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An Introduction to the Abacoa Greenway

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by

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ABSTRACT

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Greenways are corridors of relatively intact natural vegetation through otherwise disturbed habitat that typically connect larger protected natural areas. The establishment of greenway systems throughout the United States is a testament to the increasing recognition of the necessity to incorporate wild areas within urban and other disturbed landscapes for the sake of biological sustainability and the emotional welfare of human residents. In my thesis, I examine a local greenway in Jupiter, Florida, the Abacoa Greenway, which is both product and component of the greenway movement, a recent and revolutionary phenomenon in urban planning. I evaluate the greenway's ecology, the specific functions it serves, and its significance within the broader realm of environmental ethics. The primary protected habitats are a mixture of scrubby pine flatwoods and shallow wetland basins. The flatwoods provide important habitats for numerous native species, including the gopher tortoise (*Gopherus polyphemus*) and the many commensal species that live in the tortoises' burrows. The shallow wetland basins also serve a number of purposes, including a surface water management system. As a whole, the greenway is an important resource for human recreation and environmental education, including scholarly research by students and faculty at Florida Atlantic University. It serves as important link between people and nature in an urban setting where they might otherwise be completely estranged.

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Introduction

Greenways are corridors of relatively intact natural vegetation through otherwise disturbed habitats that typically connect larger protected natural areas. These “networks of green” are extremely beneficial components of today’s urban landscape for several reasons (Little 1990). They provide sanctuaries for plants and animals that would otherwise have no habitat within urban regions. They preserve sensitive riparian regimes and serve as effective storm water management systems. They also provide residents and visitors with recreational opportunities including hiking, wildlife observation and relaxation. Greenways are valuable esthetic components of a community, generating resident’s pride, and preserving cultural and historical heritage. They can serve as alternate transportation routes for residents, reducing road traffic, air and noise pollution (Shafer, Lee, and Turner 2000). They can be excellent resources for ecological education and scholarly research. They even increase property values (Nicholls and Crompton 2005). In my thesis, I examine the Abacoa Greenway in Jupiter, Florida, which is both product and component of the greenway movement, a recent and revolutionary phenomenon in urban planning. I evaluate the greenway's ecology, the specific functions it serves, and its significance within the broader realm of environmental ethics.

History of Greenways

Historians credit the landscape architect Frederick Law Olmstead with initiating the greenway movement with his famous designs for the oldest natural coordinated parkway system in Boston, Massachusetts at the end of the 19th century (Jongman and Pungetti 2004). Another century elapsed before the movement really gained momentum; greenways have only become truly pervasive components of urban planning in the last

two decades, initiated by the 1987 publication of a report made by President's Commission on the American Outdoors. This federal advocacy of greenway projects catalyzed the movement to include natural spaces within urban and sub-urban developments (Bueno, Tsihrintzis, and Alvarez 1995). Shortly after the report, the American Greenways Program was launched by the American Conservation Fund. It was the first nationwide effort to harness funding for land acquisition and scholarly research of greenways (Fabos 1995). The establishment of greenway systems throughout the United States is a testament to the increasing recognition of the necessity to incorporate wild areas within urban and other disturbed landscapes for the sake of biological sustainability and the emotional welfare of human residents (Wetterer 1999).

State and municipal governments have also joined the movement by purchasing greenway corridors or legislating their existence through zoning and development ordinances. The state of Florida came onboard with the founding of the Florida Greenways Commission in 1993. The state commission collaborated with the Conservation Fund to devise an ambitious, massive, statewide greenway linking initiative, known as the Florida Ecological Network (Hector, Carr, and Zwick 2000). The commission presented a report to the governor the following year, and legislation was adopted to establish a system that included state parks and other natural areas, which encompassed almost half the state's land area. The Florida Ecological Network is so vast that it includes an example of each of Florida's ecological communities, as well as most of its rare and endemic species, but much work is still yet to be done to establish functional linking corridors to these existing natural areas (Hector *et al.* 2000).

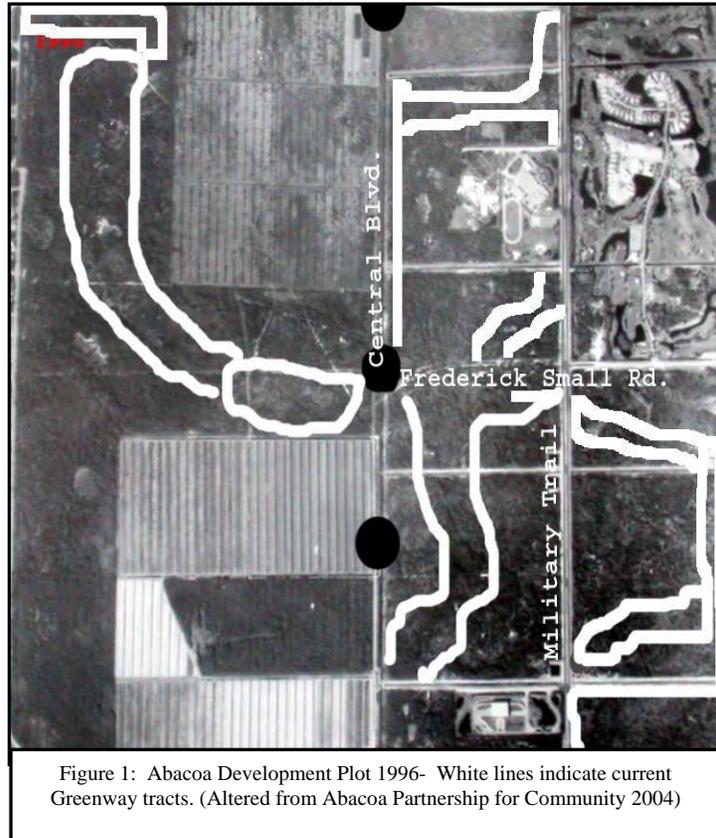
Abacoa Greenway – Facts and History

In 1992, Palm Beach County, Florida adopted the Unified Land Development Code requiring new developments to preserve twenty-five percent of land within the development plot determined to be ecologically substantial and minimally disturbed. (PBCDERM 2006). In fulfillment of this requirement, the developers of the Abacoa residential community in Jupiter, Florida (26.90°N, 80.11°W) established a 260 acre preserve, the Abacoa Greenway. It was also the intention of the Abacoa Development Company(ADC) that the greenway serve as gopher tortoise (*Gopherus polyphemus*) habitat in perpetuity, as much of the upland habitat in Abacoa was developed (Painter 1996).

The gopher tortoise is listed by the Florida Fish and Wildlife Conservation Commission as a ‘species of special concern’ due to its rapidly dwindling upland habitat in the Southeastern United States and its status as a keystone species (Puckett and Franz 1980). The gopher tortoise is critical to the survival of many other commensal species that reside in the burrows provided by tortoises including the threatened florida mouse (*Podymus floridanus*), gopher frog (*Ranacapito aesopus*), and eastern indigo snake (*Drymarchon corais*). Due to its protected status, developers seeking to build on land occupied by tortoises have legal obligations to either avoid construction in areas of the site where burrows are located, apply for a tortoise relocation permit, or for an “incidental take” permit, granting the developer permission to do physical harm to gopher tortoises in exchange for a mitigation fee. The existence of the Greenway provided a suitable and convenient on-site relocation option for tortoises during the developmental phases of Abacoa. Many aspects of the Greenway were designed specifically with gopher tortoise conservation in mind (Painter 1996).

During the planning process for Abacoa, the development company hired an environmental consulting team and enlisted aid from staff at The Conservation Fund to assess the composition of the land in order to determine the most ecologically functional sections for preservation.

Much of the land in the development plot was previously utilized for agricultural purposes, namely strawberry production and pasture (Figure 1). The consultant strategically selected areas which contained functioning, relatively undisturbed habitat. Once



the area for the preserve was selected, the Abacoa Development Company turned over the land to the Northern Palm Beach County Improvement District (NPBCID) for management purposes in a conservation easement filed in 1996 (Searcy 1996).

The NBPCID assumed responsibility for land improvements to the Greenway and began work by identifying small, isolated areas containing stands of Brazilian pepper (*Schinus terebinthifolius*) and melaleuca (*Melaleuca quinquenervia*) within the functioning habitats and made plans to restore them as meandering shallow wetland basins (Searcy 1996). These objectives fulfilled a wetland mitigation/compensation

requirement with the South Florida Water Management District to provide a surface water management system for the developed area, and at the same time removed harmful invasive, exotic species (NPBCID 1995). The remaining invasive exotic species in the Greenway were eradicated and replaced by native vegetation (Painter 1996).

Next, the NBPCID crews installed barrier chain link fencing four feet high around the borders of each range of the Greenway to protect resident species from nuisance predators, (e.g. cats and dogs) and to contain them within the sanctuary (Painter 1996). According to the management plan, the fence was to extend two feet into the ground to prevent gopher tortoises from burrowing out. That plan never materialized; the fence only reaches six to eight inches below the surface, and a number of gopher tortoises have burrowed outside the safety of the preserve (J. Moore, Florida Atlantic University, personal communication).

The crews also constructed wildlife underpass corridors that link adjoining tracts of the Greenway fragmented by roadways (Painter 1996). These culvert tunnels enable the wildlife to safely move throughout the adjacent sections (Figure 2). The underpasses were designed and installed with the gopher tortoise in mind, however scat and tracks identified within the underpasses indicate that they have not been



Figure 2: Wildlife Underpass

utilized by tortoises, but by opossums (*Didelphis virginiana*), raccoons (*Procyon lator*), and armadillos (*Dasypus novemcinctus*) (J. Moore, personal communication).

To prepare the Greenway for educational and recreational use, the NPBCID crews blazed paths throughout, constructed observation decks, platforms, boardwalks, and gazebos. They also installed information kiosks with maps of the various ranges of the Greenway system and information on the hydrology of the Greenway, the resident gopher tortoise population, land succession, pine flatwood habitat, and the evolution of the Florida landscape.

The Abacoa Greenway is used quite effectively as a resource for scholarly research, environmental education, and community involvement. Faculty of Florida Atlantic University regularly use the preserve to conduct studies. In 2004, Dr. Jon Moore and Dr. James Wetterer, both biology professors in the Harriet L. Wilkes Honors College, collaborated on a project where they investigated edge effect and the incidence of red fire ant attacks on gopher tortoises (Wetterer and Moore 2005). Dr. Moore monitors the tortoise population in one of the Greenway ranges, and has supervised various research projects for graduate and undergraduate students on gopher tortoises since 2001 (Karlin 2002, 2005). He has studied the effects of upper respiratory tract disease on tortoise populations in South Florida, a topic of particular interest due to its affect on the approval of gopher tortoise relocation permits required of developers (Karlin 2005).

Florida Atlantic University professors from varying disciplines use the Abacoa Greenway as a site for field trips, and incorporate the Greenway into the learning experience they provide for their students. Local schools including Limestone Creek Elementary, Beacon Cove Intermediate School, Independence Middle School, Jupiter

High School, Jupiter Middle School, and W.T. Dwyer High School have sent their students to the Greenway to learn about the ecology of the area and the importance of restoration and conservation of natural areas. Each summer the Florida Atlantic University Center for Environmental Studies collaborates with the Pine Jog Environmental Education Center to facilitate an environmental education summer camp, providing local elementary school students with experiential learning in the Greenway (Maietta 2004).

Several famous greenway planning guides have been published that emphasize the importance of building public and private partnerships and developing a community-wide network of support for greenways (Flink and Searns 1993, Jongman and Pungetti 2004). Flink and Searns recommend participatory planning of greenway developments, that is, involving the public in the initial greenway planning process and continuing their involvement in managing the land. The Abacoa Development Company (ADC) addressed this need by establishing a public/private greenway partnership, the Greenways Committee. It is comprised of local stakeholders including residents, environmentalists, Florida Atlantic University professors, and developers. The committee promotes and monitors all the programs involving the Greenway (Maietta 2004).

The ADC also sought to mobilize public support and community resources for the greenway by establishing a non-profit, greenway and community advocacy group: the Abacoa Partnership for Community. The Abacoa Partnership for Community collaborates with Florida Atlantic University students, and faculty, Northern Palm Beach County Improvement District Staff, and local business sponsors to organize bi-monthly greenway cleanup projects involving hundreds of residents who collect trash as they learn

about the Greenway from an expert guide. The “Greenwalks,” as they are called, expose residents to the ecology and the importance of the natural area and help to foster a sense of community pride, accomplishment and, volunteerism.

Ecological Composition

The vegetative composition of the Abacoa Greenway has been classified as a scrubby pine flatwood ecosystem (Wetterer and Moore 2005). Several ranges of the Greenway contain wetland basins, intended to provide natural surface water management,

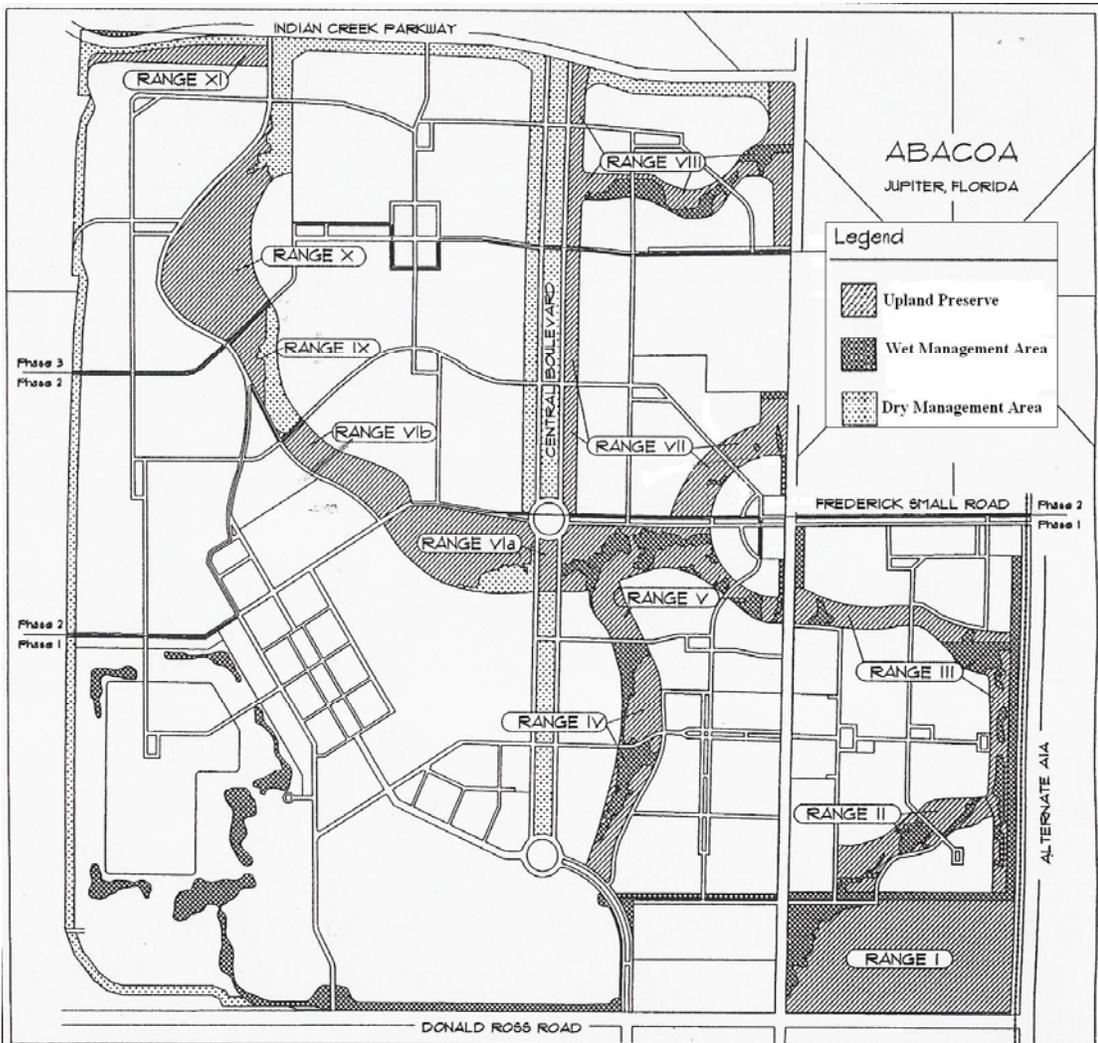


Figure 3: This map of Abacoa shows each of the eleven ranges of the Greenway, designating those tracts which contain wetland areas. (Painter 1996)

and contain their own wetland ecology (Figure 3). Scrubby pine flatwoods occur in upland areas with sandy, acidic, poorly drained soil. Pine flatwood associations are the most extensive habitat assemblages in Florida, covering half its total area (Alden, Cech, and Nelson 1998). They are characterized by frequent fires during dry seasons, occurring every five to eight years (Myers and Ewel 1990).

Flora

The vegetative constituents of scrubby flatwood ecosystems include a sparse canopy of slash pine (*Pinus elliottii*), an understory shrub layer containing saw palmetto (*Serenoa repens*), fetterbush (*Lyonia lucida*), gallberry (*Ilex glabra*), wax myrtle (*Myrica cerifera*), scrubby and live oaks (*Quercus inopina* and *virginiana*), and herbaceous ground cover including wiregrass (*Aristida beyrichiana*), chalky bluestem grass (*Andropogon virginicus*), runner oak (*Quercus minima*) and deer moss (*Cladina* spp.) (Myers and Ewel 1990).

Other plant species occurring within the Greenway include beautyberry (*Callicarpa americana*), spanish needles (*Bidens alba*), blackroot (*Pterocaulon pycnostachyum*), love vine (*Cassytha filiformis*), St. John's-wort (*Hypericum fasciculatum*), muscadine grape (*Vitis rotundifolia*), thistle (*Cirsium horridulum*), pennyroyal (*Piloblephis rigida*), Cardinal air plant (*Tillandsia fasciculata*), tasselflower (*Emilia fosbergii*), painted leaf (*Poinsettia cyathophora*), lantana (*Lantana camara*), cocoplum (*Chrysobalanus icaco*), swamp fern (*Blechnum serrulatum*), beach sunflower (*Heliantus debilis*), blanket flower (*Gaillardia pulchella*) cabbage palm (*Sabal palmetto*), gopher apple (*Licania michauxii*), bachelor buttons (*Centaurea cyanus*), sand spurs (*Cenchrus incertus*), muhly grass (*Muhlenbergia capillaries*), pine hyacinth (*Clematis*

baldwinii), catbriar (*Smilax bona-nox*), poor man's pepper (*Lepidium virginicum*), common spiderwort (*Tradescantia ohioensis*), sand pine (*Pinus clausa*), rusty lyonia (*Lyonia ferruginea*), pawpaws (*Asimina spp*), tar flower (*Befaria racemosa*), shiny blueberry (*Vaccinium myrsinites*), yaupon holly (*Ilex vomitoria*), ball Tillandsia (*Tillandsia recurvata*), locust berry (*Byrsonima lucida*), dog fennel (*Eupatorium capillifolium*), common ragweed (*Ambrosia artemisiifolia*), and bracken fern (*Pteridium aquilinum*).

Wetland areas contain bald cypress trees (*Taxodium distichum*), alligator flag (*Thalia geniculata*), white topped sedge (*Dichromena colorata*), star sedge (*Carex echinata*), spider lily (*Hymenocallis latifolia*), cattail (*Typha, spp.*), spikerush (*Eleocharis spp.*), white water lily (*Nymphaea ororata*), and sawgrass (*Cladium jamaicense*).

Fauna

Mammals typically present in a scrubby pine flatwoods include cotton mouse (*Peromyscus gossypinus*), cotton rat (*Sigmodon hispidus*), fox squirrel (*Sciurus niger*), gray fox (*Urocyon cinereoargenteus*), opossum (*Didelphis virginiana*), raccoon (*Procyon lator*), eastern cottontail rabbit (*Sylvilagus floridanus*), bobcat (*Lynx rufus*), coyote (*Canis latrans*), armadillo (*Dasypus novemcinctus*), and eastern mole (*Scalopus aquaticus*) (Myers and Ewel 1990).

Typical reptiles include gopher tortoise (*Gopherus polyphemus*), Florida box turtle (*Terrapene carolinabauri*), eastern diamondback rattlesnake (*Crotalus adamanteus*), black racer (*Coluber constrictor*), six lined racerunner (*Cnemidophorus sexlineatus*), red belly turtle (*Pseudemys nelsoni*), ground skink (*Scincella lateralis*),

brown anole (*Anolis sagrei*), green anole (*Anolis carolinensis*), gopher frog (*Rana capito*), and cane toad (*Bufo marinus*).

Avian species include ground dove (*Columbigallina passerine*), eastern towhee (*Pipilo erythrophthalmus*), bobwhite (*Colinus virginianus*), brown headed nuthatch (*Sitta pusilla*), pine warbler (*Dendroica pinus*), cardinal (*Cardinalis cardinalis*), great horned owl (*Bubo virginianus*), turkey vulture (*Cathartes aura*), mourning dove (*Zenaida macroura*), red shouldered hawk (*Buteo lineatus*), killdeer (*Charadrius vociferous*), blue jay (*Cyanocitta cristata*), common grackle (*Quiscalus quiscula*), yellow rumped warbler (*Dendroica coronata*), fish crow (*Corvus ossifragus*), tree swallow (*Tachycineta bicolor*), barn swallow (*Hirundo rustica*), house wren (*Troglodytes aedon*), blue gray gnatcatcher (*Polioptila caerulea*), downy woodpecker (*Picoides pubescens*), red-bellied woodpecker (*Melanerpes carolinus*), eastern kingbird (*Tyrannus tyrannus*), kestrel (*Falco sparverius*), swallowtail kite (*Elanoides forficatus*), cattle egret (*Bubulcus ibis*), bald eagle (*Haliaeetus leucocephalus*), great crested flycatcher (*Myiarchus crinitus*), common nighthawk (*Cornus brachyrhynchos*), whip-poor-will (*Cornus rachyrhynchos*), chuck wills widow (*Caprimulgus carolinensis*), grey catbird (*Dumetella carolinensis*), mockingbird (*Mimus polyglottos*), loggerhead shrike (*Lanius ludovicianus*), American goldfinch (*Carduelis tristis*), painted bunting (*Passerina ciris*), palm warbler (*Dendroica palmarum*), and common yellowthroat (*Geothlypis trichas*).

Insects frequently observed in the Greenway include the Halloween pennant dragonfly (*Celithemis eponina*), eastern pondhawk (*Erythemis simplicicollis*), great blue skimmer (*Libellula vibrans*), blue dasher (*Pachydiplax longipennis*), Carolina saddlebag (*Tramea carolina*), red legged locust (*Melanoplus femus-rubrum*), southeastern lubber

grasshopper (*Romalea microptera*), field cricket (*Gryllus pensylvanicus*), mole cricket (*Scapteriscus borellia*), crab-like spiny orb weaver spider (*Gasteracantha elipsoides*), golden silk spider (*Nephila clavipes*), black widow (*Latrodectus mactans*), brown widow (*Latrodectus geometricus*), wolf spiders (*Rhabidosa rabida*), antlion (*Myrmeleon spp*), American bumblebee (*Bombus pennsylvanicus*), cowkiller (*Dasymutilla occidentalis*), great southern white butterfly (*Ascia monuste*), tiger swallowtail (*Papilio glaucus*), cowkiller (*Dasymutilla occidentalis*), southern dogface (*Colias cesonia*), zebra longwing (*Heliconius charitonius*), monarch (*Danaus plexippus*), viceroy (*Limernitis archippus*) queen (*Danaus gilippus*), and 16 ant species identified by Wetterer and Moore (2005) including the red fire ant (*Solenopsis invicta*).

Wetland areas of the Greenway are home to many different species of wading birds, including great blue herons (*Ardea herodias*), little blue herons (*Egretta caerulea*), great white egrets (*Ardea alba*), white ibis (*Eudocimus albus*), wood storks (*Mycteria americana*), green herons (*Butorides virescens*). Other wetlands birds in the Greenway include anhingas (*Anhinga anhinga*), double-crested cormorants (*Phalacrocorax auritus*), mottled ducks (*Anas fulvigula*), common moorehens (*Gallinula chloropus*), piedbilled grebe (*Podilymbus podiceps*), and boattail grackle (*Quiscalus mexicanus*). American alligators (*Alligator mississippiensis*), northern river otters (*Lutra canadensis*), and apple snails (*Pomacea canaliculata*) have been observed in wetland areas on occasion as well (J. Moore, Florida Atlantic University, unpublished data). Wetland basins are occupied by mosquito fish (*Gambusia holbrooki*), spotted tilapia (*Tilapia mariae*), blue tilapia (*Oreochromis aureus*), grass carp (*Ctenopharyngodon idella*), and walking catfish (*Clarias batrachus*).

Several endangered, threatened and species of special concern can be found in the Abacoa Greenway --gopher tortoises, eastern indigo snake, florida mice, gopher frogs, little blue herons, white ibises, wood storks, and pine lilies (J. Moore, unpublished data).

Management Plans

To maintain the scrubby pine flatwood and wetland habitats, the Northern Palm Beach County Improvement District (NPBCID) takes several routine measures to manage the land in the Abacoa Greenway. The staff biologist at NPBCID periodically surveys the Greenway to monitor the survival of gopher tortoises and their commensals, rare plant species, and the presence of exotic and nuisance species. NPBCID also propagates and translocates plant species with high restorative potential, like wiregrass, to suitable sites throughout the Greenway ranges. (Painter 1996)

The Improvement District is also responsible for replicating the natural fire regime necessary for natural succession and ecosystemic balance in pine flatwoods. The management plan calls for prescribed burns as necessary in each respective section (Painter 1996), however, the required burn permits have not been issued due to the close proximity of the Greenway to schools and residential areas. Since no prescribed burns have been administered in the ten years that have passed since the management plan was written and approved, as a secondary alternative method the NPBCID utilizes mechanical reduction mowing to reduce biomass and the potential for dangerous, slow burning, wildfires (J. Moore, personal communication).

The NPBCID monitors and removes invasive exotic vegetation regularly. The management plan for the Greenway includes a specific target list of invasive/exotic species to be kept at or below 5 percent coverage in the area. The target list consists of:

alligator weed (*Alternanthera philoxedroides*), water hyacinth (*Eichhornia crassipes*), melaleuca (*Melaleuca quinquenervia*), water lettuce (*Pistia stratiotes*), Brazilian pepper, (*Schinus terebinthifolius* R.) caesarweed (*Urena lobata*), sesbania (*Sesbania vesicaria*), old world climbing fern (*Lygodium microphyllum*), Australian pine (*Casuarina spp.*), hydrilla (*Hydrilla verticillata*), torpedo grass (*Panicum repens*), salvinia (*Salvinia rotundifolia*), cattails (*Typha spp.*), and primrose willow (*Ludwigia spp.*). Other weedy species removed include dog fennel, exotic lantana, dodder, and eared eucalyptus.

Methods of exotic removal delineated in the management plan include hand removal, mechanical mowing, and spot application of herbicides. The Greenway is also monitored for opportunistic mesopredators (e.g. raccoons, domestic dogs and cats) to ensure the safety and survival of the sensitive species that live within the sanctuary (Painter 1996).

Ethical Significance and Conclusions

Some environmentalists are critical of natural areas like the Abacoa Greenway. It is hardly an example of wilderness; evidence of its urban location and human impact on the land is obvious from every point in the preserve. If our goal for the Greenway is to create an authentic, pristine nature sanctuary, the effort is hopeless. The habitat is disturbed, linear, fragmented and managed. It is in now way completely wild.

Restoration philosopher Eric Katz (2000) believes that “We cannot be masters of nature, molding nature to our wishes and desires without destroying the value of nature.” The objective for the Greenway should not be to replicate a pristine environment and “mold nature to our wishes,” but to present aspects of natural environments to the citizens of Abacoa in a place where humans and nature might be completely estranged.

The Abacoa Greenway is a terrific opportunity to create a community between humans and the natural environment. Important steps have been taken to involve the public in the greenway development process, to expose residents to aspects of nature that can get lost in an urban landscape, to harness respect and appreciation for natural systems within urban settings and in wilderness as well, and ultimately to build a constituency for nature (Higgs 2003). The Abacoa Greenway is a powerful step in the right direction towards sustainable development. Still, there is much more that can be done. The Greenway holds so much potential for changing attitudes towards nature and harmonizing the dichotomy between nature and culture (Jordan 1994).

The NPBCID can find new ways to encourage participation in the management of the greenway ecosystems. Much of the maintenance is done by landscaping crews, and is largely a technical process. When land management and restoration work become professionalized, many of the benefits of restoration, environmental consciousness raising, community pride, etc, are compromised (Light 2000). NPBCID participates in environmental education programs in the Greenway, but more direct, hands-on involvement in restoration practices is possible and should be realized. Hard work and intimate contact with natural areas makes them significantly more meaningful, venerated and special to the people involved (Schroeder 2000).

The Abacoa Partnership for Community (APC) can continue the important work that it does to expose people in the community to the Greenway and the resources it provides. It should strive to extend appreciation for the preserve to new constituencies, perhaps in collaboration with the enthusiastic, dynamic student population in the Harriet L. Wilkes Honors College of Florida Atlantic University. It could establish internships

with students and enlist their aid in finding innovative ways to bring the greenway to the community and the community to the greenway. The APC could collaborate with university faculty to design and offer a course about the greenway specifically, and work with the class to increase its utilization.

The Abacoa Greenway has the potential to be so much more than just a gopher tortoise preserve, a water management system, and a resource for recreation and education. It can forge a respectful relationship between humans and nature. It will cultivate concern and consideration for natural spaces far outside the greenway boundaries. The exposure to nature that people get when they visit or work in the Abacoa Greenway can change their behavior and approach to the environment, making them more conscious citizens of the Earth. It is imperative that all the potential benefits of the greenway are realized.

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