by Afghanistan Somsortya, which aims to replace trees in Afghanistan which have been lost through decades of war and deliver fruit trees to families in urban areas. In 1983, Dr. Mariam Raqib left Afghanistan as a child refugee for America. When she returned for the first time in 2003 she found her country devastated by war. (Raqib) Afghan society has been an agrarian society and 80 percent of the population's sole form of employment has been on farms, vineyards and forests. However, as a result of nearly three decades of war and

political unrest as well as drought, an estimated 60 to 80 percent of existing forests and fruit orchards have been destroyed. (Afghanistan Somsortya) The Afghan tree project is a non-profit organization and heavily organized under its creator Mariam Raqib. Now that the Afghan Tree project has gained momentum, there is also another ever increasing inspiration to continue the work; the women of Afghanistan. In the Afghan Tree Project campaign ad it explains how with each sapling planted, each fruit tree and develop and grow to become a source of food, shade, and other resources/ income for young women of the family; These women are often the sole bread winners or care-takers of the family and its elders. (Raqib)



Jalalabad Nursery

Management Practices

The Afghan Tree Project is under the main management of Mariam Raqib. This organization is almost solely based around the donations of generous people around the world. There are multiple levels of donations called 'perks' from which to choose in US dollars; 15 family tree (single fruit tree and training) , 30 kite runner (pair of fruit trees to two families and training), 50 quad (Four fruit trees planted plus you receive a T-shirt), 100 carbon offset (Ten fruit trees plants, carbon offset sticker, mug, T-shirt), 250 afghan tree party (25 trees, carbon sticker, notebook, T-shirt, mug), 500 the book-keeper (50 trees, photo album entailing details, mugs, sticker, T-Shirt), 1000 the Deraa (100 Trees – form urban park) 2000 the forester (200 trees- create a small forest) and 5000 the partner (500 trees – large forest, become a partner on the website). (Raqib) The Afghan Tree project utilizes local labor and skills, together with international expertise and resources, to carry out projects in agro-forestry in Surkhrod district. The Afghan Tree Project has a board of directors consisting of President Mariam Raqib, Dr. Susan Chadima, Dr. Daniel Faber, Pia Iolster, Mohammad Wasim Ludin and Abdul Kafi Rasuli. (Afghanistan Somsortya) The Afghan Tree project has been successful because of the fact that the style of management used, recognizes the importance of community and multigenerational relationships. Samsortya's approach forgoes the usual interference of outside aid organizations and works directly with citizens on the ground in Afghan communities. On account of this Samsortya has rapidly developed from propagating fast-growing support trees to producing; lemon, fig, mulberry, date fruit, orange, pomelo and eucalyptus trees as well as wheat, sugar cane, maize, cauliflower, squash and pumpkins for their nurseries. (Kearn)

Successes, Challenges and Longevity

The Afghan Tree project success emerged as a result of significant field research, including discussions with local community elders and professionals; through which initiatives were designed as a response to the needs felt and expressed by the people involved. The expertise and participation of numerous individuals with decades of experience in farming and environmental restoration were used. (Afghanistan Somsortya) Successful projects include the development of the first few nurseries, introduction of higher quality species of trees to the region, and the re-population of deforested regions with trees. To build the first nursery there was the evident challenge involving access to water in the area. The Afghan Tree Project team needed to build a well first in order to continue. (Raqib) In addition to water, an ever present challenge is financial. In order to not only begin the project but expand and reach areas to develop further, the organization needed to raise funds through donations and merchandise sales. However, the need for financial support and funding never ceases. The first nursery was a large success, beginning at 1 acre and already expanding to 7 acres in size. (Raqib) From this nursery it is now able to become a mother stock from which take cuttings from to donate as well as continue on the population. The next stage for the organization was to plant mulberry trees, which was a success with 10 000 planted; 2000 to graph and 8000 to donate. (Raqib) The Afghan tree project receives requests regularly from other communities in the neighboring provinces who know about their work and wish to collaborate with them. However, once again their main challenge involves funding. They have spent years developing a successful working model for developing projects, and these projects are easily replicated elsewhere in the country. With donations and funding they plan to plant larger quantities of seeds so that they will germinate and yield in a greater number of tree saplings. The surplus saplings will be shared with communities in neighboring provinces. The tree planting will mean the employment of additional nursery workers providing

work, contributing to the economy and forming a workforce skilled in nurturing trees for the future. (Afghanistan Somsortya) Samsortya has a goal to raise \$10,000 for the women's tree nursery for 2014 and maybe even an additional \$6,000 to outfit the new well with a solar pump. The long term plan is to convert their 10 acre nursery to solar power as well as to continually develop more nurseries and expand their locations. (Raqib)



Tree Saplings

Organizations & Sectors Involved

An important sector involved in the Afghan Tree project is the New Forests Project. The New Forests Project contributed around 5 kilos of excellent species of tree seeds. These tree seeds were used in order to establish The Afghan Tree Projects first nursery. (Afghanistan Somsortya). The Afghan Tree project also works closely with Selman Designs for campaigns and fundraising. Working together, Selman Designs makes products for The Afghan Tree Project Campaigns which are received by those who donate as gifts. In addition, Somsortya is also partnered with Columbia Basin Permaculture. They have formed an alliance with Afghanistan Samsortya to exchange information about dry-climate reforestation approaches and environment restoration techniques. The goal of these aligned companies is to mutually promote the 2014 Afghan Tree Project in addition to gain and make available organised strategies for semi-arid ecosystem design and implementation by using traditional knowledge and permaculture design techniques. (Kearns)

Characteristics of Afghan Tree Project

The Afghan tree project uses a variety of fruit trees local to area. Some example of their local fruit trees are lemon, orange, fig trees as the main varieties, as well as mulberry, eucalyptus, pomegranate, grape, fig, apple, willow, loquat. (Raqib) In four years Samsortya and local Afghan farmers in Jalalabad have dug new wells, established fledgling tree nurseries from seed, and now produce high-quality saplings from cuttings (Kearns). They currently run ever expanding nurseries, one which is growing from 7 acres to around 10 - the nursery being around 6 years old; In addition to a few new nurseries. The nurseries include critical dry-climate features such as

sunken beds, windbreaks, shading, and wild perimeters. Initial trees propagated were four nitrogen fixing support species (acacias), plus *Moringa oleifera*. (Kearns) They recently planted 10 000 mulberry trees in order to add this variety into the donations and nursery foundations. (Afghanistan Somsortya)



First nursery in Surkhrud district. 08 February 2014

Demographic and Participants

The demographic focus of the Afghan tree project is to expand the nursery projects to focus on women. The new nurseries will include women in leadership positions, as well as the everyday decision making and management of the nurseries. (Raqib) Many of the women in the programs are illiterate, widowed and are without any means to support themselves and without access to social services. They are responsible for the support of their children and elderly parents. Many of the women have a background in agriculture and farming. These nurseries are employment options for vulnerable populations, in particularly women. The women involved can use their salaries to provide food, medicine, clothing, and school supplies for their children and become empowered members of society. (Afghanistan Somsortya)

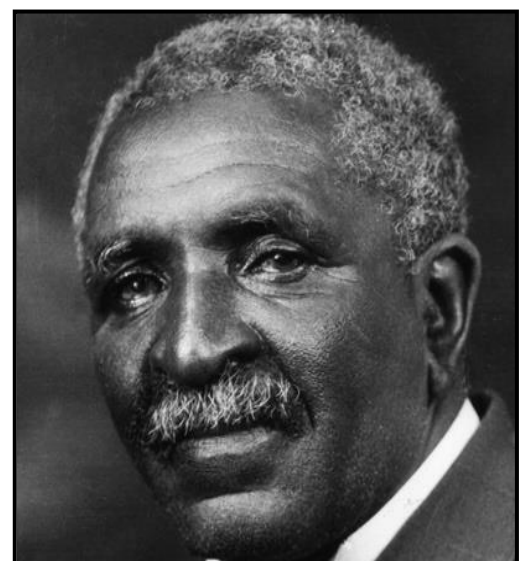
Contact

Mariam Raqib: Facebook

Dr. G.W. Carver Edible Foods: Asheville, NC

Political and Social Factors Which Affected Development

Dr. G.W. Carver Edible Park began in 1997, with local volunteers paired with Asheville city's Parks and Recreation Department with the idea to replace trash with trees. (Sezak-Blatt) City Seeds, a now obsolete local non-profit group enlisted Warren Wilson College students and other volunteers to transform a rubble-filled lot into an urban orchard. (Wilson) Today, George Washington Carver Park occupies the former site of Stephens-Lee High School, which served African-American students during segregation; it was demolished in 1975 in the name of urban renewal.



Dr. George Washington Carver

(Sezak-Blatt) The site is owned by the City of Asheville, and Bountiful Cities has partnered with the city since 2002. (Bountiful Cities) The mission of this park was to help the community have the ability and access to explore life's nature and it was developed on permaculture principles.

Management Practises

The management of Dr. G.W. Carver Edible Park is collaboratively done by Bountiful Cities, The Buncombe Fruit Nuts Club, the City of Asheville, and volunteers. (Sezak-Blatt) One main partner Bountiful Cities partnered with the city in 2002 insuring that Carver Edible Park would a resource for the community as an edible park. (Bountiful Cities) Dr. G.W. Carver Edible Park is open for visitors and visitors are encouraged to enjoy produce from the park.

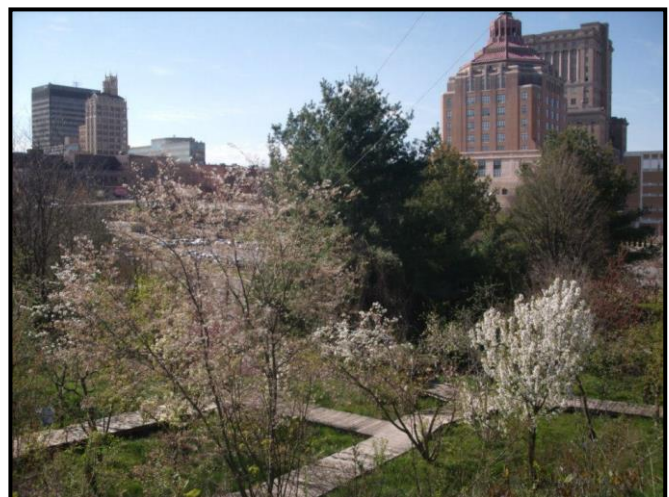
Successes, Challenges and Longevity

Dr. G.W. Carver is not only an older edible park but it is also the first public forest garden in the country. (Sezak-Blatt) With this comes the issue of visitors over indulging on the produce. However, although Carver Edibles in rather old, it remains quite an unknown site. One large problem being faced is explained by a volunteer Jennifer Saylor at Dr. George Washington Carver Park, "When you go there, you can gather nigella seeds, snack on sweet grape tomatoes and pick a bouquet of mint and sweet peas for your living room. Just watch out for condom wrappers, broken glass, whiskey bottles and holes in the boardwalk big enough to catch an unwary ankle." There was and is times when the Park is in desperate need of attention with little action from the city as well as Bountiful Cities. Being owned by the City of Asheville but managed by Bountiful Cities has sometimes led to confusion and neglect to the beautiful park. However, the garden continues and although it may need cleaning up at times the strength of the ecosystem continues with the help of volunteers who really care to keep up the health of Dr. G.W. Carver Edible Park.



Organizations & Sectors Involved

Carver Park is managed by [Bountiful Cities Project](#). Bountiful Cities is largely involved in the development and continued success of Dr. G.W. Carver Edible Park. Bountiful Cities is an urban agriculture non-profit foundation founded in 2000. They partner with community groups, to create urban agricultural spaces. Bountiful Cities shares agricultural skills and resources to promote social justice and economic viability. (Bountiful Cities) In addition to Bountiful Cities Carver Park also has help from [the Buncombe Fruit and Nut Club](#). (Sezak-Blatt)



Characteristics of Dr. G.W. Carver Edible Park

Dr. G.W. Carver Edible Park is located on a site which used to be home to Stephen- Lee High School. More than 40 varieties of fruit and nut trees grow in George Washington Carver Park. Some examples of the fruit and nut trees are; figs, mallows, apples, mulberry, pears, chestnuts, hazelnuts, plums, peaches, grapes, and paws paws. (Sezak- Blatt) In addition to plants and trees, there are also herbs and flowers planted among the park. Herbs such as; sunflowers, sweet pea, comfrey, lemon balm, mint, wild violet. Planted over 14 years ago, this urban orchard now is home to mature, fully-fruit bearing trees. (Bountiful Cities)

Demographic and Participants

The demographic involved with Dr. G.W. Carver Edible Park is a wide variety. Being an area to grow, learn explore or just visit it attracts persons of every kind. With a range of local volunteers, support organizations and visitors, the park is involved with a variety of people.

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Crenshaw High School Food Forest: South Central LA, California



Crenshaw Students and Food Forest

Political and Social Factor Which Affected Development

The Crenshaw High School Food Forest came about in 1999, when Adonijah Miyamura began developing relationships with science teachers and groundskeepers to prepare for the Food Forestry project. Adonijah Miyamura has been teaching food forestry for 25 years. (Brennan) He attended Crenshaw High School as a youth and wanted the new generation to know about permaculture and food forestry. He saw many students with poor nutritional diets and the obsession with video games leading to the isolation from natural life. Crenshaw High School is in a city high with violence and Adonijah Miyamura wanted to give the students an escape and chance to learn how to grow things with their own hands. (Brennan) There was little to no funding and cooperation from higher powers, so in order to get the ball rolling Adonijah and his team climbed the school fence at night, planted fruit trees, turned on the water and went home, they did this for years; On weekends, holidays, during Summer break and late at night. Trees and seeds grew and the greenhouse developed causing the community to notice. (Geb)

Management Practises

The management of this food forest is based around the community. With Adonijah Miyamura as the leader, the community became involved and brought in seeds and plants to be cultivated in the greenhouse. (Geb) At the end of each school day and on weekends the Crenshaw High School Food Forest is open to volunteers and youth for tours and training. (Lagreensgrounds) By 2003 with growing teacher involvement there was a student organization developed for a farmers market on the school property for the students to learn entrepreneurial skills. (Geb)

Successes, Challenges and Longevity

Many difficulties have been faced with the Crenshaw High School Food Forest. First of all, based on the neighbourhood even after many attempts to negotiate the administration was unwilling to cooperate because they were suspicious about the motives. (Geb) After taking things into their own hands and creating a food forest secret with personal funding and no help or funding from the school, Crenshaw Students and volunteers were able to create a mature food forest from an almost empty lot in less than four years. (Brennan) There have also been instances of vandalism and theft. (Geb) In addition there was also the issue of water waste, therefore some students transformed a leaky water pipe into flood irrigation for their orchard by digging a drainage from the leak to the trees. Despite these challenges the Crenshaw Food Forest has become a centerpiece of the community. It is a place to learn, help and grow, and exchange seeds; some seeds which are brought back to the years when slavery was legal, such as sasparilla. The plan for Crenshaw High School Food Forest is to expand the community exchange program, create more student opportunities and community involvement. Adonijah is creating a business that includes a nursery, restaurant connections, and home food forest creation. So much of the focus is on the success of students in their future and the school now has a science program that uses the jungle and Adonijhas expertise. The program includes advancements for the students and offers an opportunity for college. (Brennan) Recently on 05 April 2014 Crenshaw High School has been able to have a grand opening for their Garden where the community can now go and shop local. (Green Grounds)

**CRENSHAW GARDEN
GRAND OPENING**

Celebrate National Garden Month
at the
Crenshaw Garden Grand Opening

Saturday April 5, 2014
8:30 AM - 12:30 PM

Beautiful, Plant & Buy Fresh Veggies
Radishes and Cabbage fresh from
Crenshaw Garden

Crenshaw High School
5010 11th Ave, Los Angeles, CA
On the corner of 8th Ave, W 50 th St

Organizations & Sectors Involved

A sector involved with the Crenshaw High School is The African American Food Association and Community Services Unlimited which they partnered with to develop programs and events that highlighted the impact of local food systems. They organized the first Earth Day celebration

presented by African-Americans in Los Angeles at Kenneth Hahn Park. (Geb) Adonijah Miyamura has acquired many supplies such as truckloads of manure, sawdust, organic material, trees seedlings and pots through his community contacts. With he returns for free food forest planting in backyards. (Brennan) Through the non- profit organization George Washington Carver Institute they are working to get funding to repair a greenhouse and outbuilding on the property. This will allow students to prepare food and sell it in a commercial kitchen. (Brennan) Another organization closely aligned with Crenshaw High School Edible food forest is LA Green Grounds (LAGG). LAGG Started in 2010 and by the end of 2013 have installed a total of 27 edible gardens. LAGG is a grass-roots, all-volunteer based group in South Los Angeles. Bringing together a diverse group of people together to replace residential front lawns into edible gardens to be shared with the neighborhood. They focus on serving geographic areas with scarce access to fresh, affordable food. (Green Grounds)

Characteristics of Crenshaw High School Food Forest

Crenshaw High School is located in an urban area of Southern California. It has an existing 3/4 acre agriculture center in the rear of the school. This agricultural center is equipped with greenhouse, irrigation and planting supplies. This center and all its supplies were unused for years prior to the food forest program. (Geb) The food forest at Crenshaw High is a more natural-looking ecosystem and features multiple levels of canopy, permaculture style, it utilizes canopy trees to create microclimates and build soil. A tree used for this is the Paulownia, a fast growing tree that can grow up to 14' a year with large leaves that drop each year to help build soil with organic matter. There are now about 55 mature fruit trees at Crenshaw High including mango, sapote, Chilean wine palm, loquats and fig. There is also sub-tropical fruit trees that were planted in clusters to promote pollination and allow space for a vegetable underneath. (Brennan) There are trees such as; grape, mulberry, banana, fig, cherimoya, passion fruit, cherry, ten varieties of mango and Avocado. There is also blackberry, and peaches. (Geb) Some vegetables grown underneath include lettuce, celery, swiss chard, arugula, nasturtium and tropical flowers and herbs. (Brennan)



The 3rd and Final Edible-Beautification Project, Crenshaw High School. January 20, 2014

Demographic and Participants

The demographic of the food forest participants- although targeted at Crenshaw high students, include a huge number of diverse community members. Students use West African Indigenous growing techniques and work to transplant, plant, distribute compost, and learn permaculture in the food forest. (Geb) There are volunteers from different economic, cultural and religious backgrounds from all over the community working together. This food forest is used to teach everyone the importance of live, nutritious food for health. (Brennan)

Structure of Food Forest

The Food Forest at Crenshaw High School uses a structure which is closely related to ‘the seven level beneficial guild’. I first read about the seven level beneficial guild in the article, “Creating an Urban Food Forest” by Helen King. Looking deeper at the structure of Crenshaw’s Food forest it is evident that they also have trees, plants and herbs growing in a way to most successfully grow a healthy garden. The seven levels being; canopy, low tree layer, shrub layer, herbaceous, rhizosphere, soil surface and vertical layer. (King, 2013) Using examples of currently growing produce at Crenshaw gardens you can see how this structure is currently in place; Paulownia and fig (canopy), cherry and peach (low tree layer), mulberry and blackberry (shrub layer), herbs (herbaceous), celery and swiss chard (rhizosphere), strawberry(soil surface) and lastly grapes (vertical layer).

Contact

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Florence Nishida: Facebook (Founder of LAGG)

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A Report on Food Forests, Research on Communal Benefits & Forest Structure

(ERSC-3160H)

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Introduction

A food forest within Ecology Park has the potential to benefit Peterborough's residents through becoming a community project, providing an increase in available food, and food security in the city, along with providing a wide assortment of local food. A community food forest should be planned based on community input and need to be physically accessible. Donating food from the forest would reduce food insecurity within Peterborough. By donating produce, a food forest can also receive small amounts of profit in return. Additionally food forests help to educate people in the community about food; such as school trips and publicly accessible information. Through the use of gleaning programs, a food forest can provide its produce to food banks and other food services in the city and county, along with providing food to the volunteer gleaners. A food forest connects the local community with food that is nutritious, accessible, and educational and wildlife friendly and environmentally sustainable.

What is a food forest?

A food forest is similar to an orchard, although rather than the trees set up in rows for picking, the trees are installed in an ecological setting, benefiting wildlife and the environment, by being similar to a natural forest. A study on urban food forests states that an urban food forest is a combination of different elements from urban agriculture, urban forestry, and agroforestry used for improving the landscape sustainability of urban areas (Clark & Nicholas, 2013). Food forests can also be in rural areas, and have the same or similar benefits. A food forest benefits humans, though the wide availability of an accessible food source, wildlife through an increased availability of food, the environment through carbon sequestration and proving new ecosystems. Additionally, a food forest provides a communal area for people to meet and do recreational activities. An urban food forest as described by (Clark & Nicholas, 2013) is "an intentional and strategic use of woody perennial food producing species in urban edible landscapes to improve the sustainability and resilience of urban communities" (Clarke & Nicholas, 2013). Thus a food forest also brings sustainable aspects to urban living. When using variety of different species, a food forest can provide improved air quality, water and climate regulation, oxygen production, lower erosion and increase the surrounding wildlife biodiversity (Clark & Nicholas, 2013). This type of landscape usage will provide an abundance of fruit that will need to be used, to prevent the waste of food. Food banks and food cupboards are among some of the available options.

Ecology Park

Ecology Park is located at Lansdowne Street and Ashburnham Drive, Peterborough Ontario. The park is currently 5 acres (Greenup.ca, 2014). A food forest as an addition to the park could take up anywhere between 100 meters to 1 acre (Adzich, 2014). Regardless of the space that the forest is planned for, the food will help the community.

Field Trips/Community Access

A food forest can provide schools with field trips and freshly grown food. Field trips can provide education about sustainable ecosystems, the health benefits of fresh fruits, and demonstrate food growth aspects, along with promoting the park. Additionally signs that provide educational information regarding the trees and their ecological traits would be a useful addition to the food forest for educating park visitors and students on field trips.

Food Security in Peterborough Ontario

Food security in Peterborough Ontario is a large issue. The large growth of food from a food forest within the city would benefit many individuals and families in the city. Food security is comprised of four dimensions; food availability, access, utilization and stability. When one or more of these components is jeopardized or endangered, a food system is considered to be vulnerable (Clark & Nicholas, 2013). Peterborough currently has many people that are food insecure, of different age groups and living situations (Community Foundation of Greater Peterborough, 2013). Addressing food insecure in Peterborough is valuable to show how a food forest may benefit these individuals through donations. For instance over two thousand children under 18 and over three thousand adults used food banks per month in 2008 (table 1). Additionally, the percentage of food insecure individuals at this time in Peterborough was higher than Ontario in 2008 (table 2). This was still the case last year, according to the Greater Peterborough's Vital Signs report done in 2013; 9.9% of households in the greater Peterborough area are food insecure, compared to 7.6% in Ontario, (Community Foundation of Greater Peterborough, 2013). Additionally, the monthly incomes for different persons in Peterborough are very low when living costs are taken into consideration (table 3).

Table 1. The amount children and adult individuals that used food banks per month in 2007. The percentage is out of all children that visit food banks per month.

(Root Causes of Poverty Working Group, 2008)

Age Group	# Individuals Who Used Food Banks/month	% of children/youth under 18 who use Food Banks
Children/youth under 18 years of age	2513	40.1%
Adults	3748	

Table 2. The percentage of food insecure individuals living in Peterborough versus the percentage of people living in Ontario.

(Root Causes of Poverty Working Group, 2008)

	Peterborough	Ontario
Total, Food Insecure (FI)	6.1%	5.9%
FI, without hunger	4.1%	3.5%
FI, with moderate hunger	1.8%	1.8%
FI, with severe hunger	0.2%	0.6%

Table 3. Monthly incomes, and living costs in Peterborough Ontario in 2008.

(Root Causes of Poverty Working Group, 2008)

Monthly Income (after tax)/Costs	Single Person (Ontario Works)	Single Person (Ontario Disability Support Program)	Single Person (Old Age Security/Guaranteed Income Supplement)	Single Parent Family of 3 (Ontario Works)	Family of 4 (Minimum Wage Earner)	Family of Four (Median Income)
Monthly Income, including benefits and credits	\$580	\$1,026	\$1,174	\$1,665	\$2,170	\$5,788
Estimated Shelter & Utilities Cost	\$568	\$568	\$889	\$1,022	\$1,235	\$1,463
Cost of a Nutritious Diet	\$221	\$221	\$153	\$460	\$629	\$629
What's Left?	-\$209	\$237	\$132	\$183	\$306	\$3,696
% income required for shelter/utilities	98%	55%	76%	61%	57%	25%
% income required for nutritious food	38%	22%	13%	28%	29%	11%

Food Banks, Cupboards & Programs

There are many different organizations that Ecology Park can donate its excess produce to. According to the Nourish Peterborough Organization, there are 18 client specific food cupboards in Peterborough, along with three citywide food banks (Nourishpeterborough.ca, 2010). Urban Orchards, a subdivision of San Francisco Environment is a city wide urban fruit tree planting program that maintains and plants fruit trees around the city. In a phone interview, Mei Ling; the coordinator of Urban Orchards, said that when there is excess fruit on the fruit

trees, the fruit is donated to the closest food banks (Ling, 2014). Additionally, according to Travis Philp, the co-coordinator at the Trent Vegetable Gardens, the garden produce is donated to Food Not Bombs Peterborough, and an on campus café called the Seasoned Spoon (Philp, 2014). Food Not Bombs is a grassroots movement, which collects excess food from farmers, gardeners, grocers, and donations, to share with the community through weekly, publicly accessible free meals (Foodnotbombspeterborough.org, 2014). There are limitations for donating fruit to food banks, because fruit alone cannot provide a balanced diet, and thus should be promoted as part of a system to change food security, providing some extra nutrition, from areas that otherwise may be lacking (Clark, & Nicholas, 2013).

Donating the food will improve food utilization by providing free nutrient dense foods, which can reduce malnutrition and non-communicable diseases in the community (Clark & Nicholas, 2013). Additionally, harvesting from fruit trees can provide food to food banks during possible economic downturns, when donations to food banks and cupboards from other sources may be lower than usual (Clark & Nicholas, 2013). In addition, Peterborough has a local gleaning program that may help with the gleaning of trees from Ecology Park. Known as the Peterborough Gleaning Program, it functions as a group that is led by volunteers, that brings gleaners to food producers (Peterboroughgleans.wordpress.com, 2013). This gleaning program could help harvest the food that Ecology Park may produce in the future. Producers working with Peterborough Gleaning Program donate some of their fruit to the gleaners. This also contributes to the increase to Peterborough food security, because most of the gleaners are on low income, and use some of the produce for themselves and their families (Peterboroughgleans.wordpress.com, 2013).

Donation Funding

Along with improving food security, donating to food banks and cupboards can also benefit Ecology Park through funding initiatives. The 2013 Hunger report states that as an amendment to Bill 36; The Local Food Act, food producers who donate produce to food banks and other charitable meal programs are able to claim a 25% tax credit based on the market value of the product donated (Fotheringham & King, 2013). Additionally, Tree Canada's Edible Trees program offers funding of up to \$4,000, along with additional resources for community projects that provide access to fruit trees; although an application and evaluation process is necessary (Trecanada.ca, 2014).

Community Planning of the Food Forest

When the planning stage of the food forest in Ecology Park begins, it will be useful to have community input sessions. These community sessions should be held separately from public forums on the park's usage, because the dominant cultural values in these forums are

usually centered on economic and political interests, as opposed to community based values (Glover et al, 2008). The citizens in Peterborough should be viewed as stakeholders, for their values reflect the community (Glover et al, 2008). Their values are based on goals, cultural standards, along with emotionally charged beliefs that can provide valuable input for Ecology Park's implementation (Glover et al, 2008). Through giving meaning to a landscape, community members not only become attached to the landscape, but also develop personal and communal relationships with the landscape (Glover et al, 2008). Ling stated that when choosing which fruit trees to plant for a group of people, not to "pick the fruit trees for them, make them pick the trees, because they are more likely to take care of it" (Ling, 2014). This also applies to the food forest, for it is more likely that people will visit or volunteer there if varieties of trees that they want planted are in the area.

The community sessions should be based around what the community wants to see in a food forest, and what types of trees or fruits they want to see growing, along with any additional input they have about Ecology Park and food forests. When holding these meetings it is important to partake in the processes that are suggested, otherwise, the plans will not represent the community, and the community may not want to represent and visit the park (Glover et al, 2008). Holding these sessions will provide Ecology Park with value rich information on how to build and plan the food forest.

Social & Community Concerns

There are possible communal concerns for implementing a food forest in Peterborough Ontario. Mei Ling expressed that since San Francisco has a young population, people are often moving in and out of the city. She stated that people on average stay around 7 years and move out because it's too expensive to live there (Ling, 2014). Ling stated that the young population caused issues for Urban Orchards, for if they planted a tree in front of a family's house that wanted a fruit tree, when the family moved out, the newly moved in family would take the fruit tree off their lawn, causing sustainability issues (Ling, 2014). Although the Ecology Park food forest is going to be within the park, the constant arrival and departure of undergraduate students at Trent University and Sir Sanford Fleming College every 3-4 years may cause issues of promoting the food forest to students and youth. Additionally, Ling stated that since "there is a higher perceived value for these [fruit] trees, people are much more likely to steal an apple tree or a plum tree, than they are to steal a flowering plum tree" (Ling, 2014). Residents of Peterborough thus stealing fruit trees may be an issue when beginning to grow the fruit trees. To reduce the risks of this issue, Ling stated that Urban Orchards waited 18 months before letting the community know about the planted fruit trees, due to major concerns of tree theft within San Francisco (Ling, 2014).

Tree & Fruit Tree Specific Information

Having a variety of different species of fruit trees allows different tree traits to be brought forth. For suggestions of possible tender fruit trees see table 4 (Ontariotenderfruit.ca, 2014). The five most popular apple varieties in Ontario, according to the Ontario Ministry of Food and Agriculture (OMAFRA), are McIntosh, Empire, Red Delicious, and Northern Spy (Omafra.gov.on.ca, 2004). Also see table 5 for a variety of different edible plants, and their growing conditions. Some traits that may be useful for trees in a food forest are; shade and soil tolerance and tolerance of different heavy metals and pollutants within soils. Other considerations are a tree's potential to be invasive, its nitrogen fixation, nutrient density and potential wildlife benefits (Clark & Nicholas, 2013).

Table 4. Popular tender fruit varieties in Ontario.

Fruit Type	Fruit Variety					
Plums	Early Golden	Shiro	Burbank	Ozark	Premier	Vanier
Pears	Barlett	Clapp's Favorite	Bosc	Flemish Beauty		
Semi-Freestone Peaches	Harrow Diamond	Springcrest	Candor	Harrow Dawn	Early Redhaven	Garnet Beauty
Semi-Freestone Peaches Cont.	Risingstar	Brighton	Sunhaven	Harbelle	Sentine	
Freestone Peaches	Redhaven	Vivid	Harbite	Harson	Blazingstar	Starfire
Freestone Peaches Cont.	Veeglo	Harrow Beuty	Loring	PF24	Allstar	Coralstar
Freestone Cont.	Cresthaven	Redskin	Glowingstar	Harcrest		

Table 5. A climate food species matrix, showing seventy fruit tree species for use food forests, and their social context, edibility, cold weather hardiness and drought tolerance.

(Clark & Nicholas, 2013)

Latin name	Type of plant	Common name	Commercially cultivated for human food?	Widely recognized and marketed?	Palatable when eaten raw?	Can be eaten without special preparation?	Edibility rating	Approximate cold hardiness (°C)	Drought tolerant?
<i>Vaccinium angustifolium</i>	Short bush	Lowbush blueberry	Yes	Yes	Yes	Yes	5	-40	Yes
<i>Vaccinium corymbosum</i>	Tall bush	Highbush blueberry	Yes	Yes	Yes	Yes	5	-40	Yes
<i>Malus domestica</i>	Tall tree	Apple	Yes	Yes	Yes	Yes	5	-40	Yes
<i>Prunus cerasus</i>	Short tree	Sour cherry	Yes	Yes	Yes	Yes	5	-40	Yes
<i>Vitis labrusca</i>	Vine	Fox Grape	Yes	Yes	Yes	Yes	5	-35	Yes
<i>Pyrus communis</i>	Large tree	European pear	Yes	Yes	Yes	Yes	5	-30	Yes
<i>Fragaria vesca</i>	Groundcover	Alpine strawberry	Yes	Yes	Yes	Yes	5	-30	Yes
<i>Vaccinium membranaceum</i>	Short bush	Black huckleberry	Yes	Yes	Yes	Yes	5	-30	Yes
<i>Rubus fruticosus</i>	Short bush	Blackberry	Yes	Yes	Yes	Yes	5	-25	Yes
<i>Pyrus pyrifolia</i>	Short tree	Asian pear	Yes	Yes	Yes	Yes	5	-25	Yes
<i>Lycium barbarum</i>	Short tree	Goji berry	Yes	Yes	Yes	Yes	5	-25	Yes
<i>Prunus armeniaca</i>	Short tree	Apricot	Yes	Yes	Yes	Yes	5	-20	Yes
<i>Hippophae rhamnoides*</i>	Large bush	Sea buckthorn, seaberry	Yes	No	Yes	Yes	4	-40	Yes
<i>Amelanchier alnifolia</i>	Short tree	Saskatoon, serviceberry	Yes	No	Yes	Yes	4	-40	Yes
<i>Lonicera caerulea var. edulis</i>	Short bush	Haskap, honeyberry	Yes	No	Yes	Yes	4	-40	Yes
<i>Pinus koraiensis</i>	Large tree	Korean pine nut	Yes	Yes	Yes	No	4	-35	Yes
<i>Corylus avellana</i>	Short tree	Common hazel	Yes	Yes	Yes	No	4	-30	Yes
<i>Castanea mollissima</i>	Tall tree	Chinese chestnut	Yes	Yes	Yes	No	4	-25	Yes
<i>Lycium chinense</i>	Short tree	Chinese boxthorn	Yes	No	Yes	Yes	4	-25	Yes

Latin name	Type of plant	Common name	Commercially cultivated for human food?	Widely recognized and marketed?	Palatable when eaten raw?	Can be eaten without special preparation?	Edibility rating	Approximate cold hardiness (°C)	Drought tolerant?
<i>Caragana arborescens</i>	Tall bush	Siberian pea tree	No	No	No	No	1	-40	Yes
<i>Rosa rugosa</i>	Large bush	Rugosa rose	No	No	No	No	1	-40	Yes
<i>Cornus kousa</i>	Short tree	Japanese dogwood	No	No	No	No	1	-20	Yes
<i>Hovenia dulcis</i>	Tall tree	Japanese raisin	No	No	No	No	1	-20	Yes
<i>Sorbus domestica</i>	Large tree	Service tree	No	No	No	No	1	-20	Yes

Figure 5. Continued

Latin name	Type of plant	Common name	Commercially cultivated for human food?	Widely recognized and marketed?	Palatable when eaten raw?	Can be eaten without special preparation?	Edibility rating	Approximate cold hardiness (°C)	Drought tolerant?
<i>Prunus cerasifera</i>	Short tree	Cherry plum	No	Yes	Yes	Yes	4	-25	Yes
<i>Diospyros virginiana</i>	Large tree	American persimmon	Yes	Yes	Yes	No	4	-25	Yes
<i>Ziziphus zizyphus</i>	Tall tree	Jujube	Yes	No	Yes	Yes	4	-20	Yes
<i>Corylus americana</i>	Short tree	American filbert	Yes	Yes	Yes	No	4	-20	Yes
<i>Passiflora incarnata</i>	Vine	Maypop	Yes	Yes	Yes	No	4	-20	Yes
<i>Prunus tomentosa</i>	Short tree	Nanking cherry	No	No	Yes	Yes	3	-40	Yes
<i>Elaeagnus multiflora</i> *	Tall bush	Goumi	No	No	Yes	Yes	3	-35	Yes
<i>Cornus mas</i>	Short tree	Cornelian cherry	No	No	Yes	Yes	3	-25	Yes
<i>Morus alba</i>	Large tree	White mulberry	No	No	Yes	Yes	3	-20	Yes
<i>Castanea sativa</i>	Large tree	Sweet chestnut	Yes	Yes	No	No	3	-20	Yes
<i>Morus nigra</i>	Large tree	Black mulberry	No	No	Yes	Yes	3	-20	Yes
<i>Rubus idaeus</i>	Short bush	Raspberry	Yes	Yes	Yes	Yes	5	-40	No
<i>Ribes glandulosum</i>	Short bush	White currant	Yes	Yes	Yes	Yes	5	-40	No
<i>Rubus spectabilis</i>	Short bush	Salmonberry	Yes	Yes	Yes	Yes	5	-35	No
<i>Fragaria × ananassa</i>	Groundcover	Strawberry	Yes	Yes	Yes	Yes	5	-30	No
<i>Sambucus nigra</i>	Tall bush	Elderberry	Yes	Yes	Yes	Yes	5	-25	No
<i>Ribes nigrum</i>	Short bush	Black currant	Yes	Yes	Yes	Yes	5	-20	No
<i>Prunus persica</i>	Short tree	Peach and nectarine	Yes	Yes	Yes	Yes	5	-20	No
<i>Ribes uva-crispa</i>	Short bush	Gooseberry	Yes	Yes	Yes	Yes	5	-20	No
<i>Diospyros kaki</i>	Short tree	Asian persimmon	Yes	Yes	Yes	Yes	5	-18	No
<i>Ficus carica</i>	Short tree	Fig	Yes	Yes	Yes	Yes	5	-15	Yes
<i>Rubus chamaemorus</i>	Groundcover	Cloudberry	Yes	No	Yes	Yes	4	-40	No
<i>Vaccinium vitis-idaea</i>	Groundcover	Lingonberry	Yes	Yes	No	Yes	4	-35	No

Figure 5. Continued

Latin name	Type of plant	Common name	Commercially cultivated for human food?	Widely recognized and marketed?	Palatable when eaten raw?	Can be eaten without special preparation?	Edibility rating	Approximate cold hardiness (°C)	Drought tolerant?
<i>Actinidia arguta</i>	Vine	Hardy Kiwi	Yes	No	Yes	Yes	4	-30	No
<i>Vaccinium macrocarpum</i>	Groundcover	American cranberry	Yes	Yes	Yes	No	4	-30	No
<i>Asimina triloba</i>	Short tree	Pawpaw	Yes	No	Yes	Yes	4	-20	No
<i>Juglans regia</i>	Short tree	Common walnut	Yes	Yes	Yes	No	4	-20	No
<i>Carya illinoensis</i>	Large tree	Pecan	Yes	Yes	Yes	No	4	-20	No
<i>Prunus dulcis</i>	Short tree	Almond	Yes	Yes	Yes	No	4	-17	Yes
<i>Ugni molinae</i>	Short bush	Chilean guava, tazziberry	Yes	No	Yes	Yes	4	-15	Yes
<i>Ribes × culverwellii</i>	Short bush	Jostaberry	No	No	Yes	Yes	3	-35	No
<i>Schisandra chinensis</i>	Vine	Schisandra	Yes	Yes	No	No	3	-28	No
<i>Sorbopyrus auricularis</i>	Tall tree	Shipova	No	No	Yes	Yes	3	-20	No
<i>Acca sellowiana</i>	Short bush	Feijoa	Yes	No	Yes	No	3	-15	Yes
<i>Vitis rotundifolia</i>	Vine	Muscadine grape	Yes	No	No	Yes	3	-15	Yes
<i>Viburnum trilobum</i>	Tall bush	High bush cranberry	No	No	No	Yes	2	-40	Yes
<i>Aronia melanocarpa</i>	Short bush	Aronia, chokeberry	Yes	No	No	No	2	-35	Yes
<i>Crataegus aestivalis</i>	Short tree	Mayhaw	Yes	No	No	No	2	-30	Yes
<i>Mespilus germanica</i>	Short tree	Medlar	Yes	No	No	No	2	-28	Yes
<i>Juglans ailantifolia</i>	Large tree	Heartnut	No	No	Yes	No	2	-28	Yes
<i>Cydonia oblonga</i>	Short bush	Quince	Yes	No	No	No	2	-28	No
<i>Opuntia compressa</i>	Short bush	Eastern prickly pear	No	No	Yes	No	2	-25	Yes
<i>Carya ovata</i>	Large tree	Shagbark hickory	No	No	Yes	No	2	-25	Yes
<i>Diospyros lotus</i>	Large tree	Date plum	Yes	No	No	No	2	-25	Yes
<i>Gaultheria shallon</i>	Short bush	Shallon, Salal	No	No	No	Yes	2	-20	Yes
<i>Cudrania tricuspidata</i>	Short bush	Che	No	No	Yes	No	2	-20	Yes

Food Forest Structure

It is important to maintain publicly accessible fruit trees. Ling stated that all fruit trees planted by Urban Orchards are publicly accessible, in which no one would need to use a ladder to get anything from a tree. Additionally, Estelle from Incredible Edible Todmorden; a community food project in Todmorden, UK also commented that it is important to grow trees that people are able to reach. She said that popular low growing trees are apple, cherry and pear trees (Estelle, 2014). Although it is important to have short trees to allow public access, fruit trees that are pruned to be short will have lower carbon sequestration than larger fruit trees; which have less publicly available fruit (Clark & Nicholas, 2013). It is therefore important for Ecology Park to allow for a mixed growth of fruit trees, keeping many accessible species will be useful for harvesting, while allowing larger trees to grow as well, allowing a higher carbon intake, and more space for wildlife habitat. Ling also stated that it was important that the trees

could be seen from all public viewpoints (Ling, 2014). Thus, it may be important for promotion of the food forest in Ecology Park to be seen from public areas surrounding it, such as Lansdowne Street.

Tree Care

As for tree care it may be useful to have volunteers to maintain the food forest. Four main maintenance areas are mulching, watering, fertilization and winter care. Mulching allows trees to grow with less competition for nutrients from surrounding vegetation (Treecanada.ca, 2014). Also, for the first two years after planting the fruit trees it is important to water the trees at least once a week. Although, the amount of water needed will depend on the soil, species of tree and the amount of rain in the season (Treecanada.ca, 2014). Additionally, the type and amount of fertilizers used for trees depends on the species. The volunteers should participate in active pruning of the trees allows the removal of dead or diseased branches, enhancing the tree's overall structure (Treecanada.ca, 2014). Also in the winter, watering would be reduced, and for the first two winters wrapping tree stems with lightly coloured trunk guards will reduce sun damage to the bark of fruit trees. These guards will also prevent damages from wildlife (Treecanada.ca, 2014).

Ecological Concerns

Important ecological issues with regard to fruit trees in Ontario are the risks of fruit tree diseases, infection and infestations (Omafra.gov.on.ca, 2004). To counter these issues, Ecology Park owners and maintainers may want to partake in integrated pest management (IPM) programs where producers are taught by trained practitioners and crop consultants various methods to manage pests and diseases through horticultural, biological and chemical systems. Producers are also taught how to use different pesticides safely and effectively, while producing minimal environmental harm (Omafra.gov.on.ca, 2004). Untrained volunteers and ecology park workers may benefit from IPM.

Conclusion

A food forest in Ecology Park will provide many benefits to the community and environment. Through the sequestration of CO² and wildlife food, habitat and providing new ecosystems, a food forest would be environmentally sustainable. In addition, this food forest could produce a large amount of food. The food produced could be used to increase Peterborough's food security through the use of gleaning programs and volunteers, and by donating to food banks and cupboards. Additionally, Ecology Park may be able to gain a tax credit from donating the food. School trips and food tourism can provide education and

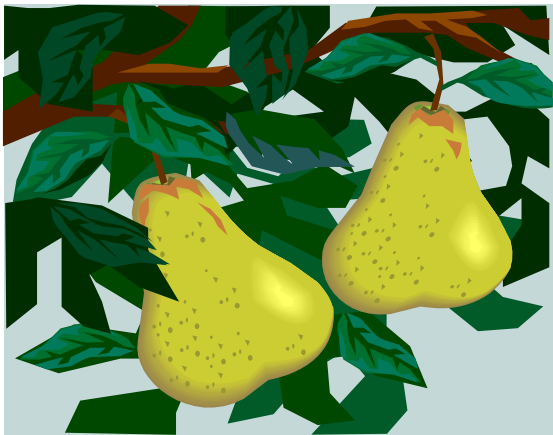
promotion to the community. There is an extensive selection of fruit trees that can be used, along with varieties of fruits. It is important to get community input before implementing the food forest, to gain communal trust, interest, volunteers, knowledge and promotion. Overall, a food forest is an environmentally and communally sustainable development for Ecology Park and Peterborough City and County.

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Food Forest Report

Research for Green UP Ecology
Park

By

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1.0 INTRODUCTION

This report outlines the profiles of three different organizations that operate some element pertaining to a food forest. This will include successes and challenges, managerial practices as well as the history of the organizations in order to glean useful information for the Ecology Park food forest design. Other components of a food forest will then be analyzed, including the sectors involved in their development and management as well as the ecology of a food forest.

2.0 ORGANIZATION PROFILES

2.1 LIFE CYCLES FRUIT TREE PROJECT, VICTORIA, BC, CANADA

2.1.1 DESCRIPTION OF FOOD FOREST

The Life Cycles Fruit Tree Project is a Victoria-wide initiative to unify the public in the creation and management of orchards and permaculture gardens on private properties. Volunteers are enlisted to glean fruit trees with the permission of private land owners, with the harvest being distributed amongst the landowner, volunteers and community food banks. Life Cycles is based out of Victoria, British Columbia, with various sites throughout city on private properties (Life Cycles, 2014).

2.1.2 POLITICAL & SOCIAL FACTORS THAT LED TO ITS CREATION

Life Cycles has numerous projects beyond their core fruit tree project which address the social needs and desires of the citizens of Victoria. These include educational programs with local elementary schools, urban agriculture workshops, as well as the “Grow a Row” initiative, where people are encouraged to grow an extra row of food in their gardens to be donated to local food banks and community kitchens. Workshops are offered regarding the proper care and maintenance of fruit tree crops, as well as other growing initiatives such as seed sharing to promote self-sustainability and urban gardening techniques (Life Cycles, 2014).

2.1.3 MANAGEMENT PRACTICES

Most of the project labour is completed by volunteers, with a few key staff that run the workshops, educational programs and administration of the organization. This organization has an outreach and media representative as well as a programs coordinator, and then a large network of volunteers, landowners and participants (Life Cycles, 2014).

All volunteers participating in Life Cycles’ programs are made to sign waivers, and are protected under the Commercial General Liability Insurance (CGL). As discussed by Renate

Nahser-Ringer (2014), the Life Cycles Fruit Tree Project & Social Enterprise Coordinator, the volunteers are protected under each homeowners' home insurance while they are on their property, but are also covered under Life Cycles' liability insurance if any issues occur. This liability insurance covers any legal expenses as well as any awards made against the company.

2.1.4 SUCCESSES, CHALLENGES, & LONGEVITY

Life Cycles has been operating since 1994, and has been steadily growing since its initial start as a community garden run by youth. Since they have informal agreements with the private landowners, the maintenance of the overall food forest is divided amongst the landowners and volunteers, creating less of a burden for the actual organization. Life Cycles recently acquired a public orchard from the township of View Royal which they have integrated into their network of orchards across the city. They have also started working with indigenous plants as well as integrated educational opportunities with school children in conjunction with the local first nations (Nahser-Ringer, 2014).

A challenge for Life Cycles was the acquisition of the Commercial General Liability Insurance, which includes an in-depth pre-planning process for the organization. In order to be eligible for the insurance the organization was required to have policy and procedures in place to account for the safety of the public and all participants, and a "form of structure or status, i.e. society or association with a clear mandate" (Nahser-Ringer, 2014).

2.1.5 ORGANIZATIONS & SECTORS INVOLVED & THEIR ROLES

Life Cycles is sponsored by numerous organizations, such as the Government of British Columbia, the United Way of Greater Victoria and TD Friends of the Environment. Other smaller sponsors include local restaurants, co-ops and guesthouses, which allows for the pooling of local resources to support the local economy (Life Cycles, 2014).

2.1.6 CHARACTERISTICS OF FOOD FOREST

The Life Cycles Fruit Tree Project is not exactly a food forest, but represents an important community network of permaculture areas that are harvested by the public. The network of volunteers are organized to visit private properties by the invitation of the landowner; harvesting the produce and distributing it throughout the community. The project includes private residences, green houses, farms, and most recently a public orchard owned by the township. The age and biological make-up of these gardens range considerably, since each property was planted and cultivated separately by different individuals of the community (Life Cycles, 2014).

2.2 MADISON FRUITS & NUTS, MADISON, WI, USA

2.2.1 DESCRIPTION OF FOOD FOREST

Relatively young, Madison Fruits and Nuts is a community group that promotes the planting of fruit and nut-bearing plants on private and public land in the city of Madison, Wisconsin. They provide workshops on the proper care of fruit and nut trees, and organize volunteers in the planting and harvesting of crops throughout the city. Through education they aim to increase edible landscaping in the city, and bring together landowners in creating orchards and sharing surplus harvest within the community. Projects include workshops on orchard planning and pruning care, as well as a coordination effort in mapping fruit trees that landowners register for community sharing. Madison Fruits and Nuts also provide educational materials, sharing a small library of books and articles on permaculture and edible landscaping on their website (Madison Fruits and Nuts, 2014).

2.2.2 POLITICAL & SOCIAL FACTORS THAT LED TO ITS CREATION

This organization stemmed from a public desire to cover the city in community orchards and gardens; benefiting the whole community with free food while promoting the training and tools necessary for the public to create their own edible gardens (Madison Fruit and Nuts, 2014).

2.2.3 MANAGEMENT PRACTICES

Madison Fruits and Nuts is run by volunteers, who complete the tree plantings, tree maintenance and educational programming for the organization. The Parks Division of the city of Madison assists in the management activities on public property, including planning and maintenance (Madison Fruit and Nuts, 2014).

2.2.4 SUCCESSES, CHALLENGES, & LONGEVITY

Madison Fruits and Nuts is a fairly young organization having started in 2009, but they already have procured resources to build three community orchards in their city, with more edibles being planted in public spaces now that they have received approval from their municipality. A project in gaining permission from the city to plant edible landscaping was recently accepted, and so volunteers will now be able to plant fruit and nut trees on public land throughout the city of Madison. This was achieved with some difficulty, and required a long, arduous process with the parks division of the municipality to gain permission to complete these plantings and harvests (Madison Fruit and Nuts, 2014).

Madison Fruits and Nuts also recently won three fruit orchards from the Fruit Tree Planting Foundation, which awarded them 3 fruit orchards for their Bock Community Garden,

Eagle Heights Community Garden, and Wingra Park, providing resources for their initiatives (Madison Fruit and Nuts, 2014).

2.2.5 ORGANIZATIONS & SECTORS INVOLVED & THEIR ROLES

Madison Fruits and Nuts is run by volunteers, and applies for awards and grants from foundations such as the Fruit Tree Planting Foundation. They also have support from the city's Parks Division, which assists them in the planning of orchard plantings in public parks. The tree selection for public spaces was also chosen on after meetings with the city's Habitat Stewardship Committee (Madison Fruit and Nuts, 2014).

2.2.6 CHARACTERISTICS OF FOOD FOREST

This project contains the planting of fruit and nut trees throughout the city of Madison in public green spaces. This includes areas such as parks, trails and along roadways. All the labour is completed by volunteers, including the gleaning of the harvest as well as the maintenance of the orchards. All plantings were completed after the organization's establishment in 2009, and are made up of a variety of fruit and nut-bearing trees (Madison Fruit and Nuts, 2014).

2.3 FALLEN FRUIT, LOS ANGELES, CALIFORNIA, USA

2.3.1 DESCRIPTION OF FOOD FOREST

Fallen Fruit is a media-based initiative that uses the theme of fruit to educate and involve the public in urban ecosystem and food resource management. Art collaborations are used to create imaginative urban spaces, and all of their programs compliment a fruit theme. Fallen Fruit is based out of Los Angeles, California (Fallen Fruit, 2014).

Fallen Fruits' projects focus heavily on visual art exhibits with a fruit theme, but also include nocturnal fruit foraging tours, fruit tree adoptions as well as the mapping of all the fruit trees on public land in Los Angeles. Their emphases are put on public exhibitions where the local people can interact and collaborate ideas using fruit as a subject of discussion and teaching. A long term project includes *The Colonial History of Fruit*, which pieces together videos and literature from the community in showing the importance of fruit, and drawing out the relationships that people have with the food they eat. Art exhibits touch on many subjects such as politics, sustainability, genetically-modified foods and promoting community sustainability and sharing of food resources (Fallen Fruit, 2014).

2.3.2 POLITICAL & SOCIAL FACTORS THAT LED TO ITS CREATION

Politics are engaged as this organization brings the community together in protesting barren landscaping by the city and promoting the idea of integrating perennial food crops in the creation of community gardens. The societal ideals of the residents on the issues of food security were also a main factor in the creation of this organization (Fallen Fruit, 2014).

2.3.3 MANAGEMENT PRACTICES

Fallen Fruit is a collaboration of artists that integrate their own works of art which they exhibit and sell and the participation of the public in displays of protest and public exhibition. Volunteers are utilized to complete tree plantings and to assist in the organization of the exhibits, with the artists managing their own profits which are divided amongst the artists and the organization for the public programming (Fallen Fruit, 2014).

2.3.4 SUCCESSES, CHALLENGES, & LONGEVITY

Fallen Fruit has grown since its beginning in 2004, accumulating more artists and involving the public in more exhibitions and tree planting initiatives since their debut. Fallen Fruit has have increased their available workshops, showing that interest in urban food systems and permaculture has risen in their communities as a result of their initial programs. Challenges that this organization have faced include gaining the acceptance of the municipality in changing their planting practices in green spaces, and the issues stemming from their public protests (Fallen Fruit, 2014).

2.3.5 ORGANIZATIONS & SECTORS INVOLVED & THEIR ROLES

The public is engaged in a way that educates them on the roles of public and private spaces, and illustrates community relationships with fun activities and participation from the people (such as featuring local artists, street events, etc.). The Fallen Fruit project is a part of the Pasadena Arts Council's EMERGE Fiscal Sponsorship Program. They have also received awards and grant funding from the Creative Capital Grant and the Muriel Pollia Foundation in the Emerging Fields category. A large component of their funding comes from donations, as well as art sales from their exhibits and events (Fallen Fruit, 2014).

2.3.6 CHARACTERISTICS OF FOOD FOREST

This initiative is very different from a food forest, and focusses more on using different media as a way to increase public awareness on food security issues and the use of green spaces in the city. Tree plantings are done on both public and private spaces, with fruit tree tours being completed throughout the city of Los Angeles (Fallen Fruit, 2014).

3.0 FOOD FOREST ANALYSIS

3.1 WHAT SECTORS ARE ENGAGED IN THE DEVELOPMENT AND OPERATION OF THESE FORESTS?

As discussed by McLain et. al. (2012), urban landscapes are most often developed over a long span of time by multiple different organizations and individuals. This may entail plantings of edible species on private properties, or the management of public areas by non-governmental organizations, the municipality or other institutions. As seen in Madison, Wisconsin, the organization Madison Fruits and Nuts developed and managed their forests with the assistance of the parks division and habitat stewardship committees of the local municipality (Madison Fruits and Nuts, 2014).

Sectors engaged in the development and operations of these forests include community kitchens and food banks which receive surplus harvest to distribute to the marginalized population in the community, the non-governmental sector which assists other NGOs in the creation of collaborative programs and funding opportunities, as well as other businesses and community socio-economic services which contribute to educational programs and community building events and provide funding. The local municipality plays a large role in the management of these forests, especially those locations that are on public property. The departments of parks, recreation, transportation and public utilities all were involved in the project. As seen with Seattle, Washington, their edible landscape was integrated with and managed through a number of official government documents including the “City of Seattle Comprehensive Plan, the Seattle Urban Forest Management Plan, Seattle Parks and Recreation Strategic Plan, Seattle City Council Ordinances and Resolutions related to urban forestry and urban agriculture,” (McLain et. al., 2012, p.188).

3.2 WHAT ARE THE DEMOGRAPHIC CHARACTERISTICS OF FOOD FOREST PARTICIPANTS?

Food forest participants include volunteers from many different demographics, with the harvest being shared among them. This also includes landowners, who are sharing their food crops and exchanging produce for the volunteer labour in harvesting them. A key demographic however is lower-income and marginalized persons, who utilize community kitchens and food banks where surplus produce is distributed (Life Cycles, 2014).

Another characteristic common in participants is that of the societal value of food security, and the ability of the food forests to alleviate the pressures associated with securing healthy food for individuals in marginalized communities (McLain et. al., 2012). The

sustainability of urban communities has become an area of concern in the face of climate change and geopolitical insecurity, and so creating these food forests and sustainable communities would help to prepare these urban landscapes for future burdens on the local food supply (Clarke and Nicholas, 2013). As seen in Cuba in the 1990s, the government began offering support to community garden initiatives; lowering the costs of garden equipment and supplies as well as offer technological and information services to the residents. This greatly assisted in helping address the food insecurities in this country after the political unrest that left many people impoverished and without healthy, available food (Altieri et. al., 1999).

3.3 ECOLOGY OF FOOD FORESTS

Urban ecosystems represent an important resource in a landscape, providing not only regulatory services such as water, soil and climate regulation, but provisional services such as food products (McLain et. al., 2012). A food forest encompasses the development of a functional and sustainable ecosystem, and has many components that must be considered in its design process. These include the architecture of the forest, social structure as well as wildlife habitat (Jacke and Toensmeier, 2013).

3.3.1 ARCHITECTURE OF THE FOOD FOREST

A food forest design includes plant species that structurally mimic a forest ecosystem, including an upper canopy, lower canopy, ground cover layer and soil profile. This diverse mixture of species types allows for the self-regulation and sustainability of the system, where numerous niches are occupied and resilience to disease is increased. Each level of the forest plays a role in the sustainability of the system, and together influence the health and integrity of the system as a whole. Peterborough, Ontario is in hardiness zone 5a, which has a minimum temperature of -20°F to -15°F (Plant Maps, 2014).

The upper canopy layer includes tree species that will grow to significant height in relation to the other plant communities. With the initial planting of the food forest, if you are working with a bare landscape, full-sun tolerant species will be most beneficial to plant first, so that they will provide shade for the herbaceous and ground cover plants that thrive in shade-tolerant sites. Once the upper canopy has been established, more shade-tolerant species will establish the lower canopy with primarily shrub species, developing a lower canopy. The forest floor will then be established with herbaceous plants and ground cover species. These provide protection and habitat for wildlife as well as protection for the soil from erosion, and increases nutrient and moisture retention (Jacke and Toensmeier, 2013).

3.3.2 SOCIAL STRUCTURE

Beyond its function as wildlife habitat, a food forest has the important social element both within the community and within the ecosystem. Understanding food web interactions is pivotal when designing a food forest, as well as understanding the behaviours of all of the organisms that will be within it (Jacke and Toensmeier, 2013).

From a human stand point, the behavioural interactions are important as well. Fruit, nuts or plant parts will be being harvested by the public, and this in turn will affect the ecology of the system. To have the food forest being utilized thoroughly, the vegetation must provide acceptable yields, while also maintaining its function as a self-regulating ecosystem. Planting species that have high yields would be beneficial, as well as plants where the harvestable portion being removed will not negatively impact the plant. There may be concerns with the maintenance of the plants, as well as concerns with the dropping of fruit that may pose a risk with trail systems or roadways. These all will influence the species selection of the forest, and in turn will determine the ecological functions and processes taking place in the system (McLain et. al., 2012).

Another important element of food forest stems from the multifunctional use of the urban landscaping, where the vegetation provides multiple functions such as aesthetic purposes, ecosystem services as well as the generation of food stuffs for human consumption. This can also satisfy multiple needs that a municipality may identify for a public space, such as using fruit trees to control erosion while providing the desired wildlife habitat and landscaping (Clarke and Nicholas, 2013).

3.3.3 BIOLOGICAL STRUCTURES

Food forests are created to mimic a forest ecosystem, which entails the providing of wildlife habitat and food resources. In addition to achieving the social objectives the provided habitat is an important element in the food forest design. Any target species should be identified, as well as the resources that they will require. Other biological considerations could include nitrogen fixators, or species where their sole function is to attract beneficial wildlife such as pollinators for the other vegetation (Gamiing Nature Center, 2014).

3.3.4 NATIVE FOOD FOREST SPECIES

It is important for the species selected for this food forest to not only provide an edible harvest, but provide wildlife habitat. The following species are examples of **native** species that would be suitable for this zone and ecosystem composition, and are sorted by their location in the forest structure. Non-native plant species may also be an option for the food forest, but these species may not supply all of the wildlife support and habitat objectives that may be deemed

significant by the project. All of these are available from a local native plant nursery that will have the local adaptations and genetics (Gamiing Nature Center, 2014).

Upper Canopy Species

Chokecherry (*Prunus virginiana*)

Height: up to 30'

Light: Full Sun

Moisture: Moist Habitat: Exposed areas, Open woodlands

Wildlife: Chokecherry is a fast-growing tree/shrub species. It is an excellent food source for turkeys, pheasants, grouse and 25 species of songbirds. Its bark remains a glossy red-gold throughout the year.

Harvest: Berries can be used to make jams, jellies, sauces and wines.

High-bush Cranberry (*Viburnum trilobum*)

Height: 9-12'

Light: Full Sun

Moisture: Moist Habitat: Cool woodlands

Wildlife: Berries are an optimum winter survival food for birds, as the berries remain through winter and improve with freezing.

Harvest: Berries can be used for jams and jellies.

Serviceberry (*Amelanchier canadensis*)

Height: up to 35'

Light: Partial-Full Sun

Moisture: Moist/ Dry Habitat: Wetlands??

Wildlife: At least 40 species of songbirds and many small mammals feed on the berries.

Harvest: The sweet fruit can be harvested.

Under-canopy/Shrub Species

Hobblebush (*Viburnum lantanoides*)

Height: 3-10'

Light: Partial-Full Shade

Moisture: Moist Habitat: Cool woodlands

Wildlife: Provides cover for wildlife. This shrub works well for hedgerows and windbreaks.

Harvest: The sweet berries are eaten, and are generally cooked. Their flavour improves after a frost.

Nannyberry (*Viburnum lentago*)

Height: 10-16'

Light: Partial-Full Shade

Moisture: Wet/ Moist Habitat: Forest edge, near water

Wildlife: Provides food for game birds and songbirds

Harvest: Considered the “**wild raisin**”, nannyberries are used for jams, jellies, stews and sauces

Herbaceous & Ground Cover Species

Wild Bergamot (*Monarda fistulosa*)

Height: 1.5- 4'

Light: Full Sun

Moisture: Moist/ Dry Habitat: Woodlands, Meadows

Wildlife: Attracts hummingbirds and butterflies, and is a drought tolerant plant

Harvest: Both the flowers and leaves are edible and can be made into an earl grey-flavoured tea

Wild Garlic (*Allium canadense*)

Height: 1'

Light: Full Shade

Moisture: Moist Habitat: Woodlands

Harvest: All parts of the plant are edible from spring through to late summer, the bulb tastes like onion, and can be added to salads, soups or any dish to substitute onion, leek or garlic

Wild Ginger (*Asarum canadense*)

Height: 1'

Light: Full Shade

Moisture: Moist Habitat: Woodlands

Harvest: The roots are edible and can be candied or dried and ground.

4.0 CONCLUSION

This food forest offers an ingenious and supportive way to address the concerns of this site with regards to the invasion of the Emerald Ash Borer. By replacing the ash forest at Ecology Park with this forest, not only will the wildlife habitat be maintained but social and community-oriented connections will also be established. It integrates social, economic and environmental issues within the City of Peterborough, and represents an opportunity to foster relationships between different sectors while addressing local food security and ecosystem functions (Altieri et. al., 1999). By looking at these other examples of similar urban agriculture projects such as Life Cycles Fruit Tree Project, Madison Fruits and Nuts, Fallen Fruit and the examples in Seattle and Cuba, as well as understand the ecological and structural components of a forest ecosystem, a food forest can be developed for Ecology Park that will incorporate the elements of these projects that will lead to the greatest success of the forest, while appropriately restoring the ecological integrity of this area.

5.0 ACKNOWLEDGEMENTS

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Peterborough GreenUp Ecology Park Food Forest

Community Based Management Presentation
Of the Socio-Economic Benefits
And Public Facilitation and Community Engagement
By: Matthew Wilkinson

Presented To: Marcy Adzich of Peterborough GreenUp

For: Dr. Tom Whillans—Trent University

Partnered: with Trent Center for Community Based Education

For: the Betterment of The City of Peterborough

April 3rd 2014

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The Peterborough GreenUp Food Forest

Providing More Than Food for an Urban Community

The Peterborough GreenUp Ecology Park can be planted to better utilize the easternmost section of the Park and be a host for *The Peterborough Food Forest*. This would promote the allocation of an increase of available greenspace allow for social community gathering, more hands-on education of natural resources and healthy nutritional eating habits, while providing training grounds and opportunities for local *Green* jobs.

It has often been said that: *the action is in the timing*. Today, as a global society, we all face the growing impacts of climate change. While in Southern Ontario, significant changes have already begun to be felt from damaged production of the global agricultural industry, transportation costs, an invasion from the Emerald Ash Borer beetle which will destroy much of the urban canopy; and a local population growth that has been reported to be rising dramatically within the next 10 years. As we face an increasingly urbanized future, urban sustainability, the decisions made today need to be made with the security of the future in mind.

With the amount of climate impact rising, Peterborough's GreenUp Ecology Park, has a tremendous opportunity to give the City, and the local citizens, an edible oasis in the urban community: by establishing and developing a social movement with an interactive, and educational *Food Forest*.

Ecology Park is an award-winning, five acre park located just on the edge of the downtown core of Peterborough Ontario. It is filled with a variety of sustainable, educational and interactive sustainable landscape and gardens suitable for all experiences of outdoor life. Ecology Park boasts a successful community tree, shrub and edibles nursery surrounded by naturalized areas.

From May to October there are hands-on, environmental children's programs, a garden market, and skill-building workshops. The eastern most two-acres of Ecology Park rests as an undeveloped and sparsely wooded area, comprised with over 70% Ash Trees at risk from infestation. It is currently acting as habitat for Ash trees, invasive European Buckthorn, and other opportunistic shrubs. It has been proposed that this section of Ecology Park be planted to serve as a Food Forest. This document serves to promote the creation of an urban Food Forest in Ecology Park, by showcasing the opportunities for *social, environmental, and economic growth* as a community based natural resource.

What is a Food Forest?

“Eat food. Not too much. Mostly plants.” –Michael Pollen

The success of a Food Forest is should not be measured by edibles per pound, but in the integration of a healthy natural setting into the landscape with its people. A Food Forest can be created in urban spaces help to promote community food production and help people rediscover the pleasures of harvesting and eating organic food that have been grown close to home. Food Forests also add green vegetation in to the urban environment, creating habitats for wildlife and increase the city's natural biodiversity. In an era of climate change, planting trees which will provide a large edible yield, annually, for decades is a logical and prudent decision that would help build food security and community resilience. Fruit and nut trees are well suited to the urban environment as they can be trained, or grown on dwarfing rootstocks, to fit into small spaces, along fence-lines and in pots. Once the trees are well rooted they require very little maintenance, compared to annual vegetables, making the trees and their fruits a perfect complement for any urban community.

Implementing an Urban Food Forest has been proven success story for many cities across North and South America and Europe. A Food Forest employs agricultural initiatives and uses principles to encourage a continual return of food growth, commonly known as *permaculture*. When these permaculture principles are applied in an urban setting they offer a renewable of source of food, and a social sense of place for gathering, eating and working together for local communities. Food Forests are often planted and maintained by trained volunteers and supported by other members of the local population, while being managed by a single team who ensure the coordination of timing and a successful harvesting. A functioning Food Forest can be as big or as small as the community wishes it, and because of that, it is often limited by the amount of planting space available and funds to buy and raise trees.

Community-Based Resource Management

“The garden teaches is that our relationship to the planet need not be zero-sum, and that as long as the sun still shines and people still can plan and plant, think and do, we can, if we bother to try, find ways to provide for ourselves without diminishing the world.” –Michael Pollan

For more than 20 years, Peterborough GreenUP has been one of Ontario’s leading non-profit organizations focused on issues of environmental education, sustainability, and stewardship. As a registered charity, GreenUp partners with individuals, businesses, other non-profit organizations and governments. In the past GreenUp has worked with countless volunteers, conducted neighbourhood tree inventories, ran skill-based workshops, organized information lectures, worked with elementary schools, and managed the Ecology Park. The design and planting principles of edible vegetation is rooted in understanding the needs of the different species and the growth; it is enough to say that they need adequate light, root space, clean water, and routine maintenance. (In another section I will discuss the ecological and environmental needs).

However, the implementation and design of a Community Food Forest needs to take in the considerations and concerns of the community, and offer local citizens something in return.

In Toronto, The **Not Far From the Tree Program** has seen the success of *gleaning* (collecting useable crops where it has been deemed “not-profitable”) from urban fruit and nut trees. Their collection program has increased every year since the program launch in 2008 when over 3000 lbs of fruit was yielded from just 40 trees. In 2013, Toronto volunteers were able to glean over 22,000lbs of useable, edible, re-sellable food. This program operates by offering 1/3 of the total weight to the pickers, 1/3 to the tree owner and 1/3 to local food banks and charities. Not Far From the Tree also offered training programs for management and volunteers to help promote project success. The promotion and expansion of the program has seen an explosion of fruit trees being included in private and public edible landscaping. This includes the allocation of City park space for edibles species.

In the downtown center in Toronto, across from a subway station sits **Ben Noblemen Park: Community Orchard**. The park was reclaimed green space that is less than 100m² or half a city block. First planted in 2009, was 14 total fruit trees: 5 apple, 3 plum, 3 apricot, and 3 sweet cherry. The small park also has Serviceberry shrubs and Shagbark Hickory. It was co-created by two women: Orchard Coordinator, Susan Poizner: susan.poizner@sympatico.ca Head Gardener and shed muralist: Sherry Firing. It is managed by a team of five and the local community.

The larger lesson to take from the creation of Ben Noblemen Park is the political and community partnerships that were formed during the process. Live Green Toronto, City of Toronto Parks, Forestry and Recreation, City of Toronto Economic Development, Walmart-Evergreen, Enterprising Non-Profits, Carrot Cache, Fiskars Tools, Richter's Herbs, Gro-Bark, Clean and

Beautiful, and The Toronto Parks and Trees Foundation. The City of Toronto, and local city councillor of Ward 21, St. Paul's, Joe Mihevc (email: councillor_mihevc@toronto.ca). Having an environmental minded city councillor supporting the park gave the project a lot of help getting created. At Ben Noblemen Park: Community Orchard, local citizens and city councillors were included in the design process. This not only had an impact on the park design but on the amount of public involvement. Through the citizen meetings there was a lot of discussion that revolved around the design of the park. Changing from a thickly planted orchard of 40 trees to the 18 and adding a children's playground, with open green spaces. Ben Noblemen Park: Urban Orchard is still waiting for the trees to mature and bear fruit, but so are all the added people who were involved.

In the downtown Toronto schoolyard at **Ossington/Old Orchard Public School** the students helped teachers, parents and community members to plant their own food forest—a dozen apple trees offer a great sense of connection for the community and started production for edible student run garden in the schoolyard—educational, nutritious and involved. After enrollment at Ossington/Old Orchard Public School lowered in 1983 the two schools were connected by a pavement. By 1989, the students and teachers of the school started to take back and re-green the school yard, planting a wilderness garden that included:

- a terraced vegetable, herb and flower garden
- an upland forest with native trees and shrubs
- a hedgerow aviary to attract birds
- a playing field and a prairie meadow planted with native
- grasses and flowers
- an outdoor classroom Celtic circle, and,

- an apple orchard

The management of the wilderness garden is supplied from the local community, student formed clubs, and teachers. The trees involve very little annual management, and have been allowed to grow on its own. Efforts were applied to contact the school by email and phone with no reply; further effort will be made in the planting season.

(Principle: Maria Pantalone: (416) 393-0710; office staff: Teresa Wisniowski
email:Ossington_OldOrchard@tdsb.on.ca)

In 2012 **Hidden Harvest** was launched in Ottawa. After Ottawa's urban forest was hit especially hard by the Emerald Ash Borer, Katrina Siks saw a social business opportunity, who was quoted saying: **"The endeavour is a recipe for promoting local food, enhancing the beauty and utility of the environment and building community."** Hidden Harvest collects and distributes fruit and nut trees from urban trees; it sells food-bearing trees for homeowners to plant or donate to local community groups. Hidden Harvest held jam and preserving workshops for a small fee.

"[Hidden Harvest] were just a godsend – they would show up in the middle of the week with all this food to supplement the baskets. Fresh Produce means so much to our clients." –Centretown Emergency Food Center.

The success of Hidden Harvest has come from forming established partnerships with the local food banks. This type of partnership has given the publicity and public support to strengthen the volunteer base, and generate revenue from the selling of fruit trees, preserves and running workshops. Hidden Harvest was successful in finding ways to be sustainable giving to social causes and enough profit to cover costs and one full time employee.

FruitShare: Fruit trees for schools, was started by a farm-to-table restaurant/cooking school/permaculture farm who wanted to see inspire school children to grow, and care for the food they eat. With the help of the Woodland Trust, a local nature trust, the program can gain access to trees and information and planting support to the school to become established with a food forest. The program involved an application program that would see the students and the community collect the harvest, and turn it into something sellable, with that revenue going to buy more trees, or add to the edible landscape. By getting the students involved they were able to improve the country side, promoting sustainable living and foster environmental stewardship.

A local organization is becoming a local example of FruitShare in The **Abbey Gardens:Food Hub**. Abbey Gardens is a quarry restoration project hosting a community garden and orchard space in Haliburton, Ontario. While much of the agricultural field is still under construction and being established, they are offering a *Community Kitchen* program. A fully stocked, industrial kitchen that can be used by members of the public to can, preserve and prepare food, primarily food that comes off of the community farm. Using information from Abbey Gardens, Peterborough GreenUp would be able to establish a community kitchen of their own. Many immigrant and marginal communities throughout North America have started this type of social connection to promote nutritional eating, food security and a social gathering space.

The Abbey Gardens Food Hub based their practices and mandates from the **East Scarborough Garden Storefront** in Toronto, Ontario built in 2009. The Toronto Star reported that “the East Scarborough Gardens were created using what they call: Community-Design-Initiative (CDI). It was a program used to create a collaborative project to redesign the East Scarborough Storefront (4040 Lawrence Avenue East) located in one of Canada’s most at-risk and diverse neighbourhoods”. With a reported heavy clay content in the soils, an elevated bio-swale was

created using logs to generate berms and an organic matter base. The Community Kitchen at Storefront is a commercial grade kitchen that is bigger, more open and often more well equipped than an average home kitchen; and certified by the local Public Health Department. All volunteer groups must have at least one member certified as a safe Food Handler from the Public Health Department. No food stuffs are allowed to be sold from Storefront. The community kitchen was conceived as the popularity of the area's community garden became more fruitful. The Storefront Eco-Food Hub Manual suggests that local residents were looking for a place to gather as a community to share knowledge and expertise on cooking, health food and environmentally sound practices that will build skills and lead to better care of the community. The community building and reinforcing that come from this project makes it a highly successful case study.

Hartford Connecticut is a town with similar demographics as Peterborough and their city councillor has invested and supported the addition of fruit trees to local parks. Hartford is also home to **The Knox Parks Foundation**, a charitable organization akin to Peterborough GreenUp. By receiving federal grant money, the executive director of KnoxParks, Ron Pitz (ronp@knoxparks.org) and Urban Forestry Chris Donnelly worked together over the past 15 years to build the cities food network. Ron Pitz noted that, "The purpose of the program is to give an opportunity to communities to conduct forestry related projects and also help people understand the importance of forestry, so projects may include inventory studies, pre maintenance and education".

7 Layers of a Food Forest

The principles of permaculture suggest planning to employ the *7 layers of the Food Forest*. This is a principle that allows for maximum density to an area that would see plants that complement each other in a symbiotic arrangement.



Deciding what edibles to plant and where to plant them will have to be done with a team of managers, local citizens and groups of gleaners and volunteer maintenance. For the purposes of this document I provide an example of what MY FOOD FOREST may look like (Appendix B).

These are just a few case studies from the booming planning and designs of permaculture gardens that revolve around Food Forests. No two projects are the same, but they are all successful as long as the trees live.

In the Appendix is a short list of some Food Forest Organizations.

What Ecology Park's Food Forest can Bring to the Urban Community

Food Security

The implementation and support of Urban Agriculture has been cited in numerous studies, academic journals and governmental reports as a necessary step for the sustainability of cities for the future. Food and nutrition security are under threat in the Peterborough community. In 2012 the *JustFood* program, through the Peterborough YWCA, helped feed over 1,000 of Peterborough's adults and children every month; with close to 10% of Peterborough households list themselves as being food insecure..

“The YWCA seeks to feed our region through a dynamic combination of innovative infrastructure, new connections and strong partnerships. This ambitious project will be supporting the establishment of where all can come together to gain a strong sense of belonging through *Growing, Cooking, Eating and Enjoying Food.*”

--Peterborough YWCA

By being food insecure, their quality of life is threatened by simply being worried about not having enough to eat, or having to compromise the quality, and nutrition of the food available. Planting a Food Forest in Ecology Park will add to the total amount of affordable, nutritious food available for everyone in the area. Simply by increasing public awareness of available fruits, and vegetables can change the public’s perception regarding food choices. By allowing the public access to the visual (and edible) connection between *plant* and *food* can make a profound influence on a populations food choices. The direct experience of growing food is largely absent in urban lifestyle. People are now used to collecting a *harvest* at the grocery store and have come to expect food to be packaged and even pre-cooked.

**“Don't eat anything your great-grandmother wouldn't recognize as food.”
Michael Pollan**

Promoting Social Capital

The World Bank refers to Social Capital as the trust that holds the institutions, relationship that shapes the quality and quantity of society’s social interactions. Finding a way how to measure social capital is an important part of plan to assess the goals, methods, mission for the project. Environmental education workshops have been a constant offering at the Ecology Park. However, to improve local Social Capital, GreenUp will need to involve all members of the local community and support their needs and wants.

Trust, is an essential part of creating social capital and engaging with the local community for the success of any project. Any trust building project will need to apply a deal of understanding,

listening and respect for the different worldviews. Currently a host of evidence exists in the literature that shows social capital as a key process to help reduce poverty and promote sustainable development. With this view in mind Ecology Park Managers cannot expect to share the same view as City planners, or park visitors who enjoy the quiet open spaces, or as the impoverished citizens in need of access for food and meaningful employment. This process to build trust and open communication may take as long as it takes to gain enough compromise and understanding.

Peterborough GreenUp has been a presence in the community offering dozens of environmental and social programs and services for over 20 years. Trust building can be the most difficult and time consuming part of any project and while may be daunting and difficult but far from impossible. Applying a greater effort for community involvement will continue to promote the creation and support for the Food Forest. Allowing for time and energy to gather supporters and create a volunteer basis will make any version of a Food Forest a better success.

Improving Human Health

In March of 2013 the World Health Organization (WHO) continued to list, so-called, Lifestyle diseases (cardiovascular disease) as the number one leading cause of premature death. The WHO are currently advocating for changes in public policy for healthier diets and more time being active outside. In the last 2 decades, type-2 and type-1 diabetes (formerly known as adult-onset diabetes) has been reported among U.S. children and adolescents with increasing frequency. Every year 13,000 additional cases of Type-2 Diabetes and childhood obesity are reported. Diabetes is one of the most common chronic diseases in children and adolescents; about 151,000 people below the age of 20 years have diabetes. The International Obesity Task Force list Childhood Obesity as “one of the most challenging public health issues of our time”.

With all this in mind, I argue that much of the (often urban) population are suffering from a severe lack of connection with their natural world; and that connection is vital to healthy minds and healthy people. This disconnect suggests that responsible communities incorporate an approach that might help address the lack of fruits and vegetables in their diet and in eyesight. Food, the nourishment which we eat to keep our selves healthy, is not, in itself healthy. Any person can drive through the countryside and see huge expansions of farmland growing the same single crop year after year. Mono-crop growing strips the land of nutrients, which means needing to apply chemical fertilizers to sustain yields and profitability. Chemical pesticides are also needed to defend against insects, fungi and parasites which could wipe out the entire crop. So, the cycle continues: non-sustainably. This is why I believe that sustainably harvested edible landscaping, stemming from Food Forests, in public spaces, are a vital key to unlocking a larger awareness of ecological processes and help foster natural connections.

Economic Opportunities

To offer support to the local community, economic opportunities will need to be developed.

This is also important to develop the sustainability to continue the success of the Food Forest.

There are many urban permaculture projects around the world that have found ways to generate revenue and create employment. Because of the nature of Permaculture and Food Forests, there are few opportunities for full-time employment towards the management of the garden.

However, there are few better places for training and experience. Organizations could make use of the 'free' fruit. Gathering fruit to be processed and sold: Canning jams, jellies, juices, and drying fruit leather can be taught. Arborist training can be used to maintain the trees and teach the next generation of professionals. Community meals can be offered to generate funds.

Continuing the success of the vegetative nursery could be increased by offering enrollment in a

program to have trees maintained by trained specialists. This program can offer annual income and larger support for the local community to purchase food bearing trees. Many examples can be found to generate revenue in order to sustain the Food Forest and the local community.

Designing Facilitation for Participatory Public Consultation

What is Participatory Public Consultation?

Participatory Public Consultation (PPC) is an important part for any community project to allow project managers to make better, and more informed decisions which reflect the needs and wishes of local citizens. Conducting a PPC allows concerned people to voice questions and concerns. PPCs are designed by professionals using the International Association for Public Participation (IAP2) guidelines, to help cross national and cultural boundaries in safe places which allow all people to be heard. The premise of PPC is based on practicing 7 values:

1. Public participation is based on the belief that those who are affected by a decision have a right to be involved in the decision-making process.
2. Public participation includes the promise that the public's contribution will influence the decision.
3. Public participation promotes sustainable decisions by recognizing and communicating the needs and interests of all participants, including decision makers.
4. Public participation seeks out and facilitates the involvement of those potentially affected by or interested in a decision.
5. Public participation seeks input from participants in designing how they participate.
6. Public participation provides participants with the information they need to participate in a meaningful way.
7. Public participation communicates to participants how their input affected the decision.

It is in using these 7 values that a public facilitator can direct the public meeting towards gaining the most interaction and support from the local community. In recent times local communities

have demanded greater transparency, and more involvement in public affairs. The traditional framework for public consulting has very much been similar to lecturing down from experts to non-educated people; telling people what was happening without discussion; also known as “decide, announce, defend”. The Canadian National Research Council concluded in 2010, that engaging public involvement "is critical to ensure that all relevant information is included, that it is synthesized in a way that addresses parties' concerns, and that those who may be affected by a risk decision are sufficiently well informed and involved to participate meaningfully in the decision". The IAP2 reports that the method of public facilitation can be more important than the message being discussed. The needs of today's local communities have a desire for deeper involvement and education about their development. The IAP2 suggest that Public Involvement may be enhanced with targeted information and interactive public forums as a deeper connection can be made by conducting workshops, focus groups and surveys. As members of the public are able to make richer connections with the decision making process, so is the measure of the project success and community ownership. The success of implementing a cooperative management balances on development of trust and a shared understanding of the community project by the local community.

Community Stakeholder Involvement Plan

A Community stakeholder involvement plan for PPC should be made to for the Ecology Park to educate and generate participatory support for a local Food Forest. A plan outline would include Goals, a Vision, Meeting timelines, Means of Communication, and a Follow-up Process. Social science has listed six "social" goals that emerge from problem assessment and create the basis for a PPC design framework. Using the following six values this paper can outline goals for a PPC involvement that would generate trust, social learning, and community engagement for Ecology Park's Food Forest. Meetings and workshops can be advertised through emailing list

Meeting Composition and Frequency

Peterborough GreenUp can easily expand the current community workshops that are being held at Ecology Park to generate discussion and raise awareness and concerns for the future development. Workshops can be held multiple times throughout the year, as needs of the changing seasons offer educational opportunities. GreenUp can easily use these workshops to concentrate a community gathering and provide better explanation of the common grounds. There is much research to suggest that using the intimate nature of hands-on workshops not only generate political support and conversation for the goals of the community, but create a working volunteer base who could be counted on, and hold a higher ownership or sense of place to continue maintenance.

Public Facilitation Vision

The vision of the Public Information Hearings should be expected to reach the greatest number of people and create a better informed and educated public. The education can take the form of promoting the increase to the social and economic structures to the local community. It can be important to enlighten the environmental benefits, without making Ecology Park fitting to a single demographic; remembering that the project success can be measured by meeting the needs of the engaged public.

To meet this demand this author has begun to generate a list of people interested in becoming volunteering for gleaning/maintenance of the Ecology Park Food Forest to be presented to the Ecology Park Managers and the Peterborough City Council.

An organizational Email account (Peterboroughfoodforest@gmail.com) has been set up to facilitate the collection of answers to the question: “What does YOUR Food Forest Look Like?”

This question will be posed to over 200 people at the Innovation Forum in Peterborough April 3rd 2014; results to follow.

Public Facilitation Goals

The outlined six goals presented here are listed and adapted from Beierles 1998 discussion paper, *Resources for the Future*, which examined public participation for environmental and social goals.

1. Educating and informing the public
 - Educating the public about the environmental, social, and economic opportunities allow the public to better carry out the vision created by everyone.
 - This can help limit team conflict. However generating educated discussion can further project development and success.

2. Incorporating public values into decision-making
 - The next goal should be focused on involving public community groups.
 - Differences in values, assumptions and project results need to be discussed
 - To gain the greatest range of opinions, all stakeholders should be invited.
 - Key information from stakeholder meetings can guide project development:
 - i. Was information from the public participation process used to inform or review analyses or decisions?
 - ii. Did the public feel that it had an impact on decisions?
 - iii. Where public input was not incorporated into analyses or decisions did the relevant agency provide justification which was acceptable to the public?
 - iv. Were all reasonably affected parties included or represented, particularly those with no formal organization?
 - v. Were there mechanisms to hold participants accountable to the community which they represented?

3. Improving the substantive quality of decisions
 - This goal has less to do with making better management choices, and more to do with steering development in terms of participant satisfaction.
 - Or, if new ideas or opportunities were generated and if there are feasible.

4. Increasing community trust in Ecology Park
 - Organizations and institutions have identities which people trust/mistrust, support/deny on sight; all people need to be shown available opportunities and listen to new ones that are presented
 - As the community social capital decreases so does the ability to resolve conflict and project success

- Through discussing timelines, cost benefits feedback and management efforts help build trust to communities.
5. Reducing conflict
- Engaging in discussion and employing ways to re-negotiate project elements
 - Looking for methods that community members can use after some time has passed, as new ideas or questions come to mind.
 - Conflict must be repaired in such a way that future issues can be improved and the process not slowed
6. Achieving cost-effectiveness
- Generating Participatory Public Consultation will cost time and money to every organization. This means that a balance will need to be found between how much public improvement is needed and how much time an organization can afford to spend.
 - This is often the goal that is viewed as the lesser. However, investing time and money in the beginning can offer returns of public involvement for years, or even generations into the future.
 - Measuring ‘effectiveness’ can be generated by assessing the money by how much time and money will be spent through avoidance.
 - How much cost did involving the community process help avoid?

Planting Food Forests for Tomorrow

“The best time to plant a fruit tree was 20 years ago. The second best time is right now.”

The planting and caring for a Food Forest is not any more or less difficult than any other plant, and should not be seen as a daunting task. With a little planning and care, any food tree can be filled with ripe edibles.

In the planning stage it is important to recognize the environment around you and understand the needs and wants of the community. By taking the time to invest in the people around you, the rewards you receive will be great.

Stage 1: Pre-Planning: Desired Results

Pre-Planning goals will need to be assessed with the full cooperation of all parties concerned.

Stakeholder meetings, community gathering and workshops can promote social capital

Social	Environmental	Economic
<ul style="list-style-type: none">• Improve Social Capital• Create Employment• Support Food Security• Create Gathering space• Continue Student Programs	<ul style="list-style-type: none">• Increase biodiversity• Support wildlife• Increase maintenance• Promote Stewardship/educational	<ul style="list-style-type: none">• Generate revenue• Support training• Help create gainful employment

Stage 2: Planning: Understand the Environment

Understand the space to be planted, the species to be planted for better success

Inventory, Assess and Understand:

1. **Soil type and drainage**
2. **Land Aspect and slope**
3. **Water needs and access**
4. **Wind, Weather and Climate**
5. **Outline location for possible planning**

Define:

**Measuring Assessment Social Capital
Wishes for the Community**

Stage 3: Prepare the Ground/Gather Local Support

Creating the Food Forest in slow stages may help generate local support and ensure maintenance

Plans attached show management stages.

1. Planted in the smallest areas.
2. Clearing the turfed grassed area to be 3-5feet around the base of the tree.
3. Minimize the competition from grasses and weeds
4. Plant trees in the fall (September-November, not in soggy or frozen soils)
5. 7 layers of Permaculture can be employed as the local stakeholders wish

Stage 4: Prepare the Holes

1. **Do Not dig much deeper than the root ball of the tree**
2. Make the hole 3 times wider than the diameter of the root ball
3. Wet the bottom of the hole with compost and water
4. Permaculture layers can be outlined to include shrubs and leave room for annuals.

Stage 5: Planting

1. Evenly wet the Root ball by placing it in a bucket filled with water
2. Carefully place the tree into the hole and then fill the space with extra soil, keeping hold of the tree.
3. Press down the soil as you add it around the tree.
4. If you have grass set aside, cut it in half and place it upside down around the base of the tree
5. Stake the tree for the first year or two
6. Attach a rubber tree tie to the lower 1-foot of the tree
7. Allow the top of the tree to move
8. Optional: mycorrhizal inoculant to all of the root ball and some in the planting hole
9. Firm the soil layer by layer as you back fill
10. **Water:** enough water to soak the hole

Maintenance: Year 1

1. Keep the area around the tree free of weeds
 - a. Use an organic mulch, compost, apply up to 10cm depth
2. Water the entire root zone
3. Pruning:
 - a. After the tree has gone dormant, after the leaves fall
 - b. Stone-fruit are prune during active growth between May and September
4. Badly pruned trees gain Diseases easily
5. Diseased dead and crossing branches to allow light and wind to pass through

Pruning Apple Tree Example:

- Cut back the branches to create the goblet-shapes to the tree.
 - Make sure you cut the branches back above a bud on the main stem just below metre height
 - Remove the 2nd bud and cut the top bud. This encourages up-and-out growth and more fruit on the lower, reachable branches.
 - Make sure your tree is well watered into mid-October
 - Remove leaves from under trees to avoid diseases and mice habitat
 - Do not fertilize
 - Place plastic guards around the lower trunk to protect against bark damage
- Ensure the stake is secure and straight.

Maintenance: Year 2-3

“Formative” pruning is the initial pruning of fruit trees, which is usually done for about the first four to five years of the tree’s growth. This kind of pruning is about helping creating the form, or shape, of the tree that it will keep throughout its lifetime. Pear and plum trees don’t need to be pruned unless they become oversized (it you prune your plum trees, this should only be done between May and September because they are susceptible to silverleaf disease at other times of the year. It is a common disease, everywhere, and is usually fatal).

If you want to give your apple trees (or pear trees if you wish) the best start then you can follow the pruning guide below, although you don’t have to; they will still grow into fruit-bearing trees if you don’t prune.

Apple Tree Pruning Example:

Year 2-3 Decide which 5-6 ‘best’ branches you will keep that will form the main structure the open goblet-shape.

- Cut back weaker branches to encourage growth, although not more than half

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Appendix A List of Urban Edible Landscape Programs

Name of Initiative or Organization	Location	Founded
<u>Dr. George Washington Carver Edible Park</u>	Asheville, NC	1998
<u>Vancouver Fruit Tree Project Society</u>	Vancouver, BC	1999
<u>Life Cycles Fruit Tree Project</u>	Victoria, BC	2000
<u>Village Harvest</u>	S. California	2001
<u>Fruit Tree Planting Foundation</u>	100+ cities	2002
<u>Fallen Fruit</u>	Los Angeles, CA	2004
<u>Boston Area Gleaners</u>	Boston, MA	2004
<u>Urban Edibles</u>	Portland, OR	2006
<u>Backyard Harvest Community Orchard</u>	WA, ID	2006
<u>Portland Fruit Tree Project</u>	Portland, OR	2006
<u>Philadelphia Orchard Project</u>	Philadelphia, PA	2007
<u>Community Harvest of South West Seattle</u>	Seattle, WA	2007
<u>Grow Sheffield</u>	Sheffield, UK	2007
<u>Solid Ground Community Fruit Tree Harvest</u>	Seattle, WA	2007
<u>City Fruit</u>	Seattle, WA	2008
<u>Neighborhood Harvest</u>	Ashland, OR	2008
<u>North Berkeley Harvest</u>	Berkeley, CA	2008
<u>Abundance Manchester</u>	Manchester, UK	2008
<u>Mississauga Fruit Tree</u>	Miss. Ont.	2009
<u>City of Calgary Community Orchards</u>	Calgary, Canada	2009
<u>Operation Fruit Rescue</u>	Edmonton	2009
<u>Urban Abundance Fruit Tree Program</u>	Vancouver, BC	2009
<u>Chicago Rarities</u>	Chicago, IL	2009
<u>Husthwaite Community Orchard</u>	Husthwaite, UK	2009
<u>The London Orchard Project</u>	London, UK	2009
<u>Neighborhood Fruit</u>	USA, Canada	2009
<u>Hackney Harvest</u>	London, UK	2009
<u>Food Forward</u>	S. California	2009
<u>Madison Fruits and Nut</u>	Madison, WI	2010
<u>Union Street Urban Orchard</u>	London, UK	2010
<u>Bloomington Community Orchard</u>	Bloomington, IN	2010
<u>Communities Take Root (nation-wide)</u>	30+ cities, USA	2010
<u>Rapid City Urban Orchard</u>	Rapid City, SD	2010
<u>Boskoi Urban Edibles</u>	Netherlands	2010
<u>Pierce County Gleaning Project</u>	Tacoma, WA	2010
<u>St. John's Fruit Projects</u>	St. John's NFL	2011
<i>Food Forest Scan</i> <u>Beacon Food Forest</u>	Seattle, WA	2011
<u>San Francisco Urban Orchard Project</u>	San Francisco, CA	2012

Appendix B—Food Forest Site Plan

Appendix C—Mailing List of interested citizens

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GreenUP Ecology Park:

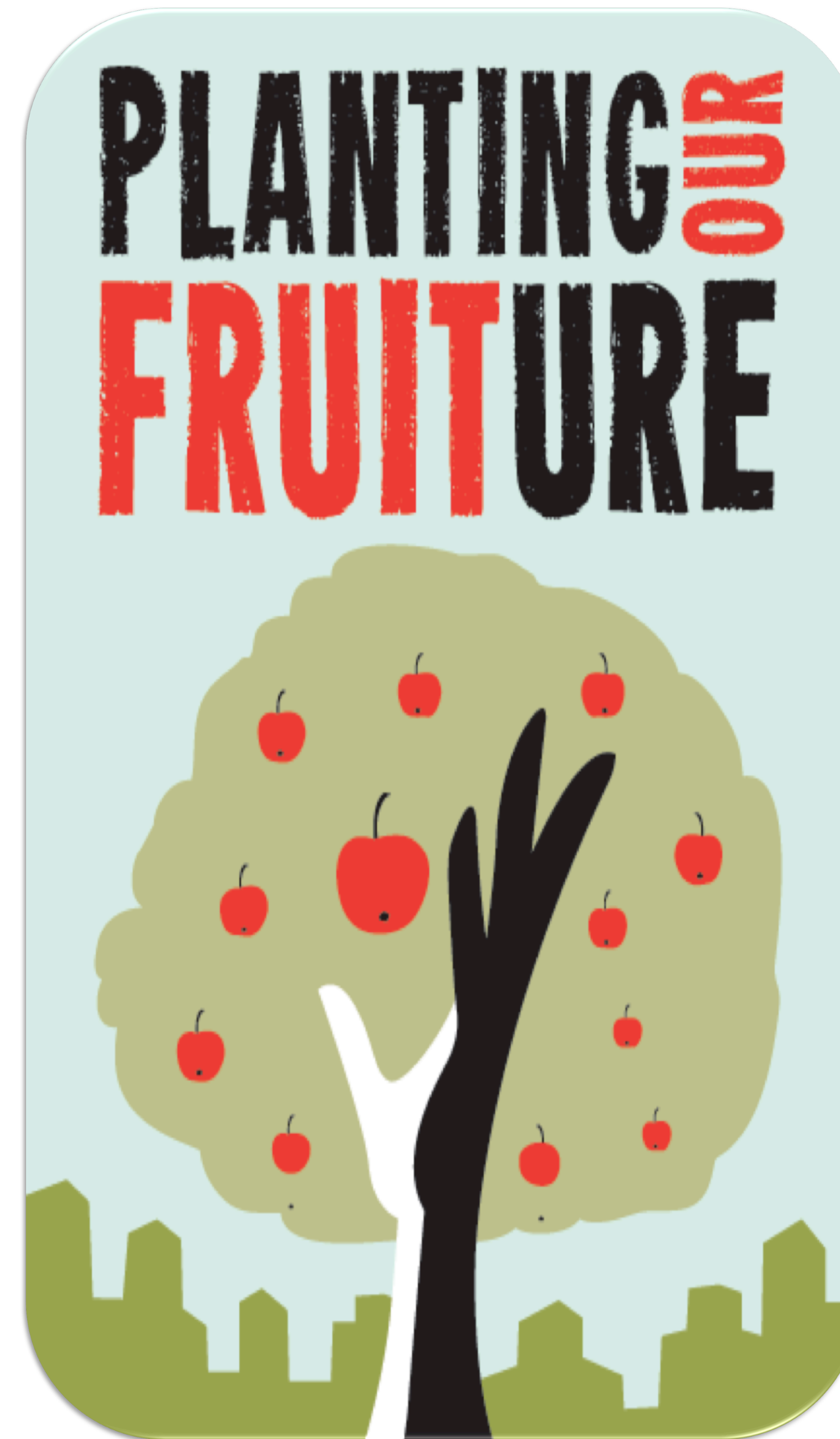
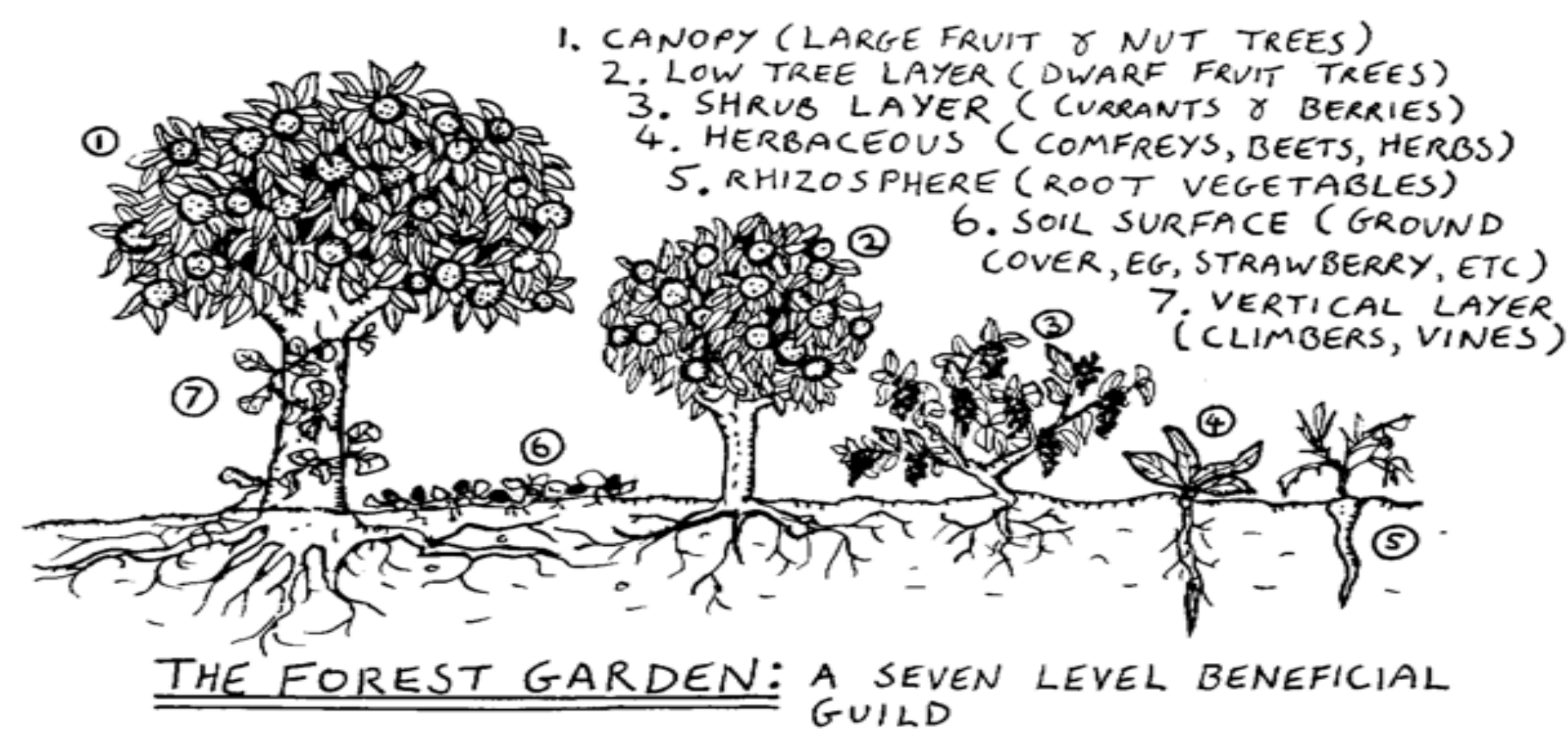
Social Benefits of a Community Food Forest

Presented to: Marcy Adzich By: Melissa Johnston, Zoë Mager, Matt Wilkinson & Matthew Poppleton Supervised By: Tom Whillans ERSC4801 April 2014

What is a Food Forest and why aren't there any rows?

A Food Forest (also known as a Forest Garden) is an approach to food production that involves creating a perennial garden of plants that are useful to humans and planning a landscape that mimics a woodland ecosystem (no rows there!). Food Forests are made up of guilds (or communities) of plants, that are intentionally planted together to optimize space, nutrient exchange, pollination, productivity and biodiversity. It is important to incorporate a variety of native plant species that attract beneficial insects and pollinators.

With its roots in Indigenous food systems from all over the world, the contemporary concept of Food Forests are based on the principles of permaculture, which is a form of gardening that plans for increasingly resilient, multi-functional, self-supporting, pragmatic, and delicious ecosystems.



Some Social Benefits of a Food Forest

Creating a food forest in an urban setting promotes community food production and food security for humans as well as an environment that creates habitats for wildlife and promotes biodiversity in the city. It also provides a public space that offers accessible gardens for foraging and gleaning and an opportunity to discover the pleasure of harvesting and eating organic food that is grown close by.

Some key benefits of Food Forests are:

- Creation of opportunities for people to become more connected to their food and the process of growing, harvesting, and stewarding local food systems.
- Engaging community in collaborative, co-creative efforts in the formation, celebration and care of an urban forest.
 - Creating accessibility and increasing the amount of affordable, fresh, nutritious local food for all community members in an inclusive way.
- Increasing public education and awareness about seasonal fruits, vegetables and nuts can help change public perception regarding food choices and provide deeper understanding in the importance of access to produce.



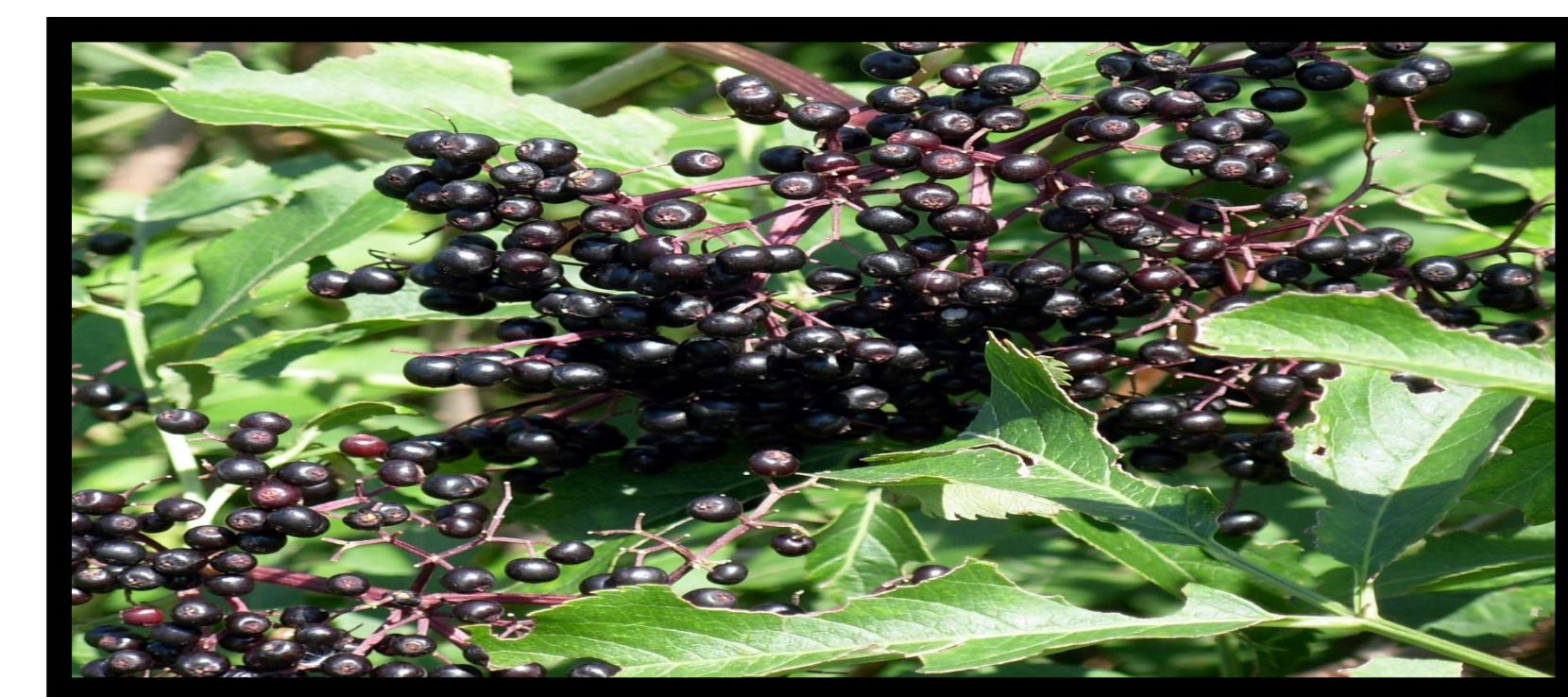
Peterborough GreenUP & GreenUP Ecology Park

Peterborough GreenUP is a registered not-for-profit organization that partners with individuals, businesses, other non-profit organizations and governments to focus on issues of environmental education, sustainability, and stewardship.

GreenUP Ecology Park is a five acre showcase of sustainable landscape ideas and resources. It contains a variety of display gardens and naturalized areas, a native plant nursery, garden market, workshops and hands-on displays



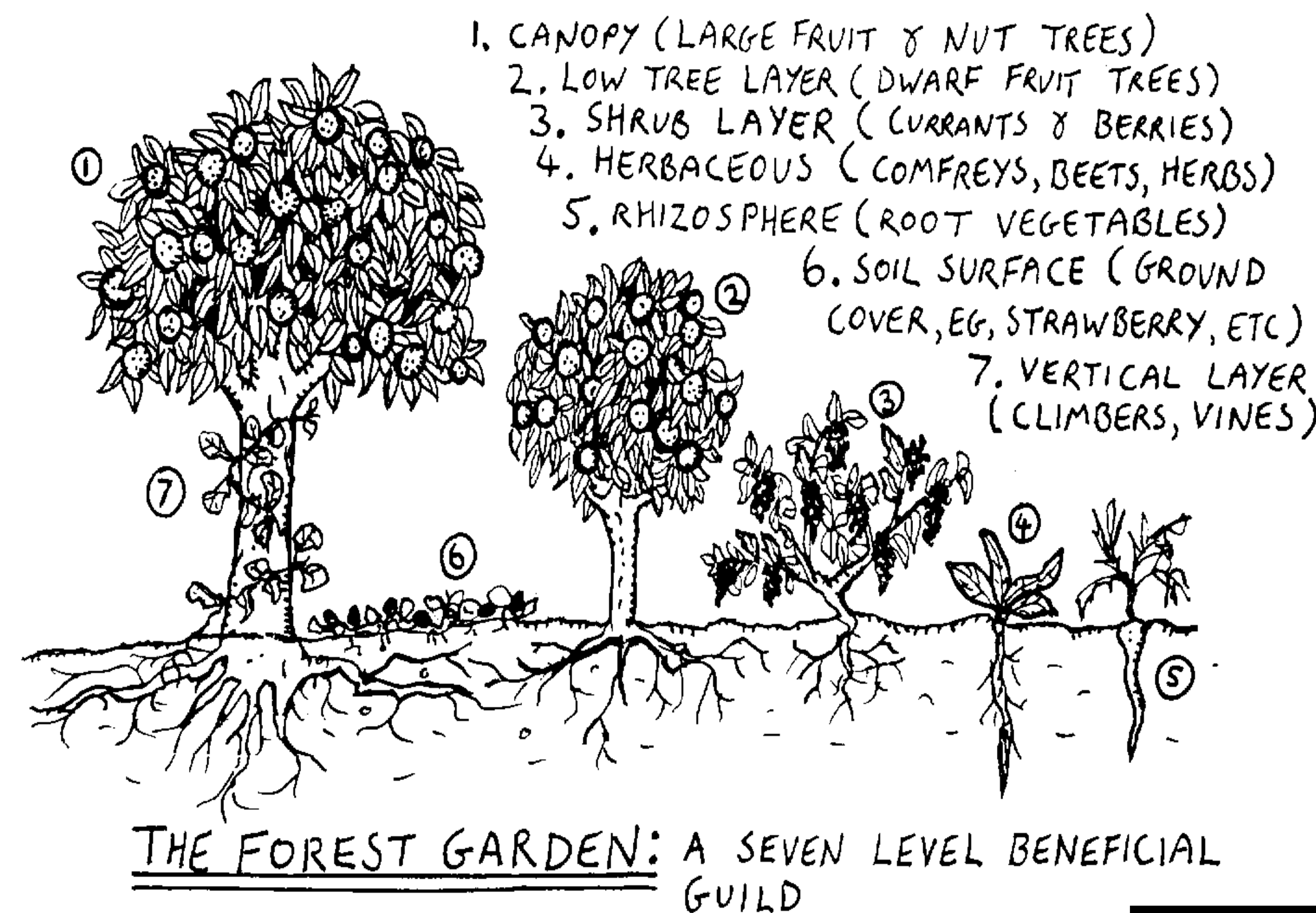
The Future of Ecology Park's



Edible Food Forest

What is a Food Forest?

A edible food forest emulates the function and complexities of a regular forest. Food forests are set up in vertical layers. Each food forest layer is characterized by a certain type of edible plant species that fits into that ecological niche (as is illustrated to the right). By utilizing various levels at the same time productivity is increased yielding more food. Edible food forests offer food security to local communities as well as opportunities to learn about gardening. Food Forests also provide valuable ecosystem services like providing habitat for species and watershed protection.



Biodiversity and Ecosystems

GreenUP Ecology Park's edible food forest will help to promote biodiversity. Biodiversity plays a huge role in promoting the health, function and productivity of an ecosystem. The greater the diversity the greater the benefit. Such benefits include, attracting pollinators and other important species that provide valuable ecosystem services. The addition of this edible food forest in Peterborough will help to create habitat for species which will increase the biodiversity in the park and the surrounding Peterborough area benefiting all the community. This is an important step towards a more diverse, healthy environment that the local community and future generations will stand to benefit from.

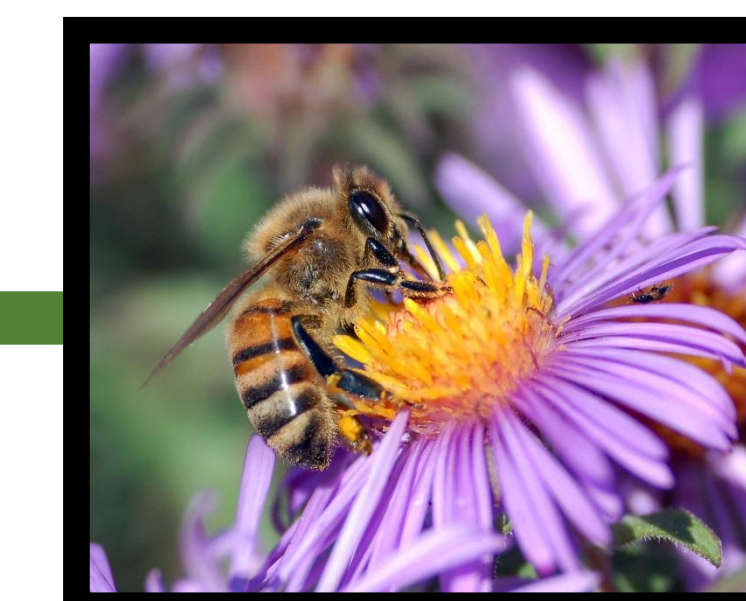
Ecology Park Food Forest

The urban forest at Ecology Park is comprised of mainly Ash trees and stands to be severely compromised in coming years by the Emerald Ash Borer. For this reason GreenUP has proposed that the Ash forest be transformed into an edible food forest that can be used and enjoyed by the community. Several gardens are already in place at Ecology Park so the establishment of a food forest will act as a great addition and help further increase community involvement in food production and increase food security in Peterborough.



Community Value

GreenUP Ecology Park provides dynamic nature-based programs. Using hands on lessons involving exploration and activities run by experienced educators. Ecology Park gives students a chance to connect with the environment around them. Curriculum-linked programs focus on a variety of environmental education themes such as soils and compost, animals and habitats, plants and trees, food gardens and insects. With the addition of an edible food forest at GreenUP Ecology Park visitors and students will have the ability to learn more about local food production. This helps to increase connectivity to our food sources, which is especially important for children when learning about sustainability and the benefits of eating locally.



Food Forest Species

Canopy

- Apple Trees (*Malus Domestica*)
- Plum Trees (*Prunus Domestica*)

Lower Tree Layer

- Pear Trees (*Pyrus Communs*)
- Cherry Trees (*Prunus Avium*)

Shrub Layer

- Sea Buckthorne (*Hippophae Rhamnoides*)
- Early Sweet Black Raspberry
- Black Currants

Rhizosphere

- Rhubarb

Soil Surface Layer

- Strawberry Seascape

Vertical Layer

- Artic Kiwi
- Blue Concord Grape



FOOD FOREST AT ECOLOGY PARK

What is a food forest?

A food forest is a type of permaculture, where the entire forest yields harvestable goods such as fruit, nuts, roots and greens. It is a self-sustainable system that requires minimal management.

How is it designed?

A food forest design includes plant species that structurally mimic a forest ecosystem, including an upper canopy, lower canopy, ground cover layer and soil profile. The forest will provide not only food for humans, but important wildlife habitat.

Examples of Food Forest Plant Species

Plant	Harvest	Wildlife Benefit
Chokecherry (<i>Prunus virginiana</i>)	Berries	Food for 25 species of songbirds, food for pollinators
Serviceberry (<i>Amelanchier canadensis</i>)	Berries	Food for birds and small mammals
Nannyberry (<i>Viburnum lentago</i>)	Berries	Food for game birds and songbirds
High-bush Cranberry (<i>Viburnum trilobum</i>)	Berries	Winter survival food for birds
Wild Bergamot (<i>Monarda fistulosa</i>)	Flowers, Leaves	Food for hummingbirds, butterflies and bees
Wild Garlic (<i>Allium canadense</i>)	Bulbs, leaves, flowers	Ground cover
Wild Ginger (<i>Asarum canadense</i>)	Roots	Ground cover, food for pollinators

Benefits to Wildlife

Food forests replace lost ecosystems, and provide many benefits to wildlife. Flowering trees and plants provide food for pollinators such as birds, bees and other insects, and the fruit provides food for small mammals, birds and other animals.



Benefits to Community

Food forests provide an opportunity for the community to come together, harvest home-grown food and connect. The public is encouraged to visit the food forest and harvest what catches their eye, supporting local community initiatives and connecting the community as a whole.

