The Putnam Railroad Corridor Restoration Project: A Comprehensive Plan for Paired Ecological Restoration and Greenway Construction

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Chapter I: Introduction to the Putnam Railroad Corridor Restoration Project

“If I’d have asked my customers what they wanted, they would have told me ‘a faster horse’.”

- Henry Ford

The Industrial Revolution and American Dream, and the ideologies behind them, set America on the path to greatness. But, generations later, designers, architects, and planners have been left with the difficult task of repairing the damage done to the natural environment by our visionary, but ecologically ignorant forefathers. Cities all over America are criss-crossed with parkways, highways and expressways, planned in an age that paid more attention to the needs of automobiles than those of human beings. The quote above, taken from Henry Ford after the release of the Model T in 1908, depicts the mentality of some of these visionary businessmen at the turn of the 20th century. The release of the Model T was the start of the new future of America, the next step in the American Dream. With the mass production of automobiles, the average American could now afford to buy a car, and move out of the city. By the 1950’s, more and more Americans were fleeing the cities and moving out to the suburbs, relying on the automobile to complete even the simplest of tasks necessary to daily life. This so called “White Flight” to the suburbs was made possible by a massive federally funded infrastructure project undertaken during the Eisenhower administration. The Federal Highway Act of 1956 appropriated $25 billion for over 40,000 miles of interstate highway construction, facilitating the commute from the suburbs to downtown urban areas all over America. Most of these highways sliced through both inner-city neighborhoods, and flourishing ecosystems outside of cities, simultaneously destroying human and wildlife communities.

Most major cities in America were re-planned according to this massive highway project under President Eisenhower. Acknowledging that a large change occurred all over the country, our focus will be on New York City, and particularly Interstate 87, The Major Deegan Expressway. The creation of this highway dates back to 1936, initialized

by influential planner and then New York City Parks Commissioner Robert Moses and mayor Fiorello LaGuardia. Moses planned to use this highway as a ‘relief route’ for congestion problems on the newly created Bronx River and Henry Hudson Parkways, and also as a connecting route to the Bruckner and Cross Bronx Expressways. When completed, this 8.4-mile stretch of highway would connect the new Triborough Bridge to the New York Thruway\(^2\). The highway runs through Van Cortlandt Park, the 4\(^{\text{th}}\) largest park in New York City, and south along the eastern bank of the Harlem River. Many families were displaced to make room for this highway, which tore apart the deeply rooted social networks of many ethnic neighborhoods in the North Bronx. The highway also interrupted the natural environment of Van Cortlandt Park, particularly a small stream known as Tibbet’s Brook, which had to be re-routed underground to make room for the new highway. An area that once supported a thriving riparian ecosystem, a local ecosystem including a river or stream and surrounding plant and wildlife species, was replaced with concrete and asphalt as New York City’s network of highways continued to transform the urban landscape. The highway runs through one of the most densely populated urban areas in the United States, where about 100,000 people call home\(^3\). Running through Bronx Community District 8, I-87 is a man-made barricade that dissected a neighborhood without remorse. Running parallel to the Broadway commercial district, the space between the concrete walls of the highway and the slope that was once the bank of a stream serve as a trash receptacle for the industrial and commercial waste of local businesses, as well as a dwelling for the homeless population. The integrity of the local ecosystems was ignored along with that of the local residents during the construction of this highway. Tibbet’s Brook, flowing south from Westchester into Van Cortlandt Pond, previously flowed even further south into the Harlem River, extending the boundaries of this riparian network. But increased development and the construction of I-87 buried this stream under a mass of concrete and mortar. Van Cortlandt Pond was dammed, forcing the flow of Tibbet’s Brook into an underground sewage tunnel, running parallel to the sewer system that was constructed pre-1900. The stream still exists (see image below), but it has been neglected for over 50 years, and is in desperate need of

\(^2\) [http://www.nycgovparks.org/sub_your_park/historical_signs/](http://www.nycgovparks.org/sub_your_park/historical_signs/)

\(^3\) [http://www.nypl.org/branch/local/govt/bxcb.html](http://www.nypl.org/branch/local/govt/bxcb.html)
repair. This project seeks to restore Tibbet’s Brook to its original ecological state and improve the quality of life of the local community that has been hindered by the man-made boundary of I-87. By reducing human impact on the natural environment, local ecosystems can be restored, and a symbiotic relationship can be established between the built and the natural environment, a vision that was ignored by the planners of the past. The establishment of a greenway through the Bronx could connect communities to one another forming a new type of socio-ecological relationship with the urban landscape.4

The proposed area for this restoration and greenway construction project begins at the southern border of Van Cortlandt Pond in Van Cortlandt Park, south to 225th and Exterior Streets, where a plan for a new park grounds has already been proposed by the New York City Department of Parks and Recreation. This site, south of 225th street, adjacent to the Target Shopping Center, has been declared one of several “Underutilized

4 Photograph taken from www.undercity.org
Site Locations” in Community District 8 by Bronx Borough President Adolfo Carrion, Jr. The goal of this project is to create a riparian greenway that will connect Van Cortlandt Park to the Harlem River, reuniting this riparian network after a 100-year hiatus. A greenway proposal is not a new idea for this area. In fact, in 1993, under the direction of mayor David Dinkins, New York City Director of the Department for City Planning (NYCDCP) Richard L. Schaffer compiled the New York City Comprehensive Waterfront Plan, which included the restoration of many of the depleted areas along the Harlem River. This plan was obviously never fully realized, but there have been recent grassroots community efforts to get the project back on track. Most of the momentum is coming from the increasing number of cyclists living in the Bronx and Westchester, who have been awaiting the realization of the Hudson River Valley Greenway, which was envisioned by the Governor’s Council as a “hiking and bicycling trail along the water’s edge from Albany to Battery Park.” With the creation of this trail, this section of the Bronx would serve as a link between Manhattan and the rest of northern New York, while improving the local aesthetic and re-introducing natural elements into the urban environment.

The space for this greenway has essentially already been cleared. An abandoned railroad line called the Putnam Railroad runs through Van Cortlandt Park, the tracks eventually connecting with the Hudson Line of Metro North at 225th street. The tracks can still be seen in some places along the highway, hidden under shrubs, weeds, brush, and piles of trash. The Putnam Rail Corridor runs parallel to the Major Deegan Expressway, and is the site of the proposed Day Lighting of Tibbet’s Brook and greenway construction for this project. The entire length of the railroad has been abandoned since the Stella D’Oro Company, which is located on Broadway and W 237th street, ceased receiving shipments via rail. The corridor is supposed to contain a walking trail, but the trail is sporadic at best, often blocked by overgrown weeds or shrubs, and lacks significant access from street level. The ecological state of Tibbet’s Brook has deteriorated over time as a result of urbanization and highway construction, causing an overall deterioration in the quantity and quality of local wildlife and plant species. This

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5 New York City Comprehensive Waterfront Plan, 1993.
project proposes that the ecological restoration of the stream and its surrounding landscape would bring about a change in the fabric of the ‘riverbed community,’ both human and non-human, located along the water, replacing an ecologically and aesthetically nucuous area with a productive public space that will benefit the community. Improvements to the environment would be countered with various public works projects, such as graffiti art, environmental literacy programs, and a space for outdoor activities for local youth, emphasizing the idea of pairing ecological restoration with community outreach and advocacy.

Sustainability and resiliency of neighborhoods form the backbone of this project, culminating in the idea that each piece of land has the potential to produce something positive for the local community; ecologically, socially, economically and aesthetically. This project is an attempt to instill in the public, as David Nicholson-Lord suggests, a ‘radical change in perception’ of the relationship between the natural and the built environment. In his book *The Greening of Cities* he states that neglected parcels of unused land can provide something for a local community, “The picture that emerges is thus one of discovery, of an urban society beginning to look at its immediate surroundings with fresh eyes, seeing new possibilities in old things. A radical change in perception is involved.”*6* Humans can no longer look at an undeveloped parcel of land as an opportunity for building something new, but rather view it as a monument to the state of the environment pre-urbanization that is to be protected. A new relationship with the urban landscape must be fostered into the ethos of the average urban dweller, mindful of the larger ecological system of which they are a part.

This communal transformation of the psyche, in order to maximize its effect, must be followed by a change in action within the community. Sustainable practice does not just happen overnight and without significant effort. A sustainable way of life begins with the recognition of ‘place,’ that is, the distinct characteristics and qualities, both built and natural that defines a certain locale. This concept of ‘place’ forms a unique socio-ecological bond between human beings and their surroundings, causing them to value the space that they occupy in a different way. The introduction of these new public spaces to

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*6* *The Greening of Cities*, 1987, 82.
the community will coincide with various public works projects, further engaging urban dwellers with the natural environment. The Putnam Railway Restoration Project seeks to counter the damage done to the environment in the past with the implementation of public parks and recreational spaces in previously derelict and empty spaces. When the Major Deegan Expressway was built, overpasses were constructed where the highway cut through the neighborhood. In the selected area for this project, there are five such overpasses that are empty and serve merely as trash dumps and shelter for local homeless. These lots underneath the overpasses have the potential to be transformed into community squares, housing children’s playgrounds, recreational gaming amenities, refreshment stands, and productive public spaces. The plan includes the incorporation of a local farmers Market at one of these overpasses, encouraging the purchase of locally grown produce as a method of increased environmental literacy and local sustainability within the target community. In order for these “pocket parks” to function properly, emphasis must be placed on accessibility from street level in the design, allowing handicapped, elderly and stroller access to and from Broadway. The details of the design will be more thoroughly explained in Chapter V.

Today, almost 50 percent of the world’s population lives in cities or metropolitan regions. By 2050 that number will be 5 billion people. This massive influx of people calls for severe infrastructure improvements that will take time, capital, and strategic and sustainable planning in order to minimize the impact of development while enhancing the quality of life within the city. This is, obviously, much easier said than done. But it is grassroots projects such as this that begin to raise awareness within a city, until it gets to the point that it is common knowledge that, for example, planting certain types of shrubs along a highway can help reduce the pollution to the water table and soil caused by runoff on highways and roadways. Little by little, the adaptation of sustainable practices to everyday life, and the incorporation of these practices into urban planning and re-development strategies will put us well on our way to coping with the environmental problems caused by global warming and carbon dioxide emissions from our reliance on the automobile. With sustainability in mind, one can reinterpret Henry Ford’s quote from the beginning of the chapter. It seems that faster horses may have

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been better for the environment, but now it is time for the Henry Ford's of today to step back and realize that with the right amount of time, capital and energy we can solve many of the problems that scientists and environmental experts predict will confront us in the future. It seems that Henry Ford forgot that popular motto of the restaurant business, that “the customer is always right.”

Current state of Putnam Rail Corridor, Bronx New York.
Chapter II: Sustainability from Ignorance: A Brief Discussion on Current Design Techniques for Environmentally Efficient Landscape Planning

“The world will not evolve past its current state of crisis by using the same thinking that created the situation.”

- Albert Einstein

Planet Earth is approximately 4.6 billion years old. For all tentative purposes, it is estimated that modern man, Homo sapiens, has been present on Earth for roughly 200,000 years, a small fraction of Mother Earth’s lifespan. The Earth has existed for billions of years, and somehow we, human beings, have managed to deplete the Earth of many of its resources and interrupt many of the complex systems and processes that made life possible in the first place. William McDonough and Michael Braungart raise a question in their book Cradle to Cradle that provokes the average human to think about the impact that human beings have had on their environment, “Consider this: all the ants on the planet, taken together, have a greater biomass than that of humans. Ants have been incredibly industrious for millions of years. Yet their productiveness nourishes plants, animals, and soil. Human industry has been in full swing for little over a century, yet it has brought about a decline in almost every ecosystem on the planet. Nature doesn’t have a design problem, people do.”7 Why is it that we as human beings have had such a blatant disregard for our natural surroundings? Why is it that the average human is either not aware or does not care enough to do something about the damage that our materialistic and capitalist society does to the environment that has allowed for our species to flourish for so many years? This discussion is my attempt to inform the reader of various steps that planners, architects, and urban designers are taking to change the way that we think about ourselves as human beings, and as members of the larger ecological community that makes up what we call Earth.

Occupation, upbringing, social status, and one’s priorities in general define one’s view of the world. The CEO of a multi-national corporation views the cost-benefit ratio

7 Cradle to Cradle. 16
of a given product much differently than the researcher that the company has hired to determine the product’s possible environmental impact. In the same way, an architect may suggest certain “green” materials for a project, but the developer or homeowner may defer due to higher cost, or risk of trying out something new. These two trains of thought, until they are met by some sort of compromise, will continue to inhibit sustainable practices from becoming the norm. Environmental educator and author David W. Orr defines these two approaches as technological sustainability and ecological sustainability.\(^8\) He states, “Every problem has either a technological answer or a market solution. There are no dilemmas to be avoided, no domain where angels fear to tread.”\(^9\) This is the view on sustainability held by the CEO or the government leaders, who have not yet come to the realization that their selfish and often biased views play a significant role in a larger global problem. Instead of changing the process outright, they seek to “make it less bad”\(^10\) in order to satisfy certain economic priorities. Orr goes on to define ecological sustainability as, “the task of finding alternatives to the practices that got us into trouble in the first place… to rethink energy use, urban design, transportation, economics, resource use, the importance of wilderness and our central values.”\(^11\) This project seeks to implement an ecologically sustainable reconstruction project in a biotic community that has been ignored during previous planning. The major obstacle that environmental educators and advocates face often lies on the local level, that is, the average American does not realize the gravity of issues such as climate change, runoff, flood control, carbon footprint, and decreasing biodiversity in urban areas. Neighborhood and community groups can and will form the base of the environmental revolution. It has already begun, especially in the Bronx, with groups such as Sustainable South Bronx, Bronx Council for Environmental Quality, and the Bronx River Alliance. Increased access, awareness and availability of resources will allow these types of groups to grow and spread the message to those who may not have thought that they could do anything about global issues.

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\(^8\) Ecological Design, 20.
\(^10\) Cradle to Cradle
Sustainability is not a new concept by any means. Knowledge of the effects of industrialization on the environment, and therefore the effects on human health, has grown exponentially in the last 100 years, catalyzing the growth of modern medicine, healthcare policies, and sanitary manufacturing techniques across the globe. In the 1840’s, English intellectual and researcher Sir Edwin Chadwick began documenting the relationship between the deteriorating public health in British cities and the living conditions of inner city neighborhoods.\textsuperscript{12} His studies showed that open spaces and public parks would improve the quality of life both psychologically and physically, providing urbanites with a source of exercise and much needed fresh air.\textsuperscript{13} This type of research, that today is part of routine health and environmental regulation policies within cities, was unprecedented in its time. The Industrial Revolution brought about so many different lifestyle improvements, facilitating life for all levels of the social hierarchy. Positive changes of this magnitude are naturally going to be adopted by the general public. This momentum and communal sense of “having more is better” contributed to the ignorance of the relationship between man and nature. It was noted by Charles Dickens that the conditions in London during this time period were so bad that it was not uncommon for a man to change his shirt after work from the airborne pollutants from coal emissions.\textsuperscript{14} Across the pond, diplomat and philologist George Perkins Marsh conducted further research on the impact of cities on the surrounding land and water sources published in his work \textit{Man and Nature, Or Physical Geography as Modified by Human Action}.\textsuperscript{15} With this document, he sought to educate the then extremely ignorant public about the detrimental effect that industrialization and urbanization were having on surrounding ecological systems. He was emphasizing the need to respect the particulars of ‘place’ that were and still are often overlooked in the design process. During this new age of technology and innovation, Marsh was attempting to explain that man now had the power to mold his natural surroundings however he chose, and with that power comes a certain degree of responsibility to maintain the integrity of the natural environment. Modern day

\textsuperscript{12} Introduction, The Ecological City, 4-5.  
\textsuperscript{13} From Commons to Commons, The Ecological City, 26-27.  
\textsuperscript{14} Cradle to Cradle, 20.  
\textsuperscript{15} Introduction, The Ecological City, 5.
planners and designers are assuming this responsibility, attempting to restore local ecologies to their previous state, adhering to Marsh’s message.

By the turn of the century, overcrowding in cities brought about American city planning and new land use zoning restrictions in cities. Progressive idealists such as Ebenezer Howard in England and Charles Reade in Australia called for a change in the planning of cities. Howard, with his revolutionary ideal of a Garden City, called for a strategically planned town surrounded by a greenbelt (uninterrupted natural landscape). These new towns would balance the amount of industrial, residential, and commercial areas within the town in order to preserve a higher quality of life than that which currently existed in cities. This vision was quickly realized in America during the international Garden City movement, resulting in towns such as Radburn, New Jersey and Jackson Heights, Queens, New York. The Great Depression hindered more of these projects from being realized, however. The fundamental idea behind all of these theories was still a long way from our current views on sustainability. The Garden City and City Beautiful movements failed at unifying the urban dweller with the landscape, essentially taking a step backwards with large-scale geometric plazas reminiscent of the cities of the Italian Renaissance. These spaces did not function well ecologically or socially, often alienating the poor and lower class from the wealthy who could afford to live near these spaces or spend the free time relaxing in the open space. Increased scientific knowledge, technology, advances in medicine, and other practices that we take for granted would have boggled many of these influential minds of the past. They still were lacking in an understanding of what I think is an ideal relationship between city and nature: that urban and natural environments make up one single entity that should be treated as such.

Influential planner, idealist and architect Le Corbusier had a vision of the house as “a machine for living.” The current shift towards sustainable design practices are attempting to force people to see the city as a complex organism with many interdependent systems and parts, all of which cannot function properly without one another. In order to paint a better picture, allow me to present you with an example. Picture your seventh grade biology textbook diagram of the cross-section of the human epidermis. The built environment is essentially an outer covering of the natural landscape, but instead of
protecting the materials and processes vital to life that are below, it ignores the fact that it has a function in relationship to the specific ‘place’ and natural environment. Our skin has a specific structure that relates to its function. Buildings, parks, greenway corridors, and other public infrastructure can be re-designed with this concept in mind, functioning within the larger ecological system of which they are a part. This would be the second giant leap of mankind, away from the previous planning methods of mid-20th century planners such as Robert Moses, who placed highways, housing projects, and bridges wherever they felt necessary, glorifying structure and ignoring function.

Conservation and protection of natural habitats have been on the national agenda in the US since the reign of President Teddy Roosevelt, who was greatly influenced by the writings of George Perkins Marsh. President Roosevelt established the basic framework for the national parks, forest and wildlife refuge system in the United States. He and his chief advisor, Gifford Pinchot, were among the first governmental figures to suggest placing limits on natural resources. American industry was quickly approaching its peak, and it was a common belief among the American population that natural resources were unlimited in number, and that nature was here at our disposal. These policies challenged these beliefs, and instilled a new dogma of conservancy, the predecessor to sustainability and resiliency. Evolving from this idea of *utilitarian conservancy* established by Roosevelt, geologist and author John Muir opposed these policies, arguing, “that nature deserves to exist for its own sake” and that man is just a small part of a larger ecological system. His philosophic and even spiritual attitude towards man’s relationship to the environment is referred to as *biocentric preservation*, emphasizing the natural rights of all organisms to exist and pursue their own interests. I consider this to be the seminal ideological theory for sustainability. Starting with the inherent selfishness of mankind, Muir bluntly states that humans have little regard for their surroundings, and have planned their society in an almost juvenile fashion in terms of ecological conservancy. Influential author and ecologist Aldo Leopold wrote many works based upon his Land Ethic, defending the integrity of the natural landscape and adding further comment to man’s role within the larger biotic community. In his essay

collection *A Sand County Almanac*, he states, “In short, a land ethic changes the role of *Homo sapiens* from conqueror of the land community to plain member and citizen of it. It implies…a respect for the community as such.” The land ethic aims to include non-human members in the global ethical community in the hope that people will treat their surrounding environment with more respect, ultimately raising ecological consciousness. Literature and “coffee table books” have continued to spread the message of conservancy and sustainability. In 1962, Rachel Carson published *Silent Spring*, informing the public of the harmful effects of pollution and toxins on the environment and on humans as well. Intellectuals, urbanists, architects and designers all began to realize the negative implications that previous planning methods have on the quality of life within cities. In 2009, the effects of these activists and writers can be seen, but not always felt. New sustainable planning tactics and manufacturing techniques will raise widespread community environmental awareness, encouraging the adoption of a more resilient way of life within the city of the future.

Psychological, market and communications/media research demonstrate that people relate to something that they can see or touch better than an idea, common belief, or spoken word. With this in mind, sustainability must be made tangible and visible, beginning with the introduction of more green-space in dense urban neighborhoods that are in need of the most repairs. The first call for more green-space within the city came in the mid 19th century, led by influential landscape architect Fredrick Law Olmstead in New York City. Central Park and Prospect Park, his two most famous designs, were meant to present all citizens with equal access to nature within the urban setting. Continuing in this tradition, current landscape architects are placing more emphasis on the natural state of the environment, rather than just green-space. Maintaining the heritage of local ecosystems often leads to more productive and healthier systems, consequentially providing a healthier urban environment for humans. It was not until the 1960’s that current views on sustainable planning began to considerably take shape. Rutherford Platt describes the policy shift in his essay *From Commons to Commons: Evolving Concepts*, “…the focus of the new environmentalism shifted from the city in the

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17 *A Sand County Almanac*, 204.
1960’s, to the nation in the 1970’s, to the planet in the 1980’s, with a consequent weakening of advocacy for traditional urban planning.”19 The advent of groups such as the Sierra Club, the Wilderness Society, Greenpeace, and the Trust for Public Land throughout the 20th century have shown a significant amount of public interest in environmental conservation and restoration efforts. In 2009, the focus still remains on the global scale, but now groups at various socio-economic levels are tackling this issue from the bottom up, with the hope that many small changes can lead to a larger change. Multi-national corporations such as Wal-Mart and DuPont have drastically changed the day to day operations of their companies, realizing that certain “eco-efficient” shipping and manufacturing processes and materials are not only better for the environment, but are also saving them millions of dollars annually. As more and more grassroots community efforts and multi-national corporations become environmentally conscious, the beacon of hope for the future sustainable city continues to shine through these dark economic times.

On the local level, certain “Eco-Communities” are popping up all over the globe. One such example of this is the Beddington Zero Energy Development Project, located on a 4-acre former wastewater treatment plant outside of London. Known locally as BedZED, this complex, made up of 99 3-story housing units, is “powered exclusively by solar energy and biomass, treats all wastewater on site, and offers a range of lifestyle amenities demonstrating that everyone on Earth can live in this fashion.”20 Small communities such as BedZED have paved the way for larger scale projects that seek to incorporate sustainable practices to all facets of community life: social, economic, cultural, and obviously ecological. ARUP Consulting Engineers and Architects, one of the leading architectural and engineering firms in the world, has come up with a design of the first sustainable ‘eco-city.’ Construction of Dongtan, China began in 2005, with the expected total completion to be some time around 2050. The aims of the design are to remain as close to carbon neutral as possible, and incorporate “energy production from wind, solar, bio-fuel and recycled city waste. Carbon neutrality means that you have net-zero carbon emissions, essentially living free of fossil fuels in all areas of private and economic processes. Clean technologies such as hydrogen fuel cells, solar and wind

19 From Commons to Commons, The Ecological City, 21.
20 Ecological Design, 11.
power will power public transportation throughout the city. A network of bicycle and footpaths will help the city achieve close to zero vehicle emissions. Farmland within the Dongtan site will use organic farming methods to grow food.”

This large-scale project is currently revolutionizing the way that we currently view the relationship between sustainability and urban planning, and is working proof that these types of sustainable projects are not restricted to a neighborhood scale. In Denmark, one of the leading sustainable and carbon neutral advocators, the small island of Samso with a population of over 4,000 is completely carbon neutral.

The primarily agrarian based economy runs on wind turbines and solar panels, while homes are heated by a series of underground pipes that distribute heat created by burning of plants that give off zero carbon emissions. This community is a model for others around the world, showing that a small island of the coast of Denmark is more sustainably advanced than every other city on the planet.

An artist’s rendering of Eco-City Dongtan, China Final Phase. www.arup.com

http://www.arup.com/eastasia/project.cfm?pageid=7047
The three projects mentioned above are excellent examples of how sustainability can be the core design principle on a large scale. The metamorphosis of the planning process is visible in many new projects, but in order to tackle regional problems of environmental negligence, one must begin to look towards the repair of existing urban areas. This new agenda is peculiar, in that the design process is essentially being reversed. That is, past planners molded the built environment around the natural landscape, and current restoration and re-development designers must reintroduce the natural environment into the urban landscape. Urban landscapes are being transformed, old buildings retro-fitted, to reduce our impact on the Earth, starting from the bottom up. We can design with nature, minimizing the effects of industrialization and urbanization on local ecosystems, striving to maintain the particulars of ‘place’ within cities and neighborhoods. Michael Hough phrases it much more eloquently in his essay Design with City Nature, “…man-made works should be designed to produce a net gain in environmental quality and in the overall quality of life. It implies both social and ecological diversity. Sustainability involves the notion that natural systems, influenced by and influencing city form, are as much a part of the urban environment as they are of the ‘unspoiled’ landscape beyond city limits.” Sustainability fosters the strengthening of the relationship that should exist between people, the natural environment and the dignity of ‘place.’ We need to re-examine our relationship with the environment, and repair what Sym Van der Ryn and Stuart Cowan call “Dumb Design.” This method has taken over the realm of design, using standard “templates” over any landscape, not taking into account the health of human communities and ecosystems, or the creation of a unique ‘place’ with a given design.

The most radical, yet the most intriguing, solution to our design enigma is the “Eco-City” proposed by Richard Register in his book Ecocities: Rebuilding Cities in Balance with Nature. His ideas, accompanied by several extremely effective sketches, force the reader to prioritize, and think about where and how life should be lived in the future in the midst of this global environmental crisis. He suggests a U-turn in city planning, placing limitations on sprawl and effectively reducing our reliance on the

automobile within cities. As seen in the image below, his vision of the city is a leap away from past planning and architectural methods, relying heavily upon vertical construction, denser urban areas, increased pedestrian and bikeways, and more reliance upon public transportation. His representation of “Ecocity” San Francisco is extremely intriguing, emphasizing rooftop gardens, integrated foliage and trees, as well as streams and rivers flowing through downtown areas. His proto-type ecocity is based around public transportation hubs, dense mixed-use towns, vertical construction, and increased pedestrian and bicycle travel. Projects such as the Putnam Railroad Corridor Restoration Project are the first step to creating a proto-type ecocity, introducing a greenway and riparian corridor in close proximity to a mixed-use zoned neighborhood with adequate public transportation. A public project of this magnitude raises awareness throughout all levels of the community, from children, to parents, to business owners, to community leaders and developers. Register’s ‘Ecocity’ is the ideal portrait of sustainable utopian urbanity, but bottom-up projects and programs are the sparks that can establish the need for sustainability to be a priority in all communities.

Consider the city within the jurisdiction of James Lovelock’s Gaia Hypothesis (the ecological theory describing the Earth and it’s processes as one giant organism). In his book Gaia: A New Look at Life on Earth Lovelock defines Gaia as, “a complex entity involving the Earth's biosphere, atmosphere, oceans, and soil; the totality constituting a feedback or cybernetic system which seeks an optimal physical and chemical environment for life on this planet.” 24 According to this theory, the city is much more than a grid of buildings and streets. It is a part of a larger living organism, with many interconnected parts and pieces that rely upon one another to maintain a healthy equilibrium within the system. The sustainable city, in this case neighborhood, could be the prosthetic lung making reparations for the damage done by the pollution of industrialization and urbanization. The verb “to sustain” is defined as, “to keep up or keep going as an action or process; to supply with food, drink, or other necessities of life.” Man created cities; therefore, it is his duty to sustain the health and proper function of the urban system. Human health problems, global warming, carbon emissions, water

pollution, invasive plant species, and all problems related to suburban sprawl are results of our petroleum based economic system that must change. Educating the public on a more sustainable lifestyle can have immediate benefits. We are already in the midst of the so called “Green Craze,” where it is becoming chic and hip in some circles to, for instance, purchase re-usable canvas bags from the supermarket, shop for organic food and locally grown produce, recycle at work, and even purchase products made from recycled or organic materials. This is a good thing, perhaps the best possible thing that could happen for the sake of sustainability. The American public is gullible enough for the ShamWow! to make millions of dollars on “made for TV” ads, imagine what could happen if Beyonce and Jay-Z put solar panels on their house and started composting their trash at their vacation home in the Hamptons. All of the sudden it’s “cool” to go green. The market exists, now it is time for companies to start investing in sustainable design and manufacturing methods, and funding long-term public projects raising environmental literacy in the general population. The Japanese automobile company Toyota has now sold over 1 million of its Prius gasoline-electric hybrid cars, with annual sales in 2008 rising 4% amidst the global auto crisis.\(^{25}\) The increased number of hybrid automobiles, as well as an increased number of cyclists, is proof that people are bringing a more sustainable lifestyle to the mainstream. However, hybrid cars make up less than 3% of the

\[^{25}\text{http://www.treehugger.com/files/2008/05/toyota-prius-hybrid-car-1-million-sold.php}\]
automobiles on the road, and only some cities and towns provide adequate bike lanes on major roadways, further proof that there is much work to be done.

Sustainability, with its global consequences, always starts at the local level. As McDonough and Braungart state, “… all sustainability is local. We connect them [human and industrial systems] to local and material energy flows, and to local customs, needs and tastes, from the level of the molecule to the level of the region itself.” Designers need to integrate the built environment into the natural environment, keeping with the natural heritage of the site. In the case of the Putnam Project, however, nature is to be stitched back into its rightful locale, with Tibbet’s Brook as the seam. Urban ecosystems are among the most damaged. For some reason, these systems have been ignored and deemed helpless because of their centrality within the urban system. Over half of the American population lives in cities, or immediate suburbs, making up a larger metropolitan area. This number is expected to grow around the world as populations grow. As cities continue to over-crowd, stress to the local biotic systems will be excessive, placing a greater need for some sort of compensation to the environment. The answer is planning, as Richard Register once again suggests, based on ecological principles, taking into account the functionality of local biota. Imagine a sauna for a moment. The constructed boundaries of the sauna itself represent the urban system. Steam is distributed to maintain a relative state of equilibrium, as to not get too hot or too cool. Our bodies absorb the heat, so the more people inside the sauna, the harder the heater has to work to keep it warm by pumping steam in. The same is true for local ecosystems. Population increases cause stress on local systems that will at some point collapse. The solution to this inevitably lies in urban ecological restoration projects. Cities all over the world have buried their local streams and rivers, with concrete urban strata inhibiting these natural systems from performing their basic biotic duties. These riparian corridors function as natural filtration systems, and on a larger scale can even function as successful waste treatment sites. The re-introduction of these ecosystems to urban neighborhoods promotes a more resilient relationship to the local system,

26 Cradle to Cradle, 123.
27 Ecocities, 6-8.
maintaining a certain level of balance that helps to reduce our impact on this fragile ecology.

Since the 1970’s, there has been a movement in the art world known as Environmental art. Beginning with influential minimalist artist Robert Smithson’s *Spiral Jetty*, and Alan Sonfist’s *Time Landscape* in the West Village of Manhattan, these artists sought and seek to strengthen the ever-fading connection between people and the environment. Many of these artists seek to achieve some sort of goal with their work, from awareness, to community development projects, to public art works. Two artists in particular have done extensive work with ecological restoration, combining this scientific process with various forms of public art and personal expression. One project that directly correlates to the Putnam Project was completed by Betsy Damon in Chengdu China. The Living Water Garden is a public recreation space, natural wastewater treatment system, environmental art exhibit, and ecological restoration project all in one. This unique design was the first public environmental outreach project of its kind in China, incorporating new sustainable wastewater treatment techniques in a city that was overcrowded and polluting their drinking water. In a similar way, the Putnam project would put the environmental restoration of Tibbet’s Brook on center stage for the local community, with these public spaces functioning as learning and recreational centers.

*Aerial view of Damon’s “Living Water Garden”, Chengdu, China.*
Riparian ecosystems can serve a variety of functions within an urban system, having social, ecological, health, and economic implications on the human experience in the area. Urban ecosystems undergo an immense amount of change over time, which causes them to adapt to current conditions caused by urbanization. However, nature has its own way of preserving some sense of order amidst the chaos. This natural phenomenon is known as ecological resilience, a term that is slowly replacing sustainability. Sustainability, by definition, implies the maintenance of the current state of things, which is, in fact, not the goal of sustainable alternatives at all. From an ecological context, it can be defined as the ability of an ecosystem to maintain the basic processes that support life on Earth. Ecologists and researchers, myself included, prefer the term resilience, “the capacity of a system to undergo disturbance and maintain its functions and controls, and may be measured by the magnitude of disturbance the system can tolerate and still persist.” Peter Newman and Isabella Jennings have put forward three strategies that would lead to more resilient ecosystems: Diversity, panarchy, and ecological memory. Diversity and ecological memory aid one another. Diversity of both plant and animal species “provides the capacity for the ecosystem to regenerate to the

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28 Cities as Sustainable Ecosystems, 99.
same state or reorganize to a different state.”^29 This regeneration is facilitated by what they call ecological memory, which “comprises the species, interactions, and structures that enable ecosystems to reorganize.”^30 The ecological memory of a certain area, therefore, determines how quickly and effectively a system can redevelop. Panarchy is the catalyst in the process. It “describes a pattern of adaptive cycles nested in space and time”^31 that enhance the interdependence of individuals within the community. These cycles are stimulated by other processes that disturb them, causing the system as whole to reorganize, resulting in an increase in ecological resilience and the strengthening of ecological memory within the biotic community. The area adjacent to the Major Deegan Expressway is in desperate need of repair. With these strategies in mind, this project aims to rebuild this ecosystem, and give it the proper ecological components to allow for successful recovery based around the principles of ecological resilience.

Chapter III: Principles of Riparian Greenway Design and Implementation

“Ecological design begins with the intimate knowledge of a particular place. Therefore it is small-scale and direct, responsive to both local conditions and local people. If we are sensitive to the nuances of place, we can inhabit without destroying.”

- Sim Van Der Ryn and Stuart Cowan. Ecological Design.

Nature is a circular system. The Law of Conservation of Mass states that matter cannot be created or destroyed in a chemical reaction in a closed system. Evolution and adaptation have led human beings to the top of the food chain on Earth, inhabiting every continent except Antarctica, plundering the Earth of its resources in every type of biome. The by-products of our industrial processes do not, as everyone should know, simply disappear into thin air. It is interesting to note the date that the Law of Conservation of Mass was formally articulated (1789)^32, and then to consider how it was ignored in regards to the environmental effects of industrialization in the following century during the Industrial Revolution. The biosphere, from the bio-physiological point of view, is the term used to describe the global ecosystem that encompasses all living things, the

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^29 Cities as Sustainable Ecosystems, 101.
^30 Cities as Sustainable Ecosystems, 102.
^31 Cities as Sustainable Ecosystems, 99-100.
surrounding environment, their life processes, and the natural cycles that support them. The biosphere is a self-regulating system, composed of many smaller systems within it, all working to sustain one thing: life on Earth. Thoroughly noted in the previous chapter, the industrial processes that support human life are destroying the biosphere, drastically altering (in some cases outright destroying) ecosystems and the organisms and processes that have supported them for millennia. The natural elements vital to the upkeep and regulation of local systems have been steadily eliminated from cities, making urban areas a priority for ecological restoration efforts. The main focus of this chapter is to define, in layman’s terms, the major ecological and design principles behind greenway structure and function, while also presenting some real world examples of completed greenway projects. The ideology of this product was molded by many of the scholarly opinions and theories presented in Chapter II, focusing on the re-introduction of green space and ecologically resilient practices into urban communities.

Environmental design involves a very precise, well-conceived planning strategy, often shaped by Aldo Leopold’s idea of a Land Ethic. Environmental designers need to know, first and foremost, that they are responsible for maintaining the natural heritage of the site while achieving their architectural goals. The design itself will naturally have social, ecological, and economic implications, all of which must be considered equally in the design process. With this proposal, I seek to achieve the highest level of responsiveness from the human and non-human community with the highest level of creativity, by creating a symbiotic environment where the two can coexist and flourish. Although New York City ranks 20th in the “Greenest Cities in America” list put together by Popular Science Magazine in 2008, many lower income neighborhoods lack adequate access to nature and are often overlooked. NYC has one of the most extensive urban parks and recreations systems in America, which includes 7 parks over 500 acres. Van Cortlandt Park is among these, with an area of roughly 1146 acres.\(^{33}\) The density of New York City, however, puts a consummate amount of stress on the local ecosystem, expediting degradation of soils, underground water systems, wetlands, forests, and above ground streams and rivers. New York’s wetland landscape, although rich with life, was

\(^{33}\) [http://www.infoplease.com/ipa/A0933260.html](http://www.infoplease.com/ipa/A0933260.html)
an obstacle for urban developers. The previous solution to this was to either ignore previous biotic communities or to re-route these natural systems in the most convenient and cost effective way possible. In the case of Tibbet’s Brook, the solution was to build a tunnel to house the stream, which currently runs underneath Broadway running towards the Harlem River. The area that is now the Bronx used to contain ecologically rich wetlands and marshes that hosted a variety of aquatic, avian and small mammalian species. The reintroduction of a greenway to this area, coupled with the day lighting of Tibbet’s Brook would extend the green corridor outside of Van Cortlandt Park, enhancing the quality of life in this dense, and often neglected, neighborhood in the Bronx.

Although creative responsibility often lies in the private sector, the funding and authority to carry out these projects is often a public responsibility. With this in mind, planners and city leaders need to divert from the idea of isolation from nature and support a new public agenda to reconnect with the environment via public works projects and restoration efforts. While conservation efforts are moving from a local to a global scale, I believe that they are one in the same, ultimately attempting to resolve the same problems. A new ethical and philosophical approach has been introduced to environmental design, placing equal emphasis on human and environmental factors. This holds with a design strategy proposed by Ron Jongman and Gloria Pungetti that they refer to as the “de-anthropisation of the plan.” As they state, “It consists in giving less weight to the anthropogenic features and more to the ecological characters of the site. Moreover, it considers the plan as a tool to know and improve the conditions not just of the human, but of the biotic and abiotic components of the landscape.”34 The Bronx, and New York in particular, is the quintessentially planned city, Manhattan being the model grid city. The grid ignores the individuality of a site, resulting in the destruction of ecosystems and lack of biodiversity in urban landscapes. Pungetti and Bernardino Romano performed a study on the relationship between the natural and cultural elements of Italian landscapes. The chapter is entitled ‘Planning the Future Landscapes’ because they believe that the country’s national agenda to maintain cultural heritage of the landscape is a model for

34 Ecological Networks and Greenways, 110.
other nations to build upon. This ethical approach to land-use must be implemented in the US, and should start where the need is the greatest, neglected neighborhoods in cities. The value of land in Western Europe is so much greater due to the lack of space and the fact that large numbers of people have been living off of this land for thousands of years, as opposed to relatively infantile American society. In this time of economic crisis, government funds should be used for infrastructure and quality of life improvements to the older, manufacturing cities before they continue bailing out Wall Street Executives who have been sending American jobs overseas for the last 30 years. Construction of these greenways would bring with it various economic improvements for the local community in the form of “green collar” jobs, which will be discussed in Chapter IV.

One of the key components to a successful greenway is the establishment of connections between untouched or undeveloped areas, extending the borders of the ecological network. One major design goal of this project is to ultimately reduce the impact of development so that these natural corridors can exist within and around urban areas, effectively eliminating unnecessary sprawl and suburban development. The concept of an “Eco-Utopia” (previously mentioned by Richard Register) would involve concentrating people into well-planned, dense urban regions surrounded by vast greenbelts and natural protected landscapes. Ebenezer Howard developed the greenbelt concept in 1898. It is meant to regulate sprawl by surrounding the urban center with parkland around the entire periphery. This concept has evolved into the idea of an ecological corridor. Howard’s concentric city plan could never be realized while maintaining the integrity of the land, so the most logical solution is the ecological corridor (an uninterrupted stretch of the natural landscape), widespread throughout Western Europe and parts of the United States. These ecological corridors serve many purposes. Rural corridors tend to be much larger, and often function solely for large-scale conservation of multiple species of plants and animals, while urban corridors tend to be smaller and focus on ecological restoration and establishing ecological connections between various neighborhoods or towns. The Bronx Greenway Project has been underway since 1993, and the Putnam Railroad Corridor, if completed, would establish a

\[35\text{ Ecological Networks and Greenways, 107-108.}\]
\[36\text{ Ecological Networks and Greenways, 29.}\]
connection from the Harlem River to West Chester County, NY. The greenway provides an opportunity for the communities of southern West Chester to connect with the Bronx, providing a means of access for pedestrians, cyclists and runners. Increasing numbers of bikers, runners, and joggers are moving into gentrified areas of the Bronx, Queens and Harlem, which is in turn leading to more community advocacy movements for bike trail construction and greenway projects in all five boroughs. An efficient greenway and bike trail system is one of the criteria presented by Register for his “ecocity,” demonstrating that this is a positive step towards creating a more resilient urban community.37

It is of the upmost importance to note that greenways of all sorts, no matter the locality, have both cultural and natural aspects to be considered. The Putnam Railroad Corridor is a riparian greenway restoration project, seeking to reconstruct a creek and it’s surrounding network of wetland, trees, wildlife and native plant life. Michael W. Binford and Richard J. Karty present an excellent analysis of riparian greenway design and function in their essay Riparian Greenways and Water Resources in the collection Designing Greenways: Sustainable Landscapes for Nature and People, which will be noted frequently throughout the next section. They define riparian forests as, “corridors of streamside plant communities that shadow streams as they run through the landscape.”38 This area usually consists of moist, fertile soils, well-developed vegetation, and a healthy and diverse community of wildlife. These riparian systems are the permeable layer that exists between land and water, acting in response to varying levels of sediment, nutrients, toxins, and other materials coming downstream from upland areas. These riparian corridors are each a vein connected to the entire circulatory system of the Earth, responsible for the transfer of materials, nutrients, and also maintaining balance within the system. It is imperative that designers understand this interconnectedness when constructing greenways, and any other structure for that matter. Streams are a part of a larger system called a watershed. A watershed is “an area of landscape that drains into a stream or other body of water.” The topography and geology of the area determine the boundaries of a watershed.39 All watersheds are unique, but geologists have come up with

37 Ecocities, 18-19.  
38 Designing Greenways, 108.  
39 Designing Greenways, 110.
a set of characteristics that are useful for comparing and describing watershed shape, productivity, and functionality. They include area, length, elevation, slope, volume, and relief.\footnote{Designing Greenways, Table 4.1, 111.} The trees, shrubs and other plants in riparian forests act as buffers for the surrounding land, protecting water quality, and reducing erosion and flooding. In the highly polluted urban setting, these buffer zones are an extraordinary ecological asset to the health of the environment, often filtering out pollutants from industrial processes, surface water runoff, pesticides, and other harmful man-made industrial by-products. Below is a cross section of a riparian forest, showing the various levels above and belowground that encompasses a riparian corridor.

As you can see above, a riparian corridor generally consists of three parts: the stream channel, the floodplain, and upland communities. The floodplain is the space adjacent to the stream that is frequently flooded with water. Sometimes referred to as the geomorphic floodplain, this is the area where a stream flows over time, limited by topographical changes in the landscape such as uplands and terraces on either side of the stream.\footnote{Designing Greenways, 114.} The context of the particular stream within the larger watershed is important when designing a riparian greenway corridor. In this case, Tibbet’s Brook is a second order stream, meaning it joins two other streams. This is an important design factor to

\textit{Cross-section of a riparian forest,}
consider. Since we know that this stream is a direct pathway to the Harlem River, we can assume that a large amount of nutrients and materials flow through this stream. A newly restored riparian corridor will improve the quality of water flowing downstream from Westchester County and the Bronx. Along with maintaining water quality, riparian zones have four other major ecological functions noted by Karty and Binford: hydrologic regulation (water quality), filtration of nutrients and sediment, removal and dispersal of nutrients, regulation of water temperature, and provision of aquatic habitat. Streams and other waterways are constantly exchanging materials between different members of the biotic community. Countless species rely on the fertile soils, highly oxygenated water, and seasonal floods characteristic of riparian buffer zones. These streams become vectors for the transfer of energy, sediment, nutrients, and other materials through the ecosystem, also providing an outlet for the movement of fish, animal and plant species throughout the system.

Vegetation is essential to a properly functioning riparian system. Native plant species give the corridor the greatest opportunity for success, drawing on the ecological memory of the site. Deep-rooted plant species and other streamside vegetation slow down runoff and flooding, horizontally dispersing water to the soil, slowly releasing it into the underground water table. Vegetation also plays a significant role in regulating water

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42 Designing Greenways, 115
43 Ecological Networks and Greenways, 22.
temperature in small streams. Tall streamside vegetation can provide shade for shallow waters that would otherwise become too hot to support certain species in the summer months. Streamside vegetation also stabilizes and contributes to the diversity of the habitat of the stream. Most freshwater aquatic organisms thrive in cool, highly oxygenated water. As water heats up, the oxygen content goes down, therefore prohibiting many organisms from thriving without these native plant species. The density of the vegetation in the Tibbet’s Brook project is very important, as noted by Karty and Binford, “For very small streams, the density of the vegetation, and thus its ability to produce shade, is the only characteristic of the riparian vegetation important in its ability to control temperature. In these cases only, the overall width of riparian corridors is not important for temperature control as long as the density of vegetation is high.”

Since our stream is relatively small, this valuable information insists that the Tibbet’s Brook restoration project consist of dense streamside vegetation due to the narrow space allotted along the side of the highway. Streams and their adjacent vegetation also maintain sediment and nutrient levels. Vegetative buffers filter pollutants before they can get further downstream after the system is flooded with an influx of these materials during a storm or flood. The introduction of vegetation to this water system would be an enormous upgrade from the current sewer pipe, which can be seen below. After rainstorms and at high tide, the stream often overflows into the adjacent sewage line, causing the freshwater to mix with the sewage. This reconstruction project aims to give this waterway the proper respect it deserves, and let it support a living community rather

Current state of Tibbet’s Brook, tunnel located underneath Broadway. [www.undercity.org](http://www.undercity.org)

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44 Designing Greenways, 125.
than act as a community toilet. This increase in nutrients from human activities causes *eutrophication*, characterized by algal blooms and excess invasive plant growth in streams. This is caused by increases in nitrogen and phosphorus to streams from sewage disposal, synthetic fertilizers, cultivating nitrogen-fixating crops and erosion.\(^ {45} \) The stability and health of this system is ultimately contingent upon how much we manipulate it, that is, how much “stuff” we put into the water. By day lighting Tibbet’s Brook, we will effectively separate this natural ecosystem from our detrimental wastewater, allowing the riparian corridor to complete its basic filtration processes naturally.

There is much more to effective greenway construction than fencing off a parcel of land and keeping people off of it. Attention must be paid to site-specific details, such as soil type, native vegetation and wildlife, corridor width, and previous environmental conditions of the site. Karty and Binford suggest some other components in regards to the ecological history of the site; “the geomorphic, hydrological and vegetational components of the original riparian zone”\(^ {46} \) should be studied and re-implemented. Ecologist and topographer Eric Sanderson and Diana LaBrauna of the Wildlife Conservation Society have mapped out the historical ecology of the Bronx River Watershed in the *Manahatta Project. I* intend to use the plant and animal species

\(^ {45} \) Principles of Environmental Science, 43-44.
\(^ {46} \) Designing Greenways, 141.
presented in this document as a guide to the reconstruction of the biotic community of Tibbet’s Brook, since this site is only about three miles from the Bronx River. The first step that they suggest to take is to establish a “reference ecosystem” in order to create an ecological map of the geography, flora and fauna of New York before industrialization. In order to reconstruct an ecosystem, we must educate ourselves as to what types of species lived there in the past. According to Sanderson, “Establishing reference ecosystems is an important part of any ecological restoration project. Reference ecosystems may be based on existing similar ecosystems that are functioning with greater integrity than the site to be restored, or they may be based on historical analysis of the restoration site.”

This extensive ecological research project is extremely valuable to a restoration project, listing speculative plant and animal species from a variety of sources and time periods. The putative list contains 1,906 plant species native to the New York area. Also, Sanderson states, “The putative plant list of the historical lower Bronx River is likely liberal in several respects. First it is better described as a New York City-wide list, than one limited to the lower Bronx River.” This historical knowledge of previous geology, vegetation, and animal life, combined with understanding of greenway design principles brings us to the final step of this project: Implementation of the greenway.

As these natural processes are clearly defined and one begins to contemplate the environmental effects of the daily American routine, the Gaia Principle seems like a worthy and viable theory that is to be taken seriously. Since I began this research project, I have noticed myself making small changes to my lifestyle, knowing the larger ecological implications that they might have. A heightened ecological awareness in the general public could bring about changes that could have a positive impact on the environment. Obvious pollutants such as the diluted sediments from heavy metals, road salts, and other hazardous chemicals can be filtered by these riparian communities, preventing these harmful substances from entering the air we breathe, the food we eat and the water we drink. One excellent example of greenway introduction into a metropolitan urban area has been underway in Staten Island, which began in 1997. The award winning Staten Island Bluebelt Program is a natural storm water collection and drainage system.

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47 Manahatta Project, 2.
48 Manahatta Project, 28.
that incorporates all natural systems (ponds, streams, wetlands) to naturally filter and manage storm water for over one third of Staten Island. The natural drainage system saves over 10 million dollars annually, covering 16 watersheds and over 10,000 acres of space.\(^\text{49}\) This program is proof that ecological restoration efforts can provide both ecological and economic benefits for communities.

Tibbet’s Brook is the small stream that will serve as the natural spine to this restoration project. It currently runs beneath Broadway, adjacent to the Major Deegan Expressway, serving as a sewer outlet. Tibbet’s Brook outfall includes the combined sewer outlet (CSO), which includes floodwater, rain and wastewater. The problem here is that the sewage system parallel to Tibbet’s Brook was built before the age of sewage treatment plants. Waste was simply put into the river and disposed of in that manner. Wastewater Treatment Plants were built to treat this sewage water; the largest of the Bronx plants is located in Hunts Point. When it rains, these sewage pipes, which include Tibbet’s Brook, combine with other local sewers in the watershed to flood the sewage to these plants. Tibbet’s Brook is a part of a larger system composed of runoff, rainwater and people’s toilet water from the Bronx River Watershed, and ending up in the Broadway Sewer and eventually in the Harlem River. The solution to this problem is to bring Tibbet’s Brook back above ground through an ecological restoration process known as “day lighting.” Day lighting is a different breed of animal from the everyday restoration project because we need to extract the natural stream from the man-made structure currently housing it, in this case a sewage line. In the case of Tibbet’s Brook, the stream currently flows from Van Cortlandt Pond south underneath Broadway. The first step to day lighting Tibbet’s Brook would be to indentify the historical location of the stream, which has already been done for us by the Manahatta project maps. Once the riverbed location is decided, a proper riparian channel must be constructed using rocks and other materials. Native vegetation, also included in the Manahatta project, will be planted along the bank of the river to prevent erosion and act as a natural buffer between the city and this newly introduced stream. Below is a map showing the historical location of Tibbet’s Brook, in blue, with the current project area highlighted in yellow, and the

Major Deegan Expressway highlighted in white. The day lighting process is the keystone environmental design strategy for this project. Without the stream, the greenway will have a significantly lower effect on improving the quality of the local environment. There are examples of day lighting projects all over the US, with one example particularly close to the Tibbet’s Brook, perhaps even in a related watershed. The city of Yonkers is currently undergoing a massive day lighting project of the Saw Mill River through downtown Yonkers, yet another example of using ecological restoration as a means for urban renewal in older communities.

Development projects often encompass a variety of bureaucratic processes before a design can be realized. In the case of an ecological restoration project, developers need the assistance of surveyors, environmental scientists, biologists, ecologists, and the approval from the city government. In order to estimate the number, type and quality of living species in a stream, environmental scientists should perform a study checking for the Index of Biological Integrity of the area (IBI). The IBI is a data collection technique that allows scientists to determine the quality of the ecosystem, that is how much damage has been done, by identifying the species currently living there and compare them to the species that live in a similar ecosystem that has been relatively untouched by development. This technique is mandatory in restoration efforts. In order to convince the government that a project will not harm the local environment, designers must also create an Environmental Impact Statement (EIS). This statement informs the decision makers (community leaders, developers, city council members) of the environmental impact of a given project on the human population of the area. The first step is an Environmental Assessment, an estimation of the possible impact, and state whether you do or do not believe that there will be a significant environmental impact. After enough data is produced, those responsible can determine whether the design will have a positive or negative effect on the environment. In the case of the Putnam Railroad Corridor Restoration Project, we seek a positive declaration to the community that this greenway will improve the aesthetic, health of the system, and health of the people that live there.

Aside from the aforementioned environmental effects, a riparian greenway in
the Bronx would undoubtedly bring with it a number of socio-economic improvements, as well as an outlet for public recreation and leisure. The introduction of a fully functioning ecosystem that is usually only characteristic of a nature reserve or suburban park would also improve the community aesthetic, and provoke a sense of community pride. The next chapter is about establishing a sense of *locus*, the Latin word for ‘place,’ around this ecological restoration project. A public project of this nature evokes community outreach and advocacy, increasing environmental literacy and ecological education of the general public. This project can be something that the citizens of this neighborhood can be proud of, and simultaneously improve the state of the environment and the quality of life.
Chapter IV: Establishing a Sense of Locus: Pride Resulting from Place

Out of all those kinds of people
You got a face with a view
I'm just an animal looking for a home
Share the same space for a minute or two

- Talking Heads

In order to establish a connection between classical attitudes towards the landscape and the modern sustainability ethic, I have chosen to focus on the characteristics of the locus, the Latin word for ‘place’ in this chapter. I have always been intrigued by the ancient’s belief in nature-gods, and the effects that this had on their city planning, governance, and militaristic strategies. The Greeks, and then the Romans, always built the acropolis (city center housing major authoritative and municipal structures) at the highest point of the urbs (city), letting the natural layout of the land determine the focal point of their city plan. They had certain requirements for a city, using their knowledge of the landscape and their respect for the gods to determine the site. As a place changes, our attitude of how we view the place changes. This implies that we, in fact, have changed as a result of the metamorphosis of the locus. When this change occurs within a larger human community, the popular attitude towards that place should also change. By definition, a place is specific and unique, since no two things in nature are exactly the same. The specificity of a place encompasses the geology, topography, ecology, climate, altitude, and human and non-human inhabitants of a certain locality. The earliest human settlements adapted to the natural landscape by using the materials and resources that defined that specific locus. In the highly urbanized world of 2009, one is often hard-pressed to define a certain community or neighborhood within a larger urban sphere, unless it has retained some sort of cultural or ethnic aesthetic. For example, Little Italy in the Bronx is a unique cultural enclave that has thrived around the delicious food, family style restaurants and friendly neighborhood atmosphere created by generations of family run businesses. However, in the age of suburban sprawl, these tight-knit ethnic communities are quickly becoming the fossils of a previous urban society buried within dilapidated and neglected neighborhoods in America’s older
cities. Suburban development is characterized by these “little boxes on the hillside” developments, where entire areas are stripped of their identity to make room for the endless quagmire of suburbia: strip malls, highways, shopping centers, gated communities, parking lots. How can cities maintain or re-establish this sense of pride and individuality in a place?

The answer to this question is complex and multi-faceted, however, I will attempt to answer it. First, I believe that a portion of the blame can be put on architects, developers, and planners who created these suburban communities packed with homes on one acre lots, deciding that simply changing the color of the aluminum siding was enough diversity architecturally. Born and raised in the suburbs, then having traveled Western Europe studying architecture in Italy, my idea of the city was forever changed. Growing up, I never thought twice about the fact that all 40 houses in my neighborhood were laid out exactly the same, with different colored shudders, probably chosen because they were the cheapest brand on the market at the time. In a very interesting essay entitled “Place: Where Community and Environment Meet,” Aaron M. McCright and Terry Nicholas Clark define these bland suburban locales as “non-places,” due to the fact that they are “centrally conceived and controlled spaces lacking in distinctive substance.” These “non-places” often characterize a significant portion of the American metropolis, and can be reconstructed based around sustainable design principles with emphasis on cultural and environmental historicity of a place. Traveling the Italian peninsula, I was exposed to a variety of cultural landscapes. It amazed me to see that people were living in 500-year-old towns, still using the same roads, staircases, and churches. My study of architectural history has led me to the conclusion that the aesthetic present in European countries, especially Italy and France, was created around the idea that architecture is a form of art. Architects like Alberti, Brunelleschi, Palladio, and Bramante, the innovators of architectural form as we know it, created some of the most symbolic and revolutionary structures of their time. These men were artists enthralled with the relationship between nature, man, and the landscape. In the present day, I have noticed that the most prominent and influential architects and builders often times are in it for monetary gains. Many

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50 Community and Ecology: Dynamics of Place, Sustainability and Politics, 17.
newer developments, especially in Asia and Dubai, seem to be driven by our consumerist society, moving away from the functional and clinging to this ignorant sense of glamour. Andrea Palladio redefined architectural principles of symmetry, proportion and decoration in his treatise *I Quattro Libri del Architettura* (The Five Books of Architecture) in 1570. Palladio relied on ancient buildings to demonstrate his new artistic expression of architecture through his sketches and fresh perspective on these vintage structures. The relative monotony of urban forms in 2009 calls for an evolution of planning and design concepts similar to the transformation in architecture brought about by Palladio that should emphasize the individual and specific characteristics of place, redefining and expressing this new sustainable urbanism.

Andrea Palladio’s revolutionary drawing of Villa Rotunda, showing façade, plan and section. 1570.

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51 Architecture and the World: 1450-1600.
The human element of architecture often defines a place, but in a similar way, the natural landscape in a dense urban area could provide this sense of identity that is lacking in many urban neighborhoods. In a recent article in the monthly publication of the American Planning Association (APA) *Planning*, author and professor of sustainable design practices at Arizona State University Emily Talen wrote on this very topic. She comments on the need to move away from this “resource-intensive and consumer-driven” style of urban design, “We need to broaden the field of urban design beyond the domain of architects. If planners are to help develop communities that function well, accommodate different types of people, promote a sense of caring about place, and ultimately provide a more supportive and inspiring public realm, they need to be actively engaged in the urban design process.”

The planning process itself in the case of the Putnam Railroad Corridor Restoration Project incorporates this method of thought into the design. The close involvement of community organizations and neighborhood groups in urban design projects presents a challenge to the designers, but it is a necessary burden. Involving the local community directly in the design process creates a sense of importance, pride, and stewardship that would make a project such as the Putnam Line an enormous benefit to the everyday life of the community.

The loss or lack of this sense of place often is a result of the neglect and unequal distribution of public funds and benefits within the larger urban context. The term environmental justice is often used to describe the ideal of fair and equal distribution of environmental burdens, ie placing a highway through the middle of bustling Bronx neighborhood. Clearly planners such as Robert Moses had no concern for this ethical approach to landscape planning. In many cases, it is easier for a community to place an unwanted structure or facility closer to a low-income, often minority neighborhood. The Bronx is no exception, home to several highways and parkways splicing through once vibrant ethnic neighborhoods home to Jews, Puerto Ricans, Italians and Irish. Increased environmental justice is often one of the chief concerns of community advocacy and non-profit neighborhood organizations working to improve the quality of life in inner city neighborhoods. The Bronx has several of these, the most well known being Sustainable

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South Bronx, The Bronx River Alliance, and the Mosholu Preservation Corporation. These organizations make a conscientious effort to raise awareness of this ecological “racism” and strive to make a change within the Bronx community. The introduction of a greenway into this Bronx neighborhood directly addresses the concern of environmental justice. It would make up for the maltreatment and neglect of past planning, re-introducing valuable green space into the urban sphere. This new agenda would also show residents that change is coming, and someone is looking out for their and their children’s well-being. The Bronx River Alliance mission statement is an excellent written example of a community based organization combining environmental justice with ecological restoration, and served as a model for the thought-process behind this section of the project.53

Keeping community-wide environmental justice in mind, this design also attempts to use the historical ecology of this Bronx neighborhood to encourage a more sustainable lifestyle and facilitate access to the environment that used to support the Native America tribes who inhabited this region before European settlement. In their book *Ecological Design*, Sim Van Der Ryn and Stuart Cowan studied the traditional cultures of indigenous peoples all over the globe, seeking to weigh their connection with their local landscape. They concluded that these indigenous peoples, who have survived on the same daily customs as their ancestors, “have achieved their longevity by structuring the smallest details of everyday life around the need to maintain the integrity of the ecosystems upon which they depend.”54 These peoples often are bound to a certain piece of land, excluded from the global economic system that supplies us with whatever we need, many times at the touch of a button. While our tomatoes that we eat in New York often are shipped from Mexico in the dead of winter, these people must find a way to grow their own food year round, enhancing their respect and need to care for the land on which they live. These traditional cultures possess a unique knowledge of their native landscape, and this sense of ecological wisdom must be brought to modern urban society. In the 21st century city, most people use nature as a recreational resource. Biking, hiking, kayaking, rowing, running, and sailing are all popular hobbies that connect man with his

53 [http://www.bronxriver.org/?pg=content&p=aboutus&m1=43](http://www.bronxriver.org/?pg=content&p=aboutus&m1=43)
54 Ecological Design, 81.
local system. This greenway would provide an accessible bike trail and several “pocket parks” where Bronx citizens can simply enjoy some fresh air, and get out of the crowded apartment for a few moments a day. We can learn from these place-centered cultures, and adapt our lifestyle by supporting local farmers markets, planting native vegetation in parks and backyards, and choosing building materials wisely in design projects. Sustainability is a culturally oriented process that relies on the involvement of local people for successful results. Modern American society may be more technologically advanced than many of these place-centered cultures, but, in my opinion, these peoples display a more viable, resilient, and knowledgeable lifestyle that is, although economically “third world,” ecologically “first world.”

Another way of achieving cultural connections through a design is by incorporating the history of a place into a design in some way. There are many examples of restoration projects in New York and all over the world were historic buildings or locations have been restored and preserved, functioning as museums or national parks. One particular type of greenway called a “rail trail” attempt, in a way, to use the past history of abandoned railroad lines to create productive greenway corridors. The station for the old Putnam Line still stands in the center of Van Cortlandt park. This structure could become a mini-museum or outdoor monument to the history of the greenway corridor, presenting passersby with a bit of history about the newly restored landscape. With over 1,200 rail trails currently in the United States alone, rail trails are built on former railroad alignments, providing local communities with productive public spaces instead of vacant eyesores. Rail trails often try to recycle or re-use some of the materials related to the abandoned railroads. In the case of the Putnam Line, I have come up with a design that reuses the train tracks, remodeling them as “green supports” complete with green walls and a passive water distribution system to facilitate plant growth. These “green supports” provide a visible historic link to the newly created corridor, while also putting an innovative sustainable design on public display. In a 2004 article of Landscape Architecture Magazine, Jim Donovan, ASLA, had this to say about the effects that rail trails can have on community character, “Railroad tracks often divided communities; rail trails provide a means of reuniting them. A successful rail trail serves as a gathering
place, providing a venue for community interaction.” Alongside of the man-made barrier, Interstate 87, this greenway can introduce productive and unifying community space to an area that was previously a divisive eyesore to the local community. Below is an image of a rail trail passing under a bridge previously occupied by a railroad, to help visualize the change that a rail trail can bring to an environment. Rail trails also are an opportunity for environmental education of the historical ecology of the land. The Silver Strand Trail in San Diego is an excellent example. This paired restoration and greenway construction project along the San Diego coast includes concrete bas-relief sculptures of local plants and wildlife, and a seating system that highlights the role of the sun in the ecosystem.

**Rail Trail.** [http://www.absoluteastronomy.com/topics/Rail_trail](http://www.absoluteastronomy.com/topics/Rail_trail)

Community level projects are often hindered by a lack of knowledge necessary to gather popular support by developers, community leaders and citizens. Matthias Gross

suggests that real-world experiments are a solution to this dilemma in an ecological restoration and design project. He defines real-world experiments as, “a means to launch an ecological restoration design project in spite of uncertainties, and uphold it without disrupting the overall process. In this framework, experimentation is a mechanism whose aim is not to overcome or control environmental uncertainty, but to live and blossom upon it.” This method of social experimentation uses what would be considered mistakes as solutions to ecological problems. Ecological restoration projects are public experiments, bringing to the forefront new knowledge from this unique form of public intervention. A restoration project such as he Putnam Line would bring together the developers, environmentalists, ecologists intellectuals, urbanists, and residents of the Bronx for a dialect revolving around community based interaction with the newly restored environment. This bottom-up approach is a step away from the previous hands-off strategy of the environmental movement to keep people away from nature in order to protect it. The two can co-exist, and an urban greenway corridor is the mechanism that allows for that interconnectedness.

With recent economic crisis in America, lower class urban neighborhoods will be hit very hard in the coming years. More qualified and often higher educated individuals are beginning to settle for service sector and blue collar jobs previously held by immigrant and minority populations. At the same time, gentrification of inner city neighborhoods is causing a rise in housing prices, making some areas impossible to live for some of these urbanites. The Putnam Project presents a possible solution to this problem in the Kingsbridge/ Broadway neighborhood. A new term, referred to as “green collar” jobs has been a hot topic in light of President Barack Obama’s economic stimulus and bailout plan. He intends to increase funds for public infrastructure improvements, including bridge and highway retrofitting, park construction, and transportation improvements. I am proposing that qualified residents of this neighborhood constitute a majority of the workforce for this project. The design calls for a large amount of work such as tree plantings, clean up, manual labor, digging, and other tasks that can be easily taught to these people struggling to find work. This would have a direct impact on the

57 Community and Ecology: Dynamics of Place, Sustainability and Politics, 44.
58 Community and Ecology: Dynamics of Place, Sustainability and Politics, 51.
local economy while simultaneously promoting the connection between inhabitant and habitat. There is something in human beings that attaches us to something we actually put our time and effort into. Men and women would be working on a park and recreational space that their children will be using everyday. Working directly on the project can provide the community with a long-term goal, and also an economic incentive to achieve that goal. The Putnam Line Project and the restoration of Tibbet’s Brook presents the local community with a unique opportunity for socio-economic gains and environmental improvements.