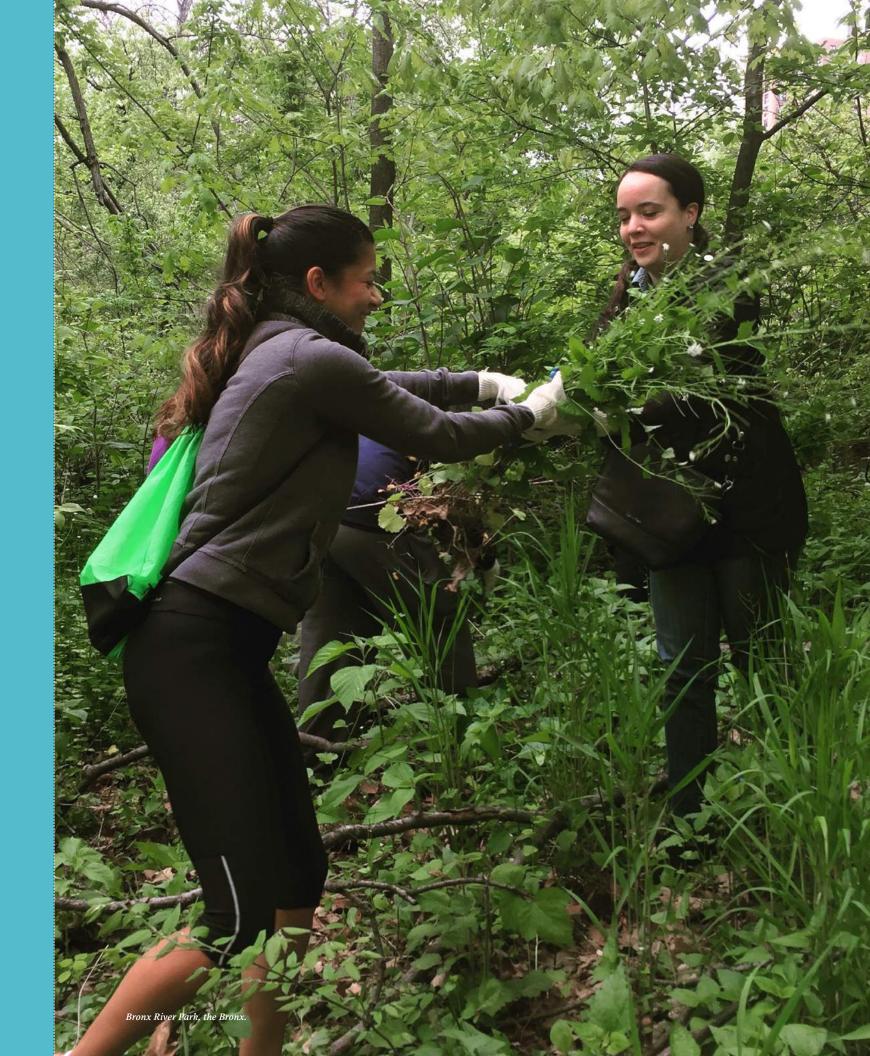


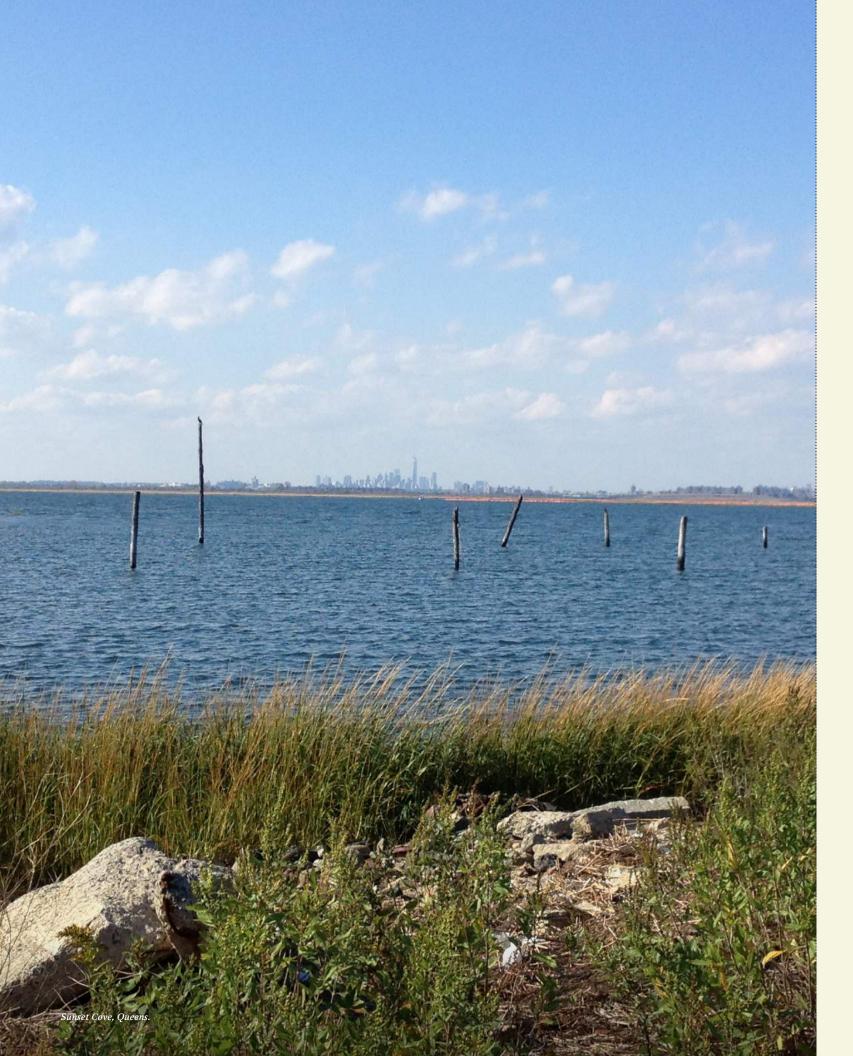
Never doubt that a group of thoughtful, committed citizens can change the world; indeed, it is the only thing that ever has.

attributed to Margaret Mead

No tract of land is too small for the wilderness idea.

Aldo Leopold





Acknowledgments

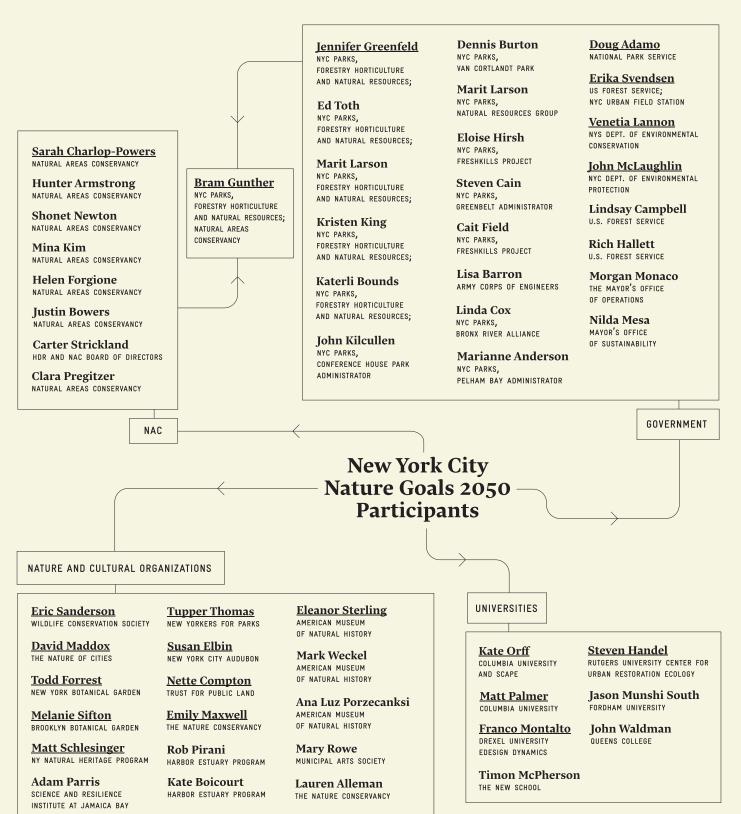
Dr. Matt Palmer hosted these workshops at Schermerhorn Hall, Columbia University. In this building some of the most important biological and genetic discoveries were made. We hope that in some small way our work can be as transformative.

Amy Freitag and the J. M. Kaplan Fund supported the New York City Nature Goals 2050 workshops and final report. We thank them for their generous grant.

We thank the Natural Areas Conservancy's Advisory Board and other participants in the Nature Goals 2050 process for being open minded, for their incredible dedication to New York City's ecological conservation, and for their belief in the power of nature.

In 2015 the New York City Nature Goals 2050 workshops were led by Eric Sanderson of the Wildlife Conservation Society and Bram Gunther and Sarah Charlop-Powers of the Natural Areas Conservancy. This report was written by Eric Sanderson, Bram Gunther, and Sarah Charlop-Powers.

New York City Nature Goals 2050 Participants



Executive Summary

Nature goals articulate what people want from nature and why. In formulating this set of 2050 goals and a Declaration of Rights to New York City Nature, our aim is to start a discussion about the future of nature in New York City, at a time of momentous change. Two significant trends are affecting the city and will continue to do so: a projected population increase of more than 500,000 people over the next 15 years and a changing and less predictable climate. Given the challenges that these phenomena will bring to our city, it is essential to affirm the rights of all New Yorkers to the benefits that nature provides. In 2015 the Natural Areas Conservancy's Advisory Board convened other scientists and organizations committed to conservation to formulate a set of qualitative goals for the function and composition of nature in New York City. The functional goals include support for biodiversity and habitat, the provision and enhancement of clean air and water, protection and resilience from coastal storms, connectivity for plants and animals, and inspiration for city residents. Compositional goals include connected and diverse native ecosystems, species, and genetic material; and human relationships to nature such as access to nature for all New Yorkers, integration of nature in urban planning, and regular activities that engage the public with nature. Goals like these serve multiple purposes: they communicate values of nature to New York City communities, provide yardsticks for measuring progress, allow for programmatic alignment across organizations, enable planning beyond standard trajectories, and guide strategic decisions of the Natural Areas Conservancy, along with other city agencies, non-profit groups, and society as a whole.

NAC Advisory Board Member NYC NATURE GOALS 2050

Introduction to the Natural Areas Conservancy

The Natural Areas Conservancy exists to restore and conserve the blue and green spaces of New York City in order to enhance the lives of all New Yorkers.



Fence post installation, Marine Park, Brooklyn.

Since 2012 the Natural Areas Conservancy has worked with NYC Parks to increase the profile and advance the care and renewal of New York City's natural areas. We are the first conservancy of our kind to focus specifically on the complex network of natural areas of New York City. We believe in science-based decision-making and adaptive management, and represent the latest innovations in urban conservation. We have collected data on the health and vulnerability of 20,000 acres of forests, wetlands, and grasslands, in order to create decision-making tools that are being used by NYC Parks and other institutions as a reference and to advance their programs and initiatives.

The Natural Areas Conservancy's Advisory Board is composed of 21 world-class experts focused on understanding and conserving New York City's natural resources. For our Nature Goals 2050 workshops we invited over 30 additional experts beyond our Advisory Board who added immense value and knowledge to our discussion.

The Natural Areas Conservancy believes that investment in nature-based programs and urban conservation will enable New York City to effectively and equitably address 21st-century urban issues like climate change, population increase, and the challenges of high-density living. Expressing clear nature goals can create long-term sustainability and improved quality of life. We also believe that a shared and coherent conservation framework based on nature goals can further New York City's status as a world leader.

Visit us online at <u>naturalareasnyc.org</u>

Declaration of Rights to New York City Nature

New Yorkers need and have rights to a local environment that is healthy and whole, which provides safety, respite, and connection to the long history of life on Earth, rooted in the particular circumstances of its place. Such rights are essential to each individual as part of the community of nature as a whole.

In spite of the biological richness of New York City at the time of its founding, the destruction of its natural resources in ways both large and small has been assumed to be an unfortunate but unavoidable cost of urban life. It is now self-evident that this assumption reflects a deep inconsistency with our ambitions, our ideals, and the facts: nature exists in the city, and given attention, management, and investment, can thrive again. We have an obligation to work together to create the social and economic circumstances necessary to lay the foundations for the long-term sustainability of the city's nature.

To honor New Yorkers' rights to the benefits that abundant and thriving nature can bring, we offer this draft set of nature goals to guide conservation and restoration efforts. Our overall aim is to assure that all New Yorkers experience the benefits of nature in their home city and local community by 2050. We propose that the city's planning and development as a whole adopt the following functional goals for New York City nature:

BIODIVERSITY AND HABITAT

Providing living environments for a diversity of native species

AIR AND WATER QUALITY

Supporting nature's ability to absorb and filter water from runoff and help clean the air

COASTAL PROTECTION AND RESILIENCE

Enhancing nature's capacity to mitigate damage from coastal storms

CONNECTIVITY

Better enabling movements of plants and animals through the city and region

INSPIRATION

Further encouraging human creativity and appreciation of beauty through nature

To fulfill these functions, New York City nature must be composed of three crucial elements:

A diversity of native ecosystems, which are interconnected, healthy, and resilient, because they are inhabited by a diverse set of native species—including rare and sensitive species and species particularly important to ecosystem services—which also possess diverse genetic material to support long-term adaptation of all species to the particulars of our local environment as it changes through time.

Furthermore, the relationship of people to nature in New York City must include the following:

Accessibility of safe, healthy, and proximate natural areas for all New Yorkers, including sites for quiet contemplation and active recreation; **integration** with the built environment and incorporation into citywide planning and policy; and **engagement** through frequent and regular education and stewardship activities conducted by a range of private and public groups and individuals.

Nature in New York City

New York was founded in a place of high biological productivity. Its remarkable richness has been shaped by its location at the juncture of the New England and the Mid-Atlantic regions and at the confluence of the Hudson River and Atlantic Ocean, at the place where the last glacier reached its southernmost extent 20,000 years ago. These factors and more bestow the city with incredible ecological potential. Early colonists remarked on the fragrance of the landscape before they reached the shore and, upon arrival, noted the richness of the harbor, the size of the trees, and the abundance of wildlife. Europeans displaced the native people who had lived here for thousands of years and quickly turned to development, enabled by the deep harbor naturally protected from storms, the richness and diversity of the soils which yielded abundant plant life, the productivity of the wetlands, and the vastness of our area's forests. All these ecosystems provided for plentiful food, shelter, trade and moneymaking, and expansion of the built city.

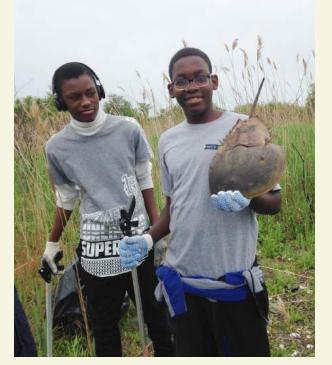
For most of the city's history, its inhabitants saw nature as something to be consumed, not as an essential part of its existence and identity. Urban structures and ideas were thought to be outside of nature. Culture, economy, arts, buildings, and roadways were largely considered separate from and independent of the trees, soil, birds, and bees. People had no rights to nature and nature for the most part was considered either an impediment or an exploitable resource, not a social good.

Within the relentless growth of New York City, however, individuals, communities, and institutions actively fought for greenery and open space. They planted trees and built parks. Bowling Green, the city's first park, was established because residents wanted outdoor leisure. Advocates of the back-to-nature movement in 1820s England sparked the creation and preservation of parkland in London and other cities. This movement, advanced here by the artists of the Hudson River School, was coalesced by William Cullen Bryant, who called for open space so the "classes could mingle." He saw that green spaces could make the city stronger by bringing diverse communities together.

Frederick Law Olmsted made this idea a reality. He believed that setting aside parklands was essential to the ability of people to live and thrive in cities and in 1858 designed the great Central Park at the heart of the growing metropolis. The creation of Central Park inspired many others: Prospect Park in Brooklyn, Forest Park in Queens, and Pelham Bay and Van Cortlandt Parks in the Bronx. Organizations like the Audubon Society and the New York Zoological Society were founded in this era, and institutions like the American Museum of Natural History and the New York Botanical Garden began to show and teach people about nature. Smaller groups such as the Brooklyn Bird Club and Natural Science Association of Staten Island formed in communities throughout the city. Today's Natural Areas Conservancy builds on the heritage of these early efforts, continuing to advocate for the value of nature in New York City.

Only over the last few decades have these values met with significant investment. Building upon previous conservation programs including significant support from the Army Corps of Engineers and New York State Bond Act money, and a mounting scientific literature on the benefits of nature to wellbeing and





Invasive plant removal at Bronx River Park forest and beach clean-up and molted horseshoe crab shell in Marine Park, Brooklyn.

health, the MillionTreesNYC campaign was launched. It was a primary feature of New York City's long-term sustainability plans, PlaNYC: A Greener Greater New York and OneNYC: The Plan for a Strong and Just City. These plans facilitated NYC Parks to plant 500,000 trees, 112,000 shrubs, and 235,000 herbaceous plants in our forests and over 160,000 street trees. (The rest of the million trees was planted via our partners on private land.) It was an unprecedented ecological capital improvement initiative, increasing nature's benefits throughout the city and bringing in thousands of new park stewards.

Today NYC Parks manages nearly 30,000 acres of parkland, over one third of it natural areas—repositories of our ecological past, representative our ecological present, the slate for our ecological and sustainable future. There are mini ecosystems in backyards, vacant lots, green roofs, and pocket parks. The combination of green spaces and natural areas under the jurisdiction of other city, state, and federal agencies and in private ownership makes over 40% of the city open space.

More than 230 native bee species, 750 species of plants, 350 species of birds, 180 species of rare animals, and state-endangered species like the little bluet damselfly exist within our natural areas. Beavers and alewives (a kind of river herring) have returned to waters around the Bronx and a newly described species of leopard frog has been found living on Staten Island.

Nature in the city provides innumerable benefits (and in economic terms, savings of billions of dollars), cleaning our water and air and offsetting noise and pollution associated with urban life. It provides vibrant and beautiful open space for play, contemplation, and creativity. Natural ecosystems play a critical role in buffering our coastal city from climate change.

Nature can do all of these things, and more, but only if we invest in it. To increase investment and the confident expectation of a good return, we need an agenda for political and social action. Nature goals, as articulated in this report, represent a first attempt to describe the explicit role that nature should play in New York City life going forward.

What are Nature Goals?

Nature goals articulate what people want from nature—and why.

Setting goals for urban nature is a complex task, just as it is to find consensus about any goals for our society. Think of everything we want from our city: to provide a job, to assure a voice to express differences, to give our children an education, to offer a diverse and rich cultural life. We want to hand off a better city to the next generation than the one left to us.

Like the city itself, nature is many things to many different people. These different points of view are reflected in the community of people, institutions, and organizations that care for nature in the city. Some organizations focus on birds and other kinds of wildlife. Others focus on parks, community gardens, environmental justice, or stewardship. Still others are focused on water quality and protecting the coasts from rising sea levels.

These individual efforts are critical, but our power to protect and restore nature in the city will be much stronger if we have a shared strategy. Nature goals are the first step.





Counter-Clockwise from Top-Left: Community garden, fishing in Jamaica Bay, 5-Boro green roof.

Setting Nature Goals for New York City

To begin setting nature goals, we gathered over 50 of the most experienced experts in local government, non-profit organizations, and academic institutions to participate in a structured set of conversations to define priority nature goals for New York City's future (see Appendix 1). Our explicit charge to the group was to work with us to express a set of goals that cross institutional boundaries, bridge the built and the natural, extend from the sea to the upland, and work for terrestrial and aquatic systems. We also wanted to understand what this group of people shared and didn't share in terms of our ideas, institutional missions, and programs. Our objective was to create a coherent framework for organizations that care about nature in New York City to align and coordinate efforts, leading to collective results greater than the sum of their parts.

"Collaborative conservation" across the entire city (and region) takes into account the interconnections between ecological and social environments and forms a common ground for decision making. This type of approach has long been recognized as means to lasting and high quality conservation.

In our process, we first considered functional goals for nature; in other words, what do we want nature to do? After a long discussion we gained some consensus around these functions: support for biodiversity and habitat, provision and enhancement of clean air and water, protection and resilience from coastal storms, connectivity for plants and animals, and inspiration for city residents. These five rose to the top, but we discussed other functions that nature provides (see list on pages 24 – 25).

We also considered the characteristics or qualities of nature (its compositions) necessary to provide these functions in New York City. We achieved consensus that the conservation and restoration of native ecosystems, species, and genetic material was essential to fulfill our functional goals. Furthermore, people need to have better access to nature, nature needs to be integrated in urban planning, and engagement activities must be provided to better connect the public with nature. Future workshops will delve even further into the details, deciding on the practical steps and pieces by which these aims can be achieved.

The working process and conceptual frameworks we used in our New York City Nature Goals 2050 workshops are detailed in Appendix 1.

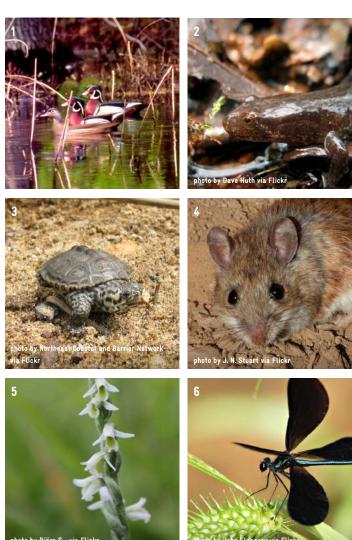


Biodiversity and Habitat

Providing living environments for a diversity of species

Human beings are abundant in New York City. So are other species. The number and variety of other forms of life (what scientists call biodiversity) is a good indication of nature's overall wellbeing and its ability to operate in ways that improve our lives. The Wildlife Conservation Society's Mannahatta Project estimated that in 1609, when Henry Hudson arrived, Manhattan might have been home to as many as 1,850 plant and vertebrate animal species (including people). Adding invertebrates—butterflies, dragonflies, oysters, clams, and other organisms without a backbonecontributes thousands more species. The city isn't only habitat for people, but also potentially for billions of other wild residents, plants and animals and other organisms, that live here with us. They need room to live too.

EXAMPLES



Wild plants and animals that live in the city include wood ducks (1), the northern dusky salamander (2), diamondback terrapins (3), white-footed mice (4), northern slender ladies tresses (a kind of orchid) (5), and the ebony jewelwing (a dragonfly) (6). These animals and plants can be seen in our natural areas in many parks across the five boroughs, including Van Cortlandt Park in the Bronx, Inwood Hill Park in Manhattan, Forest Park in Queens, Marine Park in Brooklyn, and High Rock Park in Staten Island.



New York City heron rookery.

CURRENT STATUS

We know a fair amount about the current status of biodiversity in New York City. We have about 750 native plant species; 230 native bees; 318 species of birds to name some facts. But our information is fragmented and not comprehensive. While some parks have been surveyed for certain species (like birds in Central Park or plants in Pelham Bay Park), many other areas lack biodiversity information. The Natural Areas Conservancy is advancing this citywide knowledge through its ecological assessments. Some of these species are rare and endangered (like the piping plover), while others are very common (the American robin). Some species have become particularly invasive, so much so that they are crowding out others and diminishing local biodiversity.

To increase biodiversity and habitat, a surprising array of largeand small-scale ecological restoration and conservation projects are underway throughout the city. The Natural Areas Conservancy are working on a long-term forest management plan. The Greenbelt Native Plant Center on Staten Island raises and propagates native plants from locally collected seeds. Many groups are focusing on protecting and enhancing aspects of native wildlife and rare habitat types. Despite how crowded the city is, thousands of acres have been identified for restoration. What's needed now is a sustained commitment to action for biodiversity and habitat in New York City.

Air and Water Quality

Enhancing nature's capacity to clean the water and the air

Clean air is free from airborne pollutants that damage the health of living things, including the city's residents. Quality water is safe and healthy for swimming and drinking, and is critical for aquatic organisms. While New York City is fortunate to receive about 44 inches of precipitation per year, in our densely built environment water from storms runs over the impervious streets and sidewalks, picking up pollution and garbage and landing in our harbors and waterways. The local weather is constantly mixing the atmosphere, but the abundance of cars and buildings burning fossil fuels reduces air quality, especially on still, hot days.

EXAMPLES

(Don't) take a deep breath while standing next to the Cross-Bronx Expressway. Do take one next time you are walking in your local forest, and you'll smell the difference. Forests renew our air supply by absorbing carbon dioxide and producing oxygen. Trees clean our atmosphere by intercepting airborne particles and by absorbing ground-level ozone, carbon monoxide, sulfur dioxide, and other greenhouse gases. Herbs, shrubs, and trees also return water to the atmosphere through transpiration. Our 4,000 or so acres of tidal marsh help filter and absorb pollutants in our estuary. But the pavement and buildings—impervious surfaces—don't absorb water. Dust and dirt collect on these surfaces, and when it rains the water carries pollutants into the storm drains. Instead of funneling it away, soil and plant roots capture and absorb water, filtering it in the process.

CURRENT STATUS

Federal laws, notably the Clean Air and Clean Water Acts, lay down requirements for the air and water of the city. Unfortunately, meeting their requirements is difficult, given how the city has been built and the number of people living here. Treatment facilities and regulations on cars and industry have made a difference, and nature can help too. Because 60% of New York's land is concrete, asphalt, and other impermeable surfaces, natural areas can provide an important route for rainwater and snowmelt to reach the soil. Forests and wetlands help filter the water and cool the air. Urban areas are hotter than rural areas because the city's hard surfaces hold the heat. Coupled with climate change, the heat island effect and air pollution make many people sick. Even worse, the negative effects of polluted water and air are unevenly distributed, most heavily affecting the poorest neighborhoods of the city.

The city is serious about using nature to make improvements. The Department of Environmental Protection has committed \$1.5 billion to managing storm water through green infrastructure and has put in thousands of bioswales to capture water. NYC Parks has installed over 2,200 greenstreets, green roofs are being added to buildings, and parklands are being retrofitted. Although significant amounts of funding are in place, we need a city-wide commitment to use nature effectively to clean air and water for everyone.

Opposite: Tidal wetlands in Spring Creek, Queens and 5-Boro green roof.





Coastal Protection

Enhancing nature's ability to mitigate damage from coastal storms

New York City is a coastal town. Being on the shore provides many advantages, including easy transportation for shipping, cool sea breezes, and great views, but it also means that New York City is sometimes battered by storms and flooded by waves from the sea—risks that will increase as a result of climate change. Moreover part of the city is built on land created by the sea, like barrier islands and filled-in salt marshes. These also can be destroyed by storms and rises in sea level.

Coastal ecosystems can help protect the city from storm surges. Sandy dunes, created by the wind and the tide, can absorb the energy of waves. Salt marshes can absorb storm waters and release them slowly back to the seas. They can reduce the force and height of waves; where there is still expansive tidal wetlands such as in Northwest Staten Island building damage is reduced. One recent study suggested that historically oyster reefs also had a part to play in slowing down ocean onslaughts.

EXAMPLES

Beach grass is specially adapted to living on movable sand along the seashore; its roots stabilize the dunes and hold them in place. Coastal marsh plants are adapted to both flooding and salt. Cordgrasses of the genus Spartina grow in dense mats in salt marshes, accumulating peat, holding sediment, and delivering nutrients to the coastal estuary. Salt marsh grasses also provide hiding places for juvenile fishes and various crustaceans. These habitats and ecosystems can be seen along the shorelines in the Jamaica Bay watershed in Brooklyn and Queens, in parks such as Marine Park and Spring Creek, along the Long Island Sound watershed in Soundview or Pugsley Creek Parks, or throughout Staten Island in Lemon Creek Park or Saw Mill Creek, among others.









Above: Social assessment of natural areas done by US Forest Service in Jamaica Bay and data collection in Marine Park.

Opposite: Beach grass in its native habitat in New Dorp, Staten Island, and planting dormant beach grass in the Floyd Bennett Field Gateway National Recreation Area nursery yard.

CURRENT STATUS

New York City's coastline is 520 miles long. Formerly our shores were lined with beaches, dunes, marshes, bluffs, and rocky tide pools, but nearly 90% of our natural coastal ecosystems have been replaced with bulkheads and other engineered surfaces. Many neighborhoods are built up to the edge of the sea. Some places have beaches, but they are mainly managed for recreational uses, for which dunes are often seen as an impediment. Until the 1970s, the city's coastal marshes were mainly seen as wastelands waiting to be filled and developed, which is why many industrial areas, utilities, airports, and other infrastructure are located on the coasts. Sea level may rise in excess of a meter over the next 100 years, and combined with the potential for even more intense coastal storms, many of these assets are at risk..

Nature long ago adapted to the changing fortunes of the tide. Coastal ecosystems provide natural defenses. Dunes can thwart surging seas, marshes and beaches absorb water, and plants slow wave action and help buffer against floods. Shallow bays and narrow inlets literally keep the ocean water in the ocean. Recognizing these contributions, a number of coastal wetland and dune restoration projects are underway or have been completed. Green infrastructure along tributaries and creeks can help reduce flooding. The Natural Areas Conservancy has produced an inventory of over 130 wetland restoration opportunities citywide; partner organizations are monitoring, initiating restoration programs, and modeling future coastal scenarios. Rising seas are one of the greatest threats to New York City over the next century, challenging us to learn from nature and work with it to protect our coasts.

Connectivity

Better enabling the movements of plants and animals through the city

Roads, sidewalks, and other ways for people to get around take up 60% of New York City's land area. But we're not the only ones on the move—other species need transit routes too. Because of New York's location on the Atlantic coastline, the city is an important stopover point for migratory birds on the Atlantic Flyway. It is also important to fish moving between the ocean and the Hudson River Estuary. Within the city, birds, butterflies, and bees (and other important pollinators), and fish are among the many kinds of animals that move between natural areas. Increased green and blue corridors would make human transit routes more user friendly to other species, and they could help enlarge the overall area where nature does its work.

EXAMPLES

New Yorkers can see migratory birds every spring and fall in Central Park. Studies have suggested that some of these migrants find New York City parks to be good refueling stations on their long journeys. Anglers are familiar with the changes in the fish seasonally around the city, particularly in association with the spring runs of alewife and striped bass. Bees, beetles, and other pollinators can be seen flying around the city looking for nectar from flowers. Seals, dolphins, and whales customarily follow migratory routes that include the rich and complex waterways of New York City.









Clockwise from Top-Left: Walking trail through Bronx River Park forest, bikers on boardwalk in Marine Park salt marsh, fish passage on Bronx River, and Riverdale Park, the Bronx, trail blaze.

Opposite: Walking to caves, Inwood Hill Park, Manhattan.



CURRENT STATUS

Our understanding of patterns of connectivity across the city is mostly anecdotal at this point, though some research is underway to investigate how different kinds of organisms move through the city streets, natural areas, and waterways, and how and when the built city acts as a barrier to them. The city is constructing greenways, which are primarily for human transit, but might also serve as transit routes for birds and the insects that are essential for pollination (especially our bees). NYC Parks is changing its land management approach to focus more on connectivity and producing watershed management plans that account for all types of solutions, from small green infrastructure projects to major natural areas restoration. The agency has also restored the ancient migratory route of the alewife along the Bronx River. There are emerging efforts to give power to local community groups to decide the types of green infrastructure that work best for them, and the importance of private land in connectivity is becoming clear. In spite of all these efforts, there is a vast amount of work ahead to connect the fragmented pieces of restored and latent natural space and achieve maximum interconnectedness and environmental health.

Inspiration

Further encouraging human creativity and appreciation of beauty through nature

Frederick Law Olmsted, the co-designer of Central Park, put it like this: "it is a scientific fact that the occasional contemplation of natural scenes of an impressive character, particularly if this contemplation occurs in connection with relief from ordinary cares, change of air and change of habits, is favorable to the health and vigor of men [and women]... beyond any other conditions that can be offered them." People draw inspiration from nature by viewing scenery, watching wildlife, exercising, participating in cultural and spiritual practices, and finding moments for quiet contemplation. As Olmsted writes, "Gradually and silently the charm comes over us; we know not exactly where or how. Today, it is sometimes referred to as 'forest bathing'"

EXAMPLES

New York City natural areas abound with strikingly beautiful places: the rocky coastline of Pelham Bay Park, the expansive salt marshes of Jamaica Bay, or the deep forests of Inwood Hill Park and Staten Island's Greenbelt. There are places in New York City where we can forget we are in the city; these are places of inspiration.

CURRENT STATUS

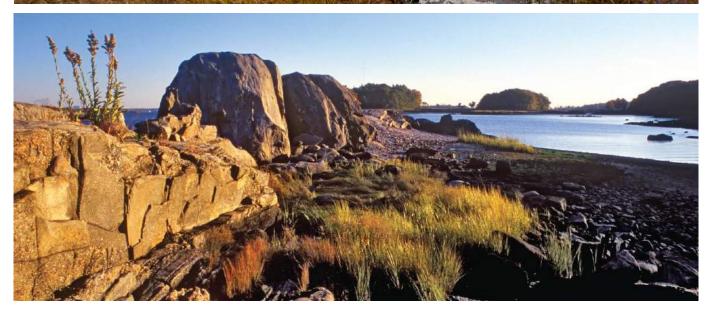
For something as subjective as inspiration, it is difficult to make an objective standard against which to measure. Although New York City has many quiet spaces, even the best are interrupted by the noise of planes and cars. Litter is a persistent problem citywide, and for the naturalist, the domination of some species detracts from the sense of vibrancy and richness that a more robust diversity of species can bring. The return of raptors, whales, and beavers in recent years holds out the potential of restoring certain elements of wildlife fauna, which provide a special source of inspiration all their own.

Numerous studies have shown that urban green spaces and natural areas de-stress people, increase their power of concentration, and hasten recuperation from illness; others have explored the role nature plays in recovering from bereavement, both on a personal and community level. Artists throughout the ages have turned to nature for their inspiration. NYC Parks and the US Forest Service have started an Artist in Residence program at their Urban Field Station to engage with an artistic perspective on land management. The thousands of acres of natural areas and parkland restored in the recent decades increase the spaces and chances for moments of inspiration. Environmental and cultural organizations across the city are advocating for their sacred spaces. Still, there is much to do in advocating for the inspirational powers of urban nature as necessary to New Yorkers' wellbeing and sense of place.

Opposite: Apartment complexes and salt marsh in Pelham Bay Park, the Bronx, islands in Marine Park, Brooklyn (photo by Adam Stoltman), the rocky intertidal shoreline of Pelham Bay Park.







Other Goals

Nature is various and provides many different benefits to people. The five functional goals previously described are only the small subset that our workshops identified as particularly important to New York City nature. A more comprehensive list includes the following:



Place and IdentityHelps define what New York City is



Health and RefugePromotes physical and mental wellbeing



Open SpaceLies within reach of all New Yorkers



EducationEnhances teaching and learning



Community Building
Helps people meet and work toward the common good



EvolutionEnables species to change



PollinationIs needed for fruits, seeds, and flowers



EconomyProvides employment opportunity



Ecosystem Services
Provides benefits to people



RecreationOffers a place for enjoyable activities



ShadeCools the city



Native Ecosystems

Conserving and restoring nature's communities

Ecosystems are the combination of living species and nonliving components of the environment (water, soil, air, etc.). Different kinds of ecosystems provide habitat for different kinds of species, and many species need combinations of ecosystems, especially at different stages of their life cycles. Owing to its unique physical setting, New York City has the potential for great ecosystem diversity. Manhattan may have had more than 50 different ecological community types when Henry Hudson arrived in 1609, and preliminary data from the Wildlife Conservation Society's Welikia project (welikia.org) suggests that historically there were more than 120 ecological community types citywide.



Spring habitat in mature forest of Pelham Bay Park, the Bronx.

EXAMPLES

New York City nature includes native ecosystems such as the high salt marsh found in Jamaica Bay, which spans Queens and Brooklyn, Pelham Bay Park in the Bronx, and Lemon Creek in Staten Island; oak-hickory forest, which grows on sunny, rocky slopes and is found in Central Park, Van Cortlandt Park in the Bronx, and Prospect Park in Brooklyn; and red maple swamps found in Cunningham Park in Queens and High Rock Park in Staten Island and riverine, estuarine, and marine ecosystems throughout the city.

CURRENT STATUS

The Natural Areas Conservancy recently commissioned an ecological land cover map of the five boroughs revealing that New York has 37 unique land cover types citywide; further analysis revealed 62 unique ecological habitats (view the map at naturalareasnyc.org/map). The most common upland habitats are coastal oak-hickory and oak-tulip. These numbers represent a fraction of what used to be here, and existing spaces are fragmented and squeezed. Still, we can increase the ecological health of what remains by restoring degraded areas and increasing ecological connectivity.

Native Species

Encouraging diversity to keep ecosystems vibrant

Species are living organisms: plants, animals, and microbes that are always adapting in response to their current and local conditions. New York City provides habitat to more than just people, our pets, and species like pigeons. Central Park is renowned for its bird watching; people fish for dozens of different species in New York waters; and even whales, seals, beavers, and coyotes can be seen in the city. Diverse native species living and interacting together create healthy ecosystems, which is why species restoration and conservation are so important.



Pollination in action.

EXAMPLES

The tulip tree, the humpback whale, the stream bluet, the striped bass, smooth cordgrass: as these examples suggest, species come in many forms, sizes, and abundances. Although no one knows exactly how many species and what kinds live in New York City along with people, we do know that historically this place supported thousands of different species and still may.

CURRENT STATUS

Although there are many different kinds of species living in the city, our understanding of them is fragmented and a work in progress. Our most accurate picture of species diversity is probably related to plant life. A 20-year effort by the Brooklyn Botanic Garden called the Metropolitan Flora Project surveyed the city's flora. The recent ecological assessment sponsored by the Natural Areas Conservancy found 750 unique plant species in New York City parks, with the most common canopy trees being the native sweet gum and black cherry. Some of the most common herbaceous species included the native Virginia creeper, white wood aster, and poison ivy. The assessment found that most of our herbaceous plants were not widespread—80% of the documented species are found in fewer than 10 places citywide.

Staff botanists at the New York Botanical Garden have found new introductions of plant species from around the world. At the same time the New York City Council just passed a bill that mandates native plants must be used when restoring natural areas. Several organizations are now working together under the State Department of Environmental Conservation to categorize vulnerable wildlife here. The American Museum of Natural History led a study on bees that revealed over 230 natives species within the five boroughs. Native species are representative of the natural history of our city and the quality and healthy functioning of our ecosystems, and are crucial to their preservation.

Native Genes

Supporting genetic variety to help local populations thrive and adapt

Genes are collections of segments of DNA that determine particular characteristics in an organism. Populations of different species are genetically diverse, reflecting local adaptations, genetic drift, and random mutations through time. The use of seeds from local plant populations, for example, ensures the success of ecological restoration or the enhancement of natural systems. Genetically healthy and diverse populations ensure the long-term sustainability of species and ecosystems and also maximize biodiversity.



Sorting native seeds at the Greenbelt Native Plant Center.

EXAMPLES

The Greenbelt Native Plant Center on Staten Island provides native plants and seeds from local populations to support the restoration and management of the city's natural areas. They recently provided beach grass from native seed collected within the city for planting in newly created dunes along the Rockaways after Superstorm Sandy. They are also involved in a national effort, called Seeds of Success, to preserve, bank, and procure native plants at a local level.

CURRENT STATUS

Source material for native plants should come from local or regional populations, but we don't have a good understanding of the genetic diversity of species in New York City, particularly animals. The efforts of the Greenbelt Native Plant Center are supported by the city and are emblematic of its commitment to native plants. But these efforts to develop, grow, and distribute native plants to regional nurseries will need to expand, in order to meet the demands of ecological restoration projects in the coming decade.

Access

Making nature locally available to New York City residents

Access combines the geographic distribution of natural areas in the city and ways of finding and reaching them, such as signage, public transportation to parkland, clear access to trails within, and an expectation of security and safety for visitors. There are over 300 miles of trails in New York City parkland and according to a social assessment of natural areas done by the Urban Field Station—a partnership between NYC Parks, the US Forest Service, and the Natural Areas Conservancy—New York City is the primary point of access to nature for half of its residents.



Accessible views of the harbor from Brooklyn Bridge Park.

EXAMPLES

Relatively large natural areas are found on Staten Island, in the Bronx, and associated with Jamaica Bay in Queens and Brooklyn. People who live nearby and own a car have easy access to nature. These natural areas, however, are less accessible via public transportation, especially if distances are far.

CURRENT STATUS

A recent survey by the Trust for Public Land found that 97% of New Yorkers can walk to a park in under half a mile. Not all parks have wild spaces in them however; many are playgrounds and ball fields. NYC Parks' Community Parks Initiative is revitalizing parkland that hasn't had capital investment for over 20 years. Many of these spaces will have added green elements such as trees and rain gardens; a large number of these parks are in underserved neighborhoods. Another NYC Parks initiative called Parks Without Borders is also working to make our city's outdoor spaces more welcoming, accessible, and better connected to surrounding neighborhoods. Programs like MillionTreesNYC have enhanced cityscapes and natural areas and connected communities and volunteers with these places. The Natural Areas Conservancy is working with NYC Parks to improve trails in natural areas throughout the city while also restoring their habitats. But significant work is necessary to enable clear and safe access to all natural spaces citywide.

Integration

Designing nature into the built environment

Integration happens when nature is built into the decision-making and planning processes for future development. Ways of increasing nature's presence within the built footprint include street trees, green roofs, bioswales, gardens, and other types of plantings. The city can also acquire land, re-zone areas, or re-purpose current land uses to favor natural areas or green spaces. Wetlands can be incorporated into waterfront development and revitalization. Development and conservation don't have to be in conflict, and with better design and planning, the built environment can leave room for restoration.



Central Park and skyscrapers: Development and conservation don't have to be in conflict.

EXAMPLES

Every development plan created in the city provides an opportunity to integrate nature and the built environment. Increasingly landscape architects and architects are designing projects in New York City to work with nature, not against it, through green roofs and bioswales that capture storm water, as well as through gardens and even natural areas. Construction of sand dunes along the seashore to provide protection from waves and adaptive re-use of old landfills are excellent examples of integration.

CURRENT STATUS

The city's strategic planning and local laws are increasingly prioritizing the integration of nature and the built environment. Examples include OneNYC: A Plan for a Strong and Just City, the Department of Environmental Protection's Green Infrastructure Plan, Sustainable Strategies for Clean Waterways, and the city's zoning code, which makes tree planting mandatory for new construction. New laws requiring the use of native plants in our natural areas provide the basis for integration. Digital tools like Visionmaker.nyc and the EPA Enviroatlas allow residents and city officials to visualize and evaluate ecological performance across built and natural ecosystems. The new participatory budget process allows communities to choose green infrastructure where gray infrastructure might have been developed. The NYC Department of City Planning is integrating green infrastructure more readily into their operations. Community groups, social and conservation organizations, and individuals across the city are working towards integrating nature more effectively in their neighborhoods. For example, the Greenbelt Native Plant Center is collaborating with the Greenwood Cemetery in Brooklyn to establish a native meadow. There is growing support for using private land as part of citywide natural resource management. Coastal re-building projects post— Superstorm Sandy provide enormous opportunities to restore and improve natural areas. The potential for green roofs and backyards as ecological connectors is great. That said, we still have much to learn about New York City as a mosaic of ecosystems knitted into the grid, functioning collectively with the built environment to achieve the goals outlined above.

Engagement

Enriching people's lives and communities through active participation

New Yorkers' engagement with natural areas includes stewardship, recreation, education, cultural activities, and public enjoyment. Engagement is promoted through school programs or other government-sponsored outreach, or the initiatives of private institutions to encourage people to use, appreciate, and value natural areas.





Horseshoe crab monitoring, Calvert Vaux Park, Brooklyn.

EXAMPLES

The Urban Park Rangers connect New Yorkers to the natural world through environmental education and outdoor recreation. New York City Audubon, the New York Botanical Garden, the Wildlife Conservation Society, the Nature Conservancy, and many other institutions offer educational programs and citizen science involving nature in the city. NYC Parks and the Natural Areas Conservancy are improving trails, engaging local volunteers, and communicating to all city dwellers about the value of nature. Communities also arrange their own engagement activities, from religious ceremonies to beach clean-ups.

CURRENT STATUS

Although there are lots of engagement activities going on, we don't understand collectively how many people are engaged, who is participating, or why. STEW-MAP, a product of the U.S. Forest Service, introduced us to the numerous stewardship groups in New York City. This work helped jumpstart stewardship efforts within NYC Parks that have included thousands of volunteers making for better parkland. A recent and important step to understanding engagement was a social assessment of natural areas, also done by the Forest Service through the Urban Field Station. The assessment found that natural areas play an important role in visitors' daily lives and enhanced their identification and connection with their community. This study and others, such as that carried out by the New School looking at how people use parkland, have revealed that people will travel further than anticipated to natural areas and open spaces. More information and activities, such as forums, seminars, publications, and interactive maps (as described in the next section), are necessary to encourage a broader range of New Yorkers to engage with nature.

Next Steps

The first year of New York City Nature Goals 2050 was groundbreaking. We had a diverse group of land managers, academics, and social and environmental non-profit groups sitting at the same table, deliberating what nature should look like in 2050, what role it should play, how it will make the city a better place, and how best to ensure that our goals are integrated into both local community and citywide political planning. We see this initial work as jumpstarting a movement that will continue on multiple fronts further expert workshops and refined goals, outreach to local communities and their leadership, increased bonds and cooperation amongst the varied groups within New York that care about nature and its role in our future, and papers and lectures that can set a model for other cities to initiate similar efforts.

In particular, we need to develop specific, measurable targets for nature conservation in New York City. Our third workshop in 2015 was an introduction to this discussion (see Appendix 1). Having identified our broad functional goals and the compositions that will best support them, we turned to the question of structural goals for nature-specific answers to questions of how much, how many, of what quality, and in what distribution the ecosystems, species, and genes are needed to fulfill the functional goals. We also discussed ideal levels of access, integration into city planning, and local engagement. What is the desired list of ecosystems in New York City and how big should they be to provide functions like biodiversity and habitat for species or coastal resilience? What specifically makes a place inspirational and how do we measure this quality? How seriously are city planners and politicians taking nature goals and are they building them into their budgets or legislation? And how effective and interconnected are local stewardship and advocacy groups in setting a nature platform and in working with NYC Parks to manage their local green spaces?

Year one set the table for the next round of thinking and discussion. The Natural Areas Conservancy and its Advisory Board will pursue this question of structure, but also look to diversify participation in our workshops by including local stewardship leaders and environmental justice groups and by communicating with, and seeking feedback from, a broader audience about what we are doing and why it is important. The overarching goal of this initiative is to build, solidify, and sustain a movement that represents many different professions and communities and that is committed to conserving and restoring New York City's nature for future generations.

Our Partners

These participating organizations, among others, are critical to the conservation movement in New York City. We are partners and allies in our efforts to restore and conserve nature here, and we continue to seek new partners and allies. Our alignment and cooperation going forward is essential to achieve our nature goals.





















































Process and Concepts in the NYC Nature Goals 2050 Workshops

Our philosophy for these workshops lies in the quote attributed to Margaret Mead at the beginning of the report: "Never doubt that a group of thoughtful, committed citizens can change the world; indeed, it is the only thing that ever has." We do not pretend that the Advisory Board is a representative group. Nor do we pretend to speak for anyone beyond ourselves. We are a thoughtful, committed group of citizens, experts in our respective fields. Our aspiration for the nature goals in this report is that they will spark a general affirmation of the rights to New York City nature expressed in our Declaration.

We began the process of setting nature goals with some definitions. We took an inclusive approach that treated "the phenomena of the physical world collectively, including plants, animals, the landscape, and other features and products of the earth, including humans and human creations." This approach allowed us to foreground the interconnection of people and the things people make with the city's other species of animals and plants, its green spaces, natural areas, waterways, and ecosystems.

We started by defining nature as having at least four components or dimensions:

GENES

Variability within a species or population

SPECIES

Variety of living species (plants, animals, etc.)

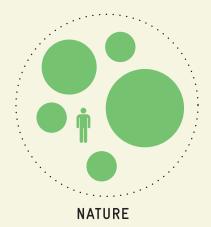
ECOSYSTEMS

Diversity of species and abiotic components interacting within the same area

HUMAN RELATIONSHIPS TO NATURE

The variety of ways that people value, impact, and interact with other kinds of genes, species, and ecosystems

We defined the functions of nature as the evolutionary and ecological processes and interactions among the components of nature that are valued by human societies. Essentially functions refer to the work that nature does. Some of that work may have direct benefits to people; it may also include other aspects of nature that people value, but which don't directly benefit us, like increased numbers of animal species. Talking about functions and functional goals helped establish the core motivations for conserving and managing nature.

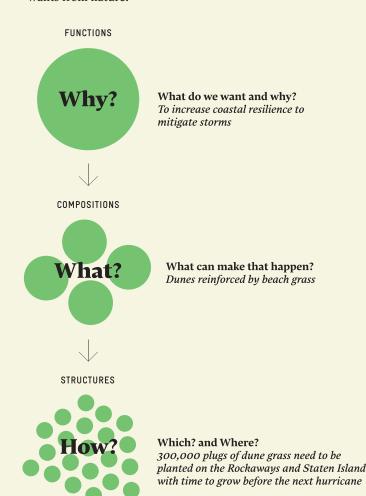


"the interconnection of people and the things people make with the city's other species of animals and plants, its green spaces, natural areas, waterways, and ecosystems"

We defined the compositions of nature as the desired characteristics and variety of the components of nature. Compositions refer to who or what is doing nature's work. Discussing the composition of nature's functions let us specify what genes, species, ecosystems, and human relationships we think are necessary for nature do its best work, and decide the most important qualitative goals for New York City nature.

We defined the structures of nature as desired amounts or patterns of the components of nature. Structures help us to understand how much of a given component we need, where we need it, and how we measure its quality; and to promote desired compositions and functions of nature in the city. Understanding structures will help us decide how best to act on our priorities, specify targets, and achieve the goals we have outlined here.

In other words, these types of goals answer questions about what society wants from nature:



Properly formulated, nature goals address all these aspects of nature. Moreover, these concepts suggested a process. Brainstorming about functions put us in mind of the compositions that might satisfy those functions, and once we understood those compositions, we could begin to consider the structural questions. In other words, the logic is that function leads to composition and composition begs the question of structure.



WORKSHOP 1

First we considered what functions are desired from the city's nature and worked through four steps: we 1) asked members to name three functions that they believe the city's nature should provide; 2) conducted a group exercise to combine related suggestions; 3) had each person concisely define these functions; then 4) had each individual vote on the functions they felt were most important.

WORKSHOP 2

We then considered the desired composition of the city's nature through the lens of the functions and categories listed above. We worked through a similar multi-step process.

workshop 3

Next came an introduction to structure. We discussed how to answer questions like these: How much nature or in what configuration is it required to fulfill the functions outlined? How big does a salt marsh need to be to provide coastal protection? What configuration of nature assures connectivity for migratory birds? Or how large does a natural area need to be to inspire? We will investigate these nuanced and complex issues further as we continue to pursue and refine our nature goals (see Next Steps).

WORKSHOP 4

Our last meeting focused on reporting back and discussing the Declaration of Rights to New York City Nature. Each of the participating institutions was invited, but not required, to discuss how the functional and compositional goals related to their institutional work.

