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Chapter 1: Restoring the Urban Forest Ecosystem: An Introduction[1]

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Abstract

Urban and community forests are often managed as individual trees instead of whole forest ecosystems. Cities inventory and manage these tree species to meet many important needs such as energy conservation, beauty, and recreation in the city. Yet, there are many opportunities for urban forest restoration to provide additional ecological benefits such as storm-water management, wildlife management, and biodiversity. Restoring the urban forest ecosystem is reestablishing the ecological health of the urban forest ecosystem. The goal of restoration is to return the urban forest to a form which is more ecologically sustainable for the community; the restored urban forest will contribute positively to the community instead of being a drain on its resources. Many of our parks, for example, are composed of trees and grass requiring intensive maintenance inputs such as fertilizing, irrigating, mowing and raking. With restoration these parks could take advantage of natural processes such as nutrient and water cycling, thereby saving money, energy and resources for the community. Connecting these restored parks to other ecosystems such as waterways can also contribute to biodiversity and wildlife management and conservation. The options for restoration sites include: yards, vacant lots, shopping centers, schoolyards, parks, industrial parks, and waterways. The projects can be varied such as: (1) The simple act of eliminating leaf-raking in a park to reestablish the natural forest floor and the natural cycling of nutrients; (2) The establishment of understory plant species in a schoolyard to promote wildlife; (3) The eradication of an invasive plant species which is eliminating much of the understory biodiversity in a park; (4) The re-design of a parking lot to decrease stormwater runoff and provide a small ecological wetland; or (5) The re-creation of a park with species and ecosystems to be just the way it was in the 1800s. The United States hosts an abundance of successful and innovative urban forest restoration projects. The two key ingredients that make these projects so successful are the involvement of people from the community and the formulation of a restoration plan.

The Urban Forest Ecosystem

To define the urban forest ecosystem we take the original definition of ecosystem and apply it to the urban forest.

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The urban forest ecosystem is a collection of living organic matter (plants, animals, people, insects, microbes, etc.) and dead organic matter (lawn clippings, leaf-fall, branches) on a soil (with all its urban characteristics) through which there is cycling of chemicals and water and flow of energy.

When we think of the urban forest ecosystem we can think of the whole city or community as one ecosystem or we can focus in on a smaller parcel of land as the urban forest ecosystem. The big picture, bird's-eye-view is important to identify sites that might need restoration (**Figure 1**). For example, we might see two parks that could be connected with a greenway to benefit wildlife communities. Or we might see an area of the city which is void of trees, an urban heat island, that could be restored with a tree canopy. Yet, we also need to look at the urban forest ecosystem as smaller parcels of land such as neighborhoods, parks, or schoolyards. At this level we can see specific management alternatives and specific ecological needs for each of these land units.

Figure 1. When we think of the urban forest ecosystem we can think of the whole city or community as one ecosystem or we can focus in on a smaller parcel of land (a park, schoolyard or industrial park, for example) as the urban forest ecosystem. Photo by Hans Riekerk

What is "Restoring the Urban Forest Ecosystem"?

Restoration has traditionally been defined as reconstructing or repairing something, often a work of art or ancient building. Ecologists have defined ecological restoration to be:

- "The return of an ecosystem to a close approximation of its condition prior to disturbance." (National Research Council 1992)
- "The intentional alteration of a site to establish a defined indigenous, historic ecosystem. The goal of this process is to emulate the structure, functioning, diversity and dynamics of the specified ecosystem." (Society of Ecological Restoration 1992)
- "Ecological restoration is the process of renewing and maintaining ecosystem health." (Society of Ecological Restoration 1995)
- "Ecological restoration is the process of assisting the recovery and management of ecological integrity. Ecological integrity includes a critical range of variability in biodiversity, ecological processes and structures, regional and historical context, and sustainable cultural practices. (Society of Ecological Restoration 1996)

Most of these definitions center around the recovery, repair or re-establishment of native ecosystems. Because of the loss of species, the increase in disturbances and several other factors, exact restoration may be an impossible feat and many people wish to call it rehabilitation.

Restoring the Urban Forest Ecosystem is reestablishing the ecological health of the urban forest ecosystem.

In urban forest ecosystems we have a very different situation, and therefore we need to define restoration differently. The urban forest is a mosaic or patchwork of highly altered landscapes ranging from street trees to neighborhoods with landscaping to shopping centers to waterways to parks to fragments of remaining native ecosystems. For this CD-ROM and its series of publications we have chosen to define restoration as reestablishing the ecological health of the urban forest ecosystem. More specifically, restoration means altering a site (a park, waterway, neighborhood) to a state which is more ecologically sustainable for the community or city. Restoration might reestablish ecological structure, functions, pathways, and/or cycles. A restored site with its renewed or re-introduced

ecological attributes will contribute more positively to the community instead of being a drain on its resources.

Examples of potential sites and projects for restoring the urban forest ecosystem include:

- The simple act of eliminating leaf-raking to reestablish the natural forest floor and the natural cycling of nutrients.
- The establishment of understory plant species in a schoolyard to promote wildlife species.
- The eradication of an invasive plant species which is eliminating much of the understory biodiversity in a neighborhood.
- The clean-up of a vacant lot or site in a neighborhood and the establishment of a park.
- The re-design of a parking lot to decrease stormwater runoff and provide a small ecological wetland.
- The re-creation of a park with the native ecosystems that were present 100 years ago.

Potential sites for restoring the urban forest ecosystem include (**Figures 2, 3, and 4**):

Figure 2. A vacant or abandoned lot in an industrial area of town.

The Story of two parks

A description of two hypothetical parks offers insights into the reasons and benefits of restoration.

Figure 3. A small water-retention pond which could be restored with wetland species.

Figure 4. A schoolyard.

Wilson Park

- Wilson Park has five baseball fields and four basketball courts which are under constant use by the community. (**Figure 5**).
- A monoculture of 60-year-old pine trees surrounding the ball fields has swing sets and picnic tables in its understory (**Figure 6**). Last year when bark beetles invested loblolly pines in nearby parks, plantations and natural areas, park managers worried that they might lose this pine forest to the beetle.
- When viewed closely we can see that not only are there no understory plant species but the park managers remove every leaf and twig that falls to the ground (**Figure 7**).
- In another area of the park, managers work to maintain a grass understory under several live oaks (**Figure 8**). With little light for grass growth, addition of fertilizers, water and frequent mowing makes this an intensively

managed area for the park. Every leaf and branch must also be removed in these hardwood and grass forests.

Figure 5. Wilson Park has several baseball fields and four basketball courts which are under constant use by the community.

Figure 6. A monoculture of 60-year-old pine trees surrounding the ball fields has swing sets and picnic tables in its understory. Last year when bark beetles invested loblolly pines in nearby parks, plantations, and natural areas, park managers worried that they might lose this pine forest to the beetle.

- A bird's-eye-view of another hardwood area shows very little remaining on the ground (**Figure 9**). All leaves have been removed and the resulting bare soil shows the exposed and unprotected roots of shrubs and trees (**Figure 10**).

- This kind of management results in intensive use of people and energy resources (**Figure 11**). Often after the natural leaves and branches are removed, landscape mulch is brought in to cover the ground.

Figure 7. When viewed closely we can see that not only are there no understory plant species but the park managers remove every leaf and twig that falls to the ground.

Figure 8. In another area of the park, managers work to maintain a grass understory under several live oaks. With little light, addition of fertilizers, water and frequent mowing makes this an intensively managed area for the park. Every leaf and branch must also be removed in these hardwood forests.

- One of the park managers has planted camelias in one of the bare understories. Because these are an exotic plant, maintenance of these flower gardens has included additional fertilization and installation of an irrigation system (**Figure 12**).

Andrews Park

- Andrews park has a natural creek running through it (**Figure 13**). The creek originates outside the town, and so the park provides a way to connect several ecosystems as it meanders through the park and town.

Figure 9. A bird's-eye-view of another hardwood area in the park shows very little remaining on the ground.

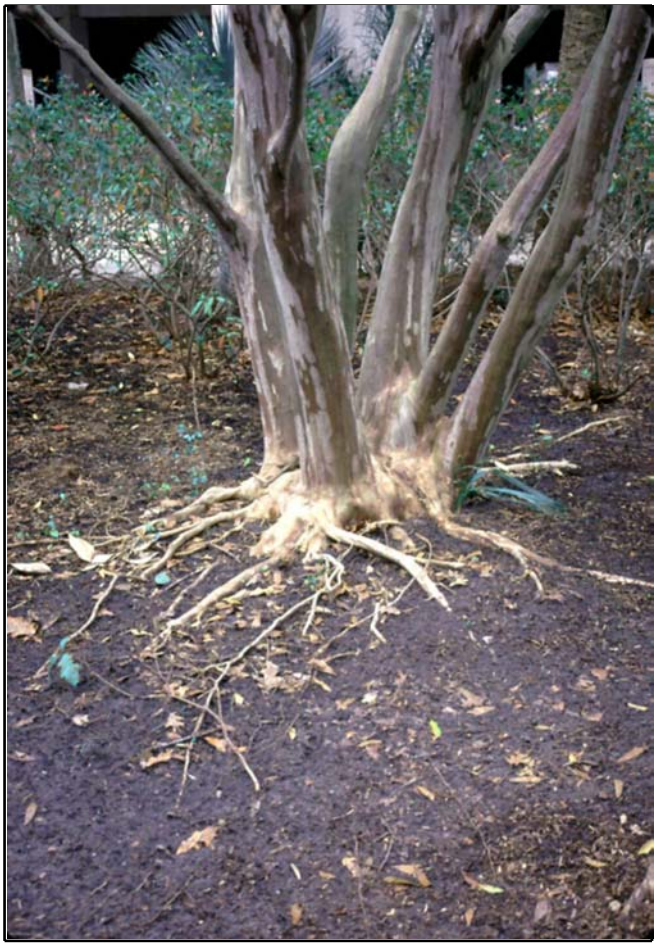

Figure 10. All leaves have been removed and the resulting bare soil shows the exposed and unprotected roots of shrubs and trees.

- Several ponds and other wetland areas support habitat for wildlife in the park (**Figure 14**).
- A walkway across one of the wetland areas offers entry and a look at this wetland ecosystem (**Figure 15**).

Figure 11. This kind of management results in intensive use of people and energy resources.

Figure 12. One of the park managers has planted camelias in one of the bare understories. Because these are an exotic plant, maintenance of these flower gardens has included additional fertilization and installation of an irrigation system. Photo by Larry Korhnak

- Fallen leaves and branches maintain a natural mulch for the park (**Figure 16**).
- Playground areas are well-defined as are the special areas where plant life is being restored (**Figure 17**)
- Fallen logs are left lying next to hiking trails and on the forest floor to enhance natural decay and nutrient cycling (**Figure 18**).
- Signs are utilized to educate people about the park's ecosystems (**Figure 19**).

Developing a Checklist

It's good to look thoughtfully and critically at our parks, neighborhoods, waterways and other urban forests to see how they contribute ecologically

Figure 13. Andrews park has a natural creek running through it. Photo by Larry Korhnak

Figure 14. Several ponds and other wetland areas support habitat for wildlife in the park. Photo by Larry Korhnak

Figure 15. A walkway across one of the wetland areas offers entry and a look at this ecosystem. Photo by Larry Korhnak

to the community. These benefits can be utilized to gain support for restoration projects. By using a checklist we can estimate the benefits for any area within the urban forest ecosystem.

Figure 16. Fallen leaves and branches maintain a natural mulch for the park helping to sustain the nutrient cycle in the ecosystem. Photo by Larry Korhnak

Figure 17. Playground areas are well-defined as are the special areas where plant life is being restored.

A Checklist of Wilson and Andrews Parks shows the contrasting ecological benefits of the two parks (**Figure 20**).

Both parks contribute recreational benefits to the community. The monoculture of loblolly pines and the hardwood forests at Wilson Park provide very little biodiversity compared to the natural ecosystems with many structural layers and plants at Andrews Park. Parking lots and forests with very little understory vegetation and natural mulch result in high levels of stormwater runoff at Wilson Park. The creek and wetland areas along with the forest floor with its high water infiltration rates offer several ways to dispose of stormwater at Andrews Park. Andrews is a low maintenance, low energy-use park compared to the high energy levels to maintain Wilson Park. The removal of all leaves, twigs, and fallen logs at Wilson Park means that nutrients are being removed from the site annually; this will

Figure 18. Fallen logs are left lying next to hiking trails and on the forest floor to enhance natural decay and nutrient cycling. Photo by Eliana Kampf Binelli

Figure 19. Signs are utilized to educate people about the park's ecosystems. Photo by Larry Korhnak

contribute to impoverishment of the site over time. In addition, organic matter will not be present in the soil to aid in water and nutrient retention. This interruption of the natural nutrient cycle can be remedied easily by retaining fallen plant materials as in Andrews Park.

Checklist of Benefits to the Community

Benefits	Wilson Park	Andrews Park
Recreation	++	++
Education	–	++
Biodiversity	– –	++
Energy Conservation	–	++
Hydrology	–	++
Beauty	+	+
Connectivity	– –	++
Nutrient Cycling	– –	++
Socio-Economic	?	?

Figure 20. By using a checklist we can estimate the benefits for any area within the urban forest ecosystem. This checklist compares the ecological benefits of Wilson and Andrews parks.

And finally, the Socio-Economic category of benefits. Parks, greenways and natural areas contribute to the economic health of a community. For example, before the construction of the Pinellas Trail (greenway), the city of Dunedin, FL had a 50% occupancy rate and now with the new greenway, there are no vacancies (Department of Environmental Protection 1996). People come or stay to recreate in communities; wildlife watching alone generates $18.1 billion in the nation (Caudill 1997). Real estate prices are enhanced with the presence of natural areas, parks and trees. The improved psychological well-being of the citizens in a community or neighborhood with parks and trees has also been documented (Schroeder and Lewis 1991). People viewing trees have slower heartbeats, lower blood pressure, and more relaxed brain wave patterns than people viewing urban areas without vegetation (Ulrich 1981).

It can be very advantageous to quantify costs and benefits for maintaining or restoring areas. In addition to stormwater and energy conservation cost reductions, other less tangible benefits such as health and recreation can be demonstrated. Recreational studies have shown that citizens often prefer recreating in parks near their homes, emphasizing the importance of community parks (Schroeder 1990). In Chicago, 50% of all the people visiting forest

preserves traveled 10 minutes or less from their homes (Young and Flowers 1982). In 1996, 2.7 million Floridians participated in wildlife recreational activities within a mile of their homes (Florida Game and Fresh Water Fish Commission 1998). It is very important for urban foresters to demonstrate to their city councils and managing agencies the importance of parks and trees as infrastructure in their communities.

Where can We Restore?

The options for restoration sites and projects in cities and communities are endless. Here are a few:

- Yards can be enhanced with native species or even native ecosystems (**Figure 21**).
- Vacant lots, often ignored or treated poorly for many years, are often candidates for restoration.
- The possibilities for better energy conservation and stormwater management in shopping center parking lots are great (**Figure 22**).
- Street trees, aging or lacking diversity, can be restored.
- Schoolyards can become natural areas with unlimited potential as educational areas.
- Industrials parks can be transformed.
- Waterways can be enhanced and connected to support recreational and hydrological benefits (**Figure 23**).

Examples of Sucessful Projects

One objective of this CD-ROM was to find and showcase successful restoration projects in the U.S. We have been overwhelmed with the variety and the high quality of projects being implemented throughout our cities and communities. There is a tremendous amount of creativity, ingenuity, and hard work going into these projects. The high quality and success are due to the amount of effort by so many talented people ranging from young children to funding agency personnel to natural resource managers and community development professionals. Partnerships are a common ingredient

Figure 21. Yards can be enhanced with native species or even native ecosystems. Instead of a typical mono-species hedge or a fence, this area between two neighbors has been restored and planted with native species.

Figure 22. The possibilities for better energy conservation and stormwater management in shopping center parking lots are great.

Figure 23. Waterways such as this creek can be enhanced with native species and connected to support recreational and hydrological benefits.

of these projects. As you can see the variety illustrates the imagination involved and the potential for even more new projects in other communities.

The Forest Park Ivy Removal Project in Portland

Sandy Diedrich saw a problem in her neighborhood park and decided to take the lead in trying to remedy it. Forest Park, is a 5,000 acre urban park in Portland, Oregon -- one of the largest urban forested parks in the country. It has 70 miles of trails and 30 miles of creeks and tributaries. But it also has English ivy, a common landscaping plant, which has invaded the park, covering the native understory plants and trees, and reducing the biodiversity in the forest. Controlling the ivy is a challenge - because it is so mixed with the native plants, herbicides are not feasible. Instead manual control is necessary (**Figure 24**). In 1993, Sandy started a program with volunteers, specifically with high school students (**Figure 25**). She developed workshops and workdays when citizens would come to help. In addition to eradicating the ivy in the park, the workshops taught nearby residents methods for ivy control in their yards - the source of the ivy in the park (**Figure 26**). Through their work with this project, the high school students learned about the basic ecology of the park, working together as a team, and the importance of environmental projects in the community. Alex Johnson, a high school student and crew leader, noted that, "It's a chance to make a difference. I've never known about the forest and here I've learned a lot about nature."

Figure 24. Crew leaders demonstrate ivy removal methods.

Figure 25. Sandy Driedrich (center) with the crew leaders (Bruno Precciozzi, Kristin Harman, Alex Johnson, and Heidi Dragoo) in the headquarters of the Forest Park Ivy Removal Project.

Figure 26. Standing in front of an area where ivy has been removed and the forest's natural biodiversity is returning.

Drew Gardens in New York

Ray Emanuel and several others in the Bronx, New York identified a site in their community that had potential to be restored. The site was a vacant lot located next to a school; for years this lot was used for dumping and even criminal activities. Their goal was to transform the space into a park for the community and the school children. This community-driven initiative including corporations, the Urban Resources Partnership, and the community began with planning and clean-up of the site. Fall clean-ups and spring festivals involve the community and corporate volunteers. High school students work at the gardens and this work program is part of a job protocol educational program (**Figure 27**). Several high school classes utilize the gardens for their instruction including art, language arts (especially

writing), and science classes. Ecology Days at the gardens include stations where participants can learn about subjects such as water testing of the Bronx River, composting, small wildlife, and edible wild plants (**Figure 28**).

Figure 27. A vacant lot located next to a school in New York was transformed into a park for the community and the school children.

Figure 28. Included in this new park, named Drew Gardens, are trails and a deck to view the Bronx River.

Apex Park in Tampa

Apex Park is on Davis Island, a small island in Tampa. It is the first thing you see after you cross the bridge to the island. And the residents wanted the first impression to be the best. So they approached Steve Graham, Tampa's urban forester for assistance in restoring the site, a small piece of land about an acre in size. After researching old photos and documents and some remnant ecosystems in the area, they arrived at a list of plants that would have made up the ecosystem before development of the island (**Figure 29**). They were delighted to find one grass, twisted fiddle leaf, that was endangered and found some specimens still remaining on the island (**Figure 30**). They planted a small area with native tree and shrub species including twisted fiddleleaf. The other small part of the park was landscaped with grass to showcase and allow viewing of the native ecosystem (**Figure 31**). The park has kindled interest among residents in native species and several people have landscaped their yards with many of these species.

Figure 29. With the help of Steve Graham, Tampa's urban forester, the community of Davis Island restored native plants at Apex Park.

Figure 30. One plant, twisted fiddleleaf, was endangered so the community collected specimens and planted it at the park.

Landscaping for Wildlife

An educational program developed by the Florida Cooperative Extension Service has given homeowners the knowledge and tools for landscaping their backyards and small urban lots for wildlife using ecological principles (**Figure 32**). Workshops are aided by the inclusion of a participant's guide, instructor's guide and videos

Figure 31. The other part of the park was landscaped with grass to showcase and allow viewing of the native ecosystem.

developed by extension specialists. The first of three modules entitled "Landscaping for Wildlife: Providing Food in Your Yard" demonstrates how to restore a remnant of native landscape, start a bird-feeding program, control squirrels, plant a wild bird food plot, and feed hummingbirds and butterflies. The second module enables participants to select plants to provide good wildlife cover including bird and bat houses, burrows for toads and other small mammals, treefrog houses, rock piles for lizards and snakes and brush piles for birds and rabbits **(Figure 33)**. The third module highlights the importance of the third wildlife requirement - water.

Figure 32. In the Landscaping for Wildlife program, homeowners learn how to enhance wildlife habitat in their backyards. Photo by Joe Schaefer

Naturescaping For Clean Rivers

Landscaping your backyard can have a positive impact on the environment. That's the theme for Portland's Naturescaping For Clean Rivers project (**Figures 34 and 35**). "Rainwater runoff, or

Figure 33. The second module enables participants to select plants to provide good wildlife cover including bird and bat houses, burrows for toads and other small mammals, treefrog houses, rock piles for lizards and snakes and brush piles for birds and rabbits. Photo by Joe Schaefer

stormwater, becomes a problem in urban areas because of the thousands of acres of impervious surface: roofs, roads, driveways, and parking lots," notes the project workbook. This runoff contains contaminants such as oils, metals, and chemicals. The goal of naturescaping is to improve the quality and reduce the quantity of water reaching storm drains. Workshops teach homeowners how to landscape with native plants which require much less water, fertilizers, mowing, and chemicals to maintain (**Figures 36 and 37**). Other classes include composting, attracting wildlife and reducing pesticide use. Neighbors work together to host workshops in their communities; all workshop participants receive project workbooks which help them develop an action plan for their yard.

Restoring Fire In Haile Plantation

A neighborhood in Gainesville, Florida wanted to restore the native longleaf pine ecosystem as well as reduce the fire hazard for their homes. In the past, fire was a natural disturbance in Florida longleaf pine ecosystems. Yet, development as well as new forest practices have excluded fire from many of Florida's ecosystems. The neighborhood decided to re-instate

Figure 34. In the Naturescaping for Clean Rivers program homeowners learn how to landscape with native plants which require much less water, fertilizers, mowing, and chemicals to maintain. Here a backyard is prepared for planting. Photo by Linda Robinson

Figure 35. The backyard is transformed into an energy and water efficient native landscape. Photo by Linda Robinson

Figure 36. Native wildflowers adorn a "naturescaped" backyard. Photo by Linda Robinson

this natural ecological process to the small patches of forest in their community (**Figure 38**). Fires reduce the competing hardwoods allowing longleaf pine to

Figure 37. Butterfly gardens are a popular part of the Naturescaping program. Photo by Linda Robinson

regenerate and become reestablished in the ecosystem (**Figure 39**). Educational signs are a big part of the program.

Figure 38. A neighborhood in Gainesville, Florida has brought fire in as a management tool to restore the native longleaf pine ecosystem as well as reduce the fire hazard for their homes. Photo by Eliana Kampf Binelli

Greening the Great River Park

The Mississippi River, as with most rivers in the world, became a center of industry and shipping as St. Paul, Minnesota became a prosperous city. But often as with most industrial areas the native forests along the river were destroyed and replaced with industrial buildings, pavement, and warehouses. The Greening the Great River Park Program, established in 1995, seeks to restore many of these areas along the River (**Figures 40 and 41**). This public-private partnership includes The Saint Paul Foundation, City of St. Paul and others including thousands of volunteer and over 240 partner organizations. The project involves the landscaping of over 100 private industrial lands with the four native plant ecosystems

Figure 39. Fires reduce the competing hardwoods allowing longleaf pine to regenerate and become reestablished in the ecosystem.

Figure 40. The Greening the Great River Park Program, established in 1995, seeks to restore many sites in industrial areas along the River. This shows an industrial site before restoration. Photo by Rob Buffler

Figure 41. Over 100 private industrial lands have been landscaped and planted with four native plant ecosystems. This shows the same site after restoration. Photo by Rob Buffler

including 30,000 trees and shrubs that occupied the area in the past. "Our goal is to have a 50% canopy cover throughout the valley. In 20 to 25 years, as the trees reach mature heights, we want the valley to look as though the buildings were placed in a forest rather than some trees were planted around buildings."

A Community Park in New York City

A one-acre lot used as a bus garage for many years and next to three schools was the site for the birth of a community park in New York City. The planning began in 1990 with meetings involving the whole community - city agencies, non-profit organizations (headed by "Open Road"), students, businesses, neighbors and more. The grass-roots park design includes a greenhouse, basketball area, nature pond with plantings, wildlife area, and playground (**Figures 42**). To restore this "brown field" site the area needed to be lined with plastic and new soil needed to be imported. However, the group including professional engineers and school children, decided to develop a composting system and produce compost from nearby businesses to produce the "soil." The newly invented composting system is now sought by many other communities in New York. School classes using the park range from science and gardening to energy and physics to poetry and art. A math class, for example, helped design the greenhouse. Paula Hewitt, the project creator and Open Road Director, emphasizes that "the purpose of the park is to be educational, yet we have a very relaxed, fun atmosphere" (**Figures 43 and 44**). The park is open to the community every day of the year.

Figure 42. The planning for this community park in New York City began in 1990 with meetings involving the whole community - city agencies, non-profit organizations (headed by "Open Road"), students, businesses, neighbors and more. The grass-roots park design includes a greenhouse, basketball area, nature pond with plantings, wildlife area, and playground.

Figure 43. Paula Hewitt, the community organizer, looks for turtles and fish in the park's pond with neighborhood kids.

Figure 44. Gerald Brinson, who started as a volunteer for the park and is now part of the staff, describes the new dock project with flowing water that he is constructing.

Bill Baggs Park

In 1991 Hurricane Andrew struck Miami and its surrounding communities including Key Biscayne. Bill Baggs Park which until that time was mostly occupied with an invasive tree, Australian pine, was completely destroyed (**Figure 45**).

Figure 45. In 1991 when Hurricane Andrew struck south Florida, the non-native Australian pine forest at Bill Baggs Park on Key Biscayne was completely destroyed.

The nearly clean slate provided an opportunity and several visionaries saw that it was a possible chance to restore the park. With partnering between federal, state, county, city and many non-profit groups, a proposal and plan was developed to re-create the park to the way it was 100 years ago. They researched the five native ecosystems including four wetland areas that had occupied the site (**Figures 46 and 47**).

Historical and recreational amenities were also considered - for example, without the shade of the previous forest, nine picnic shelters needed to be constructed (**Figure 48**). Cultural history including archaeological findings were incorporated into the plan (**Figure 49**). The ecosystems were restored and future invasions of non-native plants were monitored by volunteers. Educational displays were important to inform the public about the process of restoration as well as the diversity of the "new" ecosystems (**Figures 50 and 51**).

Figure 46. With partnering between federal, state, county, city and many non-profit groups, a restoration proposal and plan was developed to restore the park with the five native ecosystems that it had 100 years ago. Old documents were studied to carefully re-create and map the ecosystems.

Figure 47. The coastal strand ecosystem three years after planting shows the restoration success.

Figure 48. The shade that had been removed with the Australian pine tree canopy had to be replaced with several picnic shelters.

Figure 49. The historical, cultural, and archaeological significance of the site such as this 1825 lighthouse with restored lighthouse-keeper's house was an important part of the restoration plan.

Figure 50. Involving the park's neighbors and the community in all the stages was very important to the restoration success. Nearby condominiums can be seen from the restored south Florida slash pine ecosystem.

Streamside Restoration in Virginia

The Difficult Run Watershed in Virginia has over one-half million acres of forests and urban communities. Nonpoint source pollution is affecting the water quality of the Difficult Run River and downstream the Potomac River and Chesapeake Bay. This restoration project is a partnership with the Virginia Department of Forestry, Environmental Protection Agency, Virginia Department of Conservation and Recreation, Chesapeake Bay Foundation and the USDA Forest Service. Together they are striving to:

- Improve water quality by enhancing and restoring streamside forests.

Figure 51. Educational displays were important to inform the public about the process of restoration as well as the diversity of the "new" ecosystems such as the mangroves along the ocean and bay.

- Increase public awareness and education regarding the value of riparian forests.
- Improve fish and wildlife habitat (**Figure 52**).

Over 8,000 trees have been planted to reestablish riparian buffers or streamside forests to restore and maintain this important watershed.

The Two Key Ingredients

These projects have been very successful because they all had two key ingredients. First, the people. All projects became an essential part of the community because they involved the people in the community from the start and then in every step. People included all stakeholders such as citizens (all ages), businesses, non-profit groups, volunteers, and government agencies. Collectively these people put together the second key ingredient to success - a

Figure 52. The Difficult Run Watershed Project restores streamside forests which act as buffers to protect water quality and fish and wildlife habitat in riparian ecosystems. Photo by Judy Okay

plan. As you will see in Chapter 5, the successful restoration plan contains a vision, goal, objectives, action plans and evaluation tools. Well-developed plans demonstrate the need for the project and are used to seek public and financial support. These plans are usually very effective at obtaining funding and other in-kind support. Successful projects have support of the people and a well laid-out plan (**Figure 53**).

Figure 53. Successful restoration projects have two key ingredients - support of the people and a well laid-out plan.

Conclusions

There are many options for restoring ecological benefits in your community. It is important to consider the whole city or community as an ecosystem and then to focus in on parcels or projects that could benefit that ecosystem or landscape as a whole. Restoration projects can be as small as

backyards to parking lots, city streets, parks, waterways and any place where there are or could be trees. Most often it's important to start with a small manageable project. The United States hosts an abundance of successful and innovative urban forest restoration projects. The Bronx's Drew Park brought life back to a vacant lot next to a school. Portland's Ivy Project removed invasive ivy at the 5,000 acre Forest Park. Greening the Great Green River is restoring industrial parks along the Mississippi River. The possibilities for restoration projects are unlimited and up to the imagination and energy of people (**Figure 54**). Planning and involving the community - the stakeholders - are the two most important ingredients for success.

Figure 54. The possibilities for restoration projects are unlimited and up to the imagination and energy of people.

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