RESPONDING TO CLIMATE CHANGE

PROTECTING OUR COASTLINES

ESTABLISHING RIPARIAN BUFFERS & WETLAND PROTECTIONS

PROMOTING SUSTAINABLE FORESTRY

PROMOTING URBAN FORESTRY & GREEN INFRASTRUCTURE

RESPONDING TO CLIMATE CHANGE

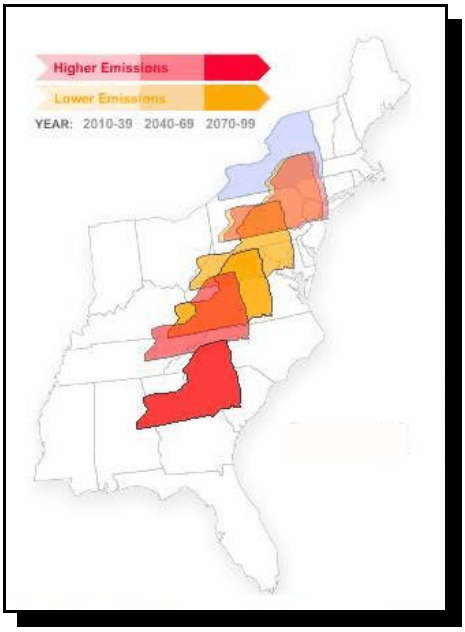
OUR CHANGING CLIMATE

www.dec.ny.gov/energy/44992.html

Scientists have documented changes in the climate of the Northeast United States that correlate with changes in temperature across the globe. The best current information on our area's climate change is found in two reports. "Climate Change in the U.S. Northeast" *(www.climatechoices.org/assets/documents/climatechoices/NECIA_climate_report_final.pdf)* is a report of the "Northeast Climate Impacts Assessment," a collaboration between the Union of Concerned Scientists and a team of independent experts. This study estimates the effects of climate change under two scenarios: high emissions (continued heavy reliance on fossil fuels, with rapid growth of greenhouse gas emissions), and low emissions (a shift away from fossil fuels, with a decline in greenhouse gas emissions by mid-century). The report stresses that, while some additional global warming is unavoidable, how much climate change we experience will depend on energy choices we make *now* and in the next decade.

The second report, "Potential Consequences of Climate Variability and Change – Metro East Coast" (*www.usgcrp.gov/usgcrp/nacc/metro.htm*), is one section of a national study carried out by the U.S. Global Change Research Program. It outlines the potential effects of climate change on resources and infrastructure in southeastern New York, Long Island, northeastern New Jersey, and western Connecticut.

- *Rising temperatures.* The average annual temperature in the Northeast has risen 1.8 degrees F over the last 100 years. Winter temperatures have risen even faster, as much as 4.4 degrees in the last 30 years. In the coming decades, summer days also are expected to become hotter, increasing evaporation of soil moisture and leading to drier conditions between rain events.



www.climatechoices.org
Summer in Upstate New York could feel like summer in South Carolina or Georgia by the year 2070 unless we take action to reduce heat trapping emissions today.

- *More heavy rains and stronger storms.* While average annual precipitation is expected to increase only slightly, precipitation more often will occur as events heavy enough to cause local flooding. Paradoxically, the studies also suggest that short-term droughts (1-3 months) will be more frequent, as dry spells between heavy rains grow longer and hotter.

- *More hurricanes and tropical storms.* When water vapor in the atmosphere condenses, energy is released and becomes added fuel for hurricanes and tropical storms. Because warmer water evaporates faster from the ocean surface, there is more condensing vapor available to energize the storms that arise over the open ocean. The number of strong storms in the Northeast has shown relatively little change yet, but warmer water temperatures are expected to feed stronger storms in the coming decades.

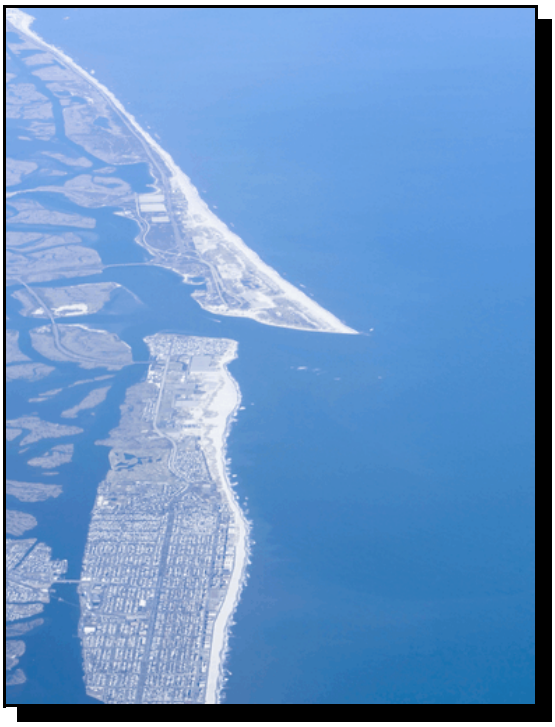
- *Shorter winters and longer growing seasons.* Data from the last 30 years indicate that much of the Northeast already has seen a change in the winter snow season. In the Adirondacks, total annual snowfall has decreased by 40 to 60 inches (more winter precipitation now falls as rain). During the same time, the period with

snow on the ground has decreased by as much as 20 days in some parts of the State. By the end of the century, parts of New York could see only 5 to 10 days of snow cover during the winter season.

- *Change of winter freeze and thaw dates.* Lake Champlain now freezes over, on average, 11 days later than it did when records began in the early 1800s. It also thaws earlier in the spring, and in 16 of the last 31 years it hasn't frozen over at all. In the Great Lakes region, later ice-in dates appear to be increasing the frequency of "lake effect" storms, very heavy snowfalls that occur when open water in the lakes is warmer than the surrounding land surface. If the lakes freeze over later in winter (or not at all), more lake effect events are expected.

- *The timing of spring bloom.* Plants bloom in response to the temperature, sunshine, rainfall and humidity, all factors that determine climate. Spring bloom dates in the Northeast are now, on average, 4 to 8 days earlier than in the 1960s. Across New York, the last frost is now 8 days earlier than in the 1970s. By the end of the century, New York's growing season is projected to be four to six weeks longer.

- *Sea level rise*. Measured at tidal gauges in New York Harbor, sea level today is more than 15 inches higher than it was 150 years ago. Some of this change is due to geological forces. The remainder comes from the expansion of ocean water as it warms and from the melting of glaciers and polar ice sheets, both factors that will increase as global temperatures warm. With so many forces at work, it is difficult to predict future sea level rise. Instead, scientists offer a range of possible levels, depending in part on whether CO_2 emissions are stabilized or continue to increase. By mid-century, a conservative projection puts global sea level between 2.5 and 13 inches higher than today. By the end of the century, scientists estimate a rise of between 4 and 33 inches, or higher. Scientists predict that this higher sea level could double the likelihood of a storm that produces a 100 year flood in New York City.



Long Island Sound

EFFECTS OF CLIMATE CHANGE

Shorter, warmer winters and longer growing seasons will affect the types of species that survive in our region, both on the ground and in the water. As temperatures rise, some plants and animals will move north or to higher elevations to find cooler conditions. In particular, New York's fisheries could undergo significant change. Today, New York's marine waters are home to a seasonal mix of cold and warm/temperate species, and our inland fresh waters support thriving populations of cold water fish like trout and salmon. In both marine and freshwater fisheries, warming waters may tilt the balance toward warm water species, diminishing the State's biodiversity.

It may also become too warm for traditional New York plants, such as sugar maple trees. The maple syrup season decreased by 2 to 4 days in the last 30 years; at some point in the future, maple syrup production may no longer be viable in our region. Increased local flooding will expand flood plain areas and increase the number of high velocity flows. Unchecked development in frequently inundated areas will increase the cost of replacement or relocation and the loss of natural flood absorption.

Rising sea waters may increase saltwater intrusion into drinking water supplies near the coast, making it harder to meet the high demand for water that accompanies development. The sea also could inundate tidal marshes and sensitive shallow habitats that support many species of fish and wildlife. While these critical aquatic habitats naturally migrate inland with rising water, attempts to buttress shorelines against rising seas will prevent lost habitat from replacing itself.

TAKING ACTION to PROTECT COMMUNITIES & PRIVATE PROPERTY

New York's communities and resource managers need to prepare for the inevitable changes in climate that are occurring. Protecting forests helps to store carbon, which helps mitigate the effects of climate change. Open space conservation programs and strategies that focus on protecting wetlands, forests, flood plains and the State's extensive coastlines, including the Great Lakes, should be our first line of defense to protect adjacent private property and communities from the increased storm intensity, flooding and rising coastlines.

These natural resource-based programs are usually far cheaper than "engineered" solutions that often shift the negative impacts down stream or to adjacent property owners, as well as not being sustainable for the long term nor protecting natural resources. While resource-based programs are usually cheaper and a worthy investment, they require a commitment of resources at the state and local level for implementation.

While it will be challenging for New York's communities to address climate change, acting *now* can avoid huge losses to private property and community resources later. Sensible land use regulations and incentive programs can help protect private property, save communities money and conserve valuable wildlife habitat and create recreational opportunities.

Several state agencies are working together with the State Smart Growth Cabinet to enhance the technical and financial assistance available to local governments to prepare communities for climate change.

How can the State's Open Space Conservation program respond to the effects of global climate change?

By acting upon and implementing strategies for:

- Protection of Our Coastlines;
- Protection of Riparian Areas & Wetlands;
- Promotion of Sustainable Forestry Practices; *and*
- Promotion of Urban & Community Forestry, & Green Infrastructure.

Protecting Our Coastlines

Great South Bay, Suffolk County

New York's coastlines are the third longest in the nation with over 15 million people, *85% of our State's population*, living and working in marine coastal counties. It is an area that accounts for 12% of the State's land mass. By 2010, an estimated 700,000 additional people will join them.

New York's coastal and estuarine lands provide great diversity of fish and wildlife habitats, bluffs, barrier islands, and other natural protective features. Enormous economic benefits are derived from the coast each year. New York's commercial fishing industry, ports and marinas, and coastal farming areas contribute billions annually to the State's economy.

As the warming of our climate continues, rising seas and increased storm surges will put New York's coastlines at a significant risk. Rising sea levels pose serious threats to coastal communities and natural resources around the globe, altering natural ecosystems and affecting the habitability of coastal cities and towns. According to the Northeast Climate Impacts Assessment conducted in 2007 by the Union of Concerned Scientists, as seas rise:

- Beaches and bluffs will suffer increased erosion, while the risk of severe flooding and storm damage will increase.
- Low-lying areas will be inundated, with potential for saltwater to infiltrate into surface waters and aquifers.
- Sewage and septic systems, as well as transportation infrastructure, are at risk from flooding and erosion.

NYS SEA LEVEL RISE TASK FORCE

www.dec.ny.gov/energy/45202.html

The Task Force was created in 2007 by the State Legislature to assess impacts to our State's coastline from rising seas and to recommend protective and adaptive measures. A DEC staff steering committee is organizing the research, analysis and writing to support the effort. Two technical work groups were established: 1) Infrastructure and Community Resilience; and 2) Natural Resources. Both groups are comprised of experts with essential knowledge of our State's coastal environments. The goal is to provide a useful report to help guide the State Legislature in taking action to assist local governments, public authorities, businesses and communities develop and implement effective strategies to address the potential impacts of sea level rise.

ACTIONS

- ***Gather data on baseline condition of habitats and species, population trends, and projections of impacts from climate change, especially in coastal, and riparian areas, in order to assess potential impacts, draft protective and adaptative strategies, monitor impacts, and mitigate expected impacts (DEC, NYS Sea Level Rise Task Force and partners). Implement the recommendations of the Sea Level Rise Task Force to protect our coastline and adapt to rising sea level.***
  - *Integrate sea level rise and other climate considerations into the DEC-Environmental Facilities Corporation assessment of water infrastructure needs and criteria for the Clean Water and Drinking Water State Revolving Loan Funds (DEC, EFC & NYS Sea Level Rise Task Force).*
  - *Install Sediment Elevation Tables (SETs) in select tidal wetland complexes to establish long-term sedimentation datasets to monitor marsh elevations and identify marsh responses to sea level rise and natural subsidence.*
- ***Work in partnership with the Gateway National Recreation Area to assist in the development of a new General Management Plan to guide the resource preservation and visitor use within the Jamaica Bay. Develop & implement short-term management, restoration and research priorities for tidal wetlands, as identified and developed in Jamaica Bay by the Jamaica Bay Task Force.***

JAMAICA BAY

Jamaica Bay, under the primary stewardship of the National Parks Service and Gateway National Recreation Area (Gateway), has seen a steady decline in the size of its marsh islands since 1974, when these tidal wetlands gained regulatory protections through the State's Tidal Wetlands Act (ECL Article 25). DEC's Jamaica Bay Task Force has been working in collaboration with the Parks Service, Gateway, NYCDEP and its partners in guiding the restoration of the marsh islands to 1974 acreage, including research of the causes of marsh loss and restoration efforts.

Establishing Riparian Buffers & Wetland Protections

RIPARIAN BUFFERS

Riparian (streamside) zones are biologically diverse vegetated ecosystems and often provide critical habitat for wildlife species, and also perform many important ecological functions, including temperature regulation, flood control, and stream bank stabilization. They are critical to maintaining healthy streams and waters and their conservation is a major element of any holistic watershed program. Riparian areas are often severely damaged during the land development process, leading to unintended negative impacts to our streams and rivers. Vegetated buffers help to reduce pollution entering waterways by slowing down and filtering runoff, thus extending retention time and improving water quality. Buffers also help to reduce flooding and erosion by stabilizing shorelines and absorbing high velocity flows. In addition, they serve an important role for wildlife as a shoreline transition zone and travel corridor.

Maintaining riparian buffers in the face of climate change, especially in the most critical areas prone to flooding and development pressure, will help protect human life and health and allow streams to move naturally. Modeling the "floodplain of the future" may be needed to accommodate the new hydrology likely to occur with more intense storm events.

The most detailed information on riparian buffer widths in NY come not from laws or regulations, but from guidance and voluntary programs encouraging best management practices (BMPs) in agriculture and timber harvesting.

While the ecological value of maintaining buffer zones is well understood and accepted, considerable debate exists over appropriate buffer zone width. Most regulatory buffer widths were designed for maintaining water quality and may not be adequate to protect fish and wildlife. Most of the research concludes that buffers solely designed or maintained to protect water quality are insufficient for protecting most fish and wildlife habitat. The best approach is to integrate goals for protection and restoration with site characteristics such as slope, soil characteristics, vegetation, land use, stream size, and nearby wildlife resources, and analyze buffer width on a site by site basis.

Conserving Natural Areas & Wildlife in Your Community: *Smart Growth Strategies for Protecting the Biological Diversity of New York's Hudson River Valley*
www.dec.ny.gov/lands/50083.html

One hundred feet should be considered an absolute minimum buffer width for streams regardless of site-specific characteristics. Whenever possible buffers greater than 100 ft, and preferably 300 ft or more, should be used for the protection of stream function, as well as fish and wildlife resources.

WETLANDS

Although wetlands and their shores, banks, and edges are sometimes included in the definition of riparian zones, wetlands are more often treated independently of riparian zones in the literature and in state and federal regulations. In general, *wetlands* are areas characterized by hydric soils that are inundated or saturated for part of the growing season and dominated by specific wetland plants. They are known by many names, such as marshes, swamps, bogs, and wet meadows. Wetlands are invaluable to the people and environment of our State, performing many crucial functions and providing multiple benefits.

However, for many years, their values have gone unrecognized and consequently, we have lost almost half of our State's wetlands to activities such as filling and draining, although in parts of the State, we are regaining wetlands due to abandonment of agricultural land.

Wetlands have an important position in the cycle of water within a watershed. They often serve as groundwater discharge sites to maintain base flow in streams and rivers, and to support ponds and lakes. In some places, wetlands are needed to recharge groundwater supplies. Wetlands help control erosion by slowing water velocity and filtering sediments, protecting reservoirs and navigational channels. They cleanse water by filtering out natural and many manmade pollutants, which are then broken down or immobilized. In wetlands, organic materials are also broken down and recycled back into the environment, where they support the food chain.

Stewart State Forest ~ East of Drury Swamp

Wetlands are one of the most productive habitats for for fish and wildlife, including many rare and endangered species, and, provide areas for recreation, education and research. They are also valuable open space, especially in developing areas where they may be the only remaining natural green space.

ACTIONS

- ***Establish and enhance riparian buffers and wetland protections to mitigate the effects of greater intensity rain events caused by climate change and to protect and improve water quality.***
  - *Provide increased protection of the State's freshwater and tidal wetlands laws by increasing penalties for violations, updating existing wetlands maps, and expanding the reach of the State's wetlands laws to include smaller wetlands.*
  - *Expand protection of aquatic habitat by regulating activities in more New York streams.*
  - *Enhance stream and floodplain/riparian protection by identifying appropriate river segments and, where appropriate, incorporating them into the State's Wild, Scenic and Recreational Rivers program.*
  - *Complete comprehensive trends analysis of wetlands in New York State to track acreage losses and gains of various wetland types.*
  - *Provide technical assistance and model ordinances that can be implemented during the next five years by local and regional governments to expand vegetative buffer requirements and limit inappropriate development along river and stream corridors, wetlands, flood plains and riparian areas. The program will focus on providing the tools to local governments to address this critical need, to protect private property and community resources in this era of increased storm intensity and flooding. By acting now, workable, community-based solutions can be developed that avoid the need for top-down, State driven regulations. (DOS & DEC)*
  - *Develop a long-term statewide program to prioritize high risk floodplain areas for conservation through acquisition and easement. Include plans to facilitate tidal wetland migration in response to sea level rise.*
  - *Identify properties in danger of flood impacts and provide technical assistance to municipalities to establish zoning laws to ensure that only appropriate development occurs around identified floodplain areas (DEC& DOS).*
  - *Assist communities in modeling the "floodplain of the future" to accommodate the new hydrology likely to occur with more intense storm events due to climate change.*

- *Work to provide targeted training to stream professionals and contractors on in-stream project practices; and to public and to local governments on stream dynamics and methods and tools for responding to flood emergencies and post-flood problems in watershed.*

- *Vigorously enforce stream and wetland protection laws and provide authority for injunctive relief.*

- *Continue to support state, local government and non-profit acquisition of priority projects (listed in Chapter V) that protect wetlands and riparian areas identified by the Regional Open Space Advisory Committees.*

❑ ***Provide technical assistance to local governments.***

- *Provide assistance to communities to develop and implement comprehensive plans, local open space, biodiversity and watershed protection programs, and develop Community Preservation Acts. (DEC & DOS)*

- *Encourage communities to sign the Climate Smart Communities Pledge and provide assistance for implementation.*

- *Enhance the State's Smart Growth web site to better deliver technical assistance to local governments in the areas of smart growth, open space protection, carbon management, adaptation to climate change and the Climate Smart Communities pledge. (DOS)*

- *Develop a webpage resource for local governments on a wide variety of environmental topics including open space planning, stormwater management, urban & community forestry,SEQR, Ecosystem Based Management, pesticides, riparian buffers, roadside ditch management, barrier mitigation (dams/ culverts), floodplain management, training opportunities, watershed planning, and implementing the Climate Smart Communities pledge, including implementation and adaptation measures. (DEC)*

- *Build upon the successful natural resource-based outreach and technical assistance activities of the Hudson River Estuary Program. (DEC)*

Ocean & Great Lakes Conservation Council
www.nyoglecc.org

On April 8th, 2009, the New York Ocean & Great Lakes Ecosystem Conservation Council completed a report, "Our Waters, Our Communities, Our Future." The Council's nine-member State agencies collaborated to detail opportunities to protect and enhance New York's shoreline waters through an "ecosystem-based management" approach to decision-making within their respective missions. This is a clear break from traditional, often segmented resource management methods; shifting to recognize the inter-connections among various ecosystems; and the need to manage our human activities to ensure ecosystems can deliver what we will need.

Promoting Sustainable Forestry

TREES – THE CARBON STORAGE EXPERTS
CARBON SEQUESTRATION

Scientists are continuing to study ways of pulling carbon out of the atmosphere and storing it long-term elsewhere in order to slow the increase of carbon dioxide which is trapping heat in the Earth's atmosphere and causing temperatures to rise across the globe. This process is called carbon sequestration, and high-technology methods to achieve this are being explored worldwide.

We can, however, increase carbon sequestration now by working with some resident experts. They're called trees, and they have almost 350 million years experience in sequestering carbon. Trees, like other green plants, use photosynthesis to convert carbon dioxide (CO2) into sugar, cellulose and other carbon-containing carbohydrates that they use for food and growth. Trees are unique in their ability to lock up large

amounts of carbon in their wood, and continue to add carbon as they grow. Although forests release some CO2 from natural processes such as decay and respiration, a healthy forest typically stores carbon at a much greater rate than it releases it.

Typical carbon sequestration rates for managed forests in the Northeast average from 1 to 3 tons of carbon per acre per year. The actual rate of carbon sequestration will vary with species, climate and site, but in general, younger and faster growing forests have higher annual sequestration rates. Considering that one half of the weight of dried wood is carbon, trees in a forest hold a lot of carbon. *When the enormous amount of carbon stored in forest soils is added to the trees' carbon, the inescapable conclusion is that forests are one of our major carbon storage reservoirs working for us today.*

The main strategies for using forests for carbon sequestration are listed below in order of their potential for carbon sequestration in New York:

- *Active forest management.* Enhancing forest growth through sustainable forestry.
- *Avoided deforestation.* Reducing the loss of forested land by promoting smart growth, and limiting sprawl.
- *Forest preservation.* Leaving forests un-disturbed as is done in the 3 million acre Adirondack and Catskill Forest Preserve.
- *Afforestation.* Adding forest to previously unforested land, as was done on State Forest land during the Great Depression.

Although forests alone can't sequester all of the excess carbon added by burning fossil fuels, they clearly play a significant role. Wisely managed forests can sequester carbon and also provide a sustainable source of fuel and lumber, help clean our air and water, preserve wildlife habitat, provide recreation opportunities and preserve the beauty of trees in their natural setting for generations to come.

NEW YORK'S PRIVATE FORESTS

More than 62% of New York State is forest land, which amounts to 18.6 million acres of land covered by trees. Approximately, 14.8 million acres or 80% of New York's 18.6 million acres of forest lands are privately owned. Approximately 12 million acres of private forest land is left unmanaged and could contribute significant carbon sequestration under active forest management.

NEW YORK'S FOREST PRESERVE

Large forests have the capacity to capture large amounts of atmospheric carbon dioxide, providing front-line defenses against the many impacts of global warming. The approximate 3 million acres of the Adirondack and Catskill Forest Preserve are conservatively estimated to sequester 3 million tons of carbon per year.

"The cost of U.S. forest-based carbon sequestration," Pew Center on Global Climate Change. Stavins and Richards (2005).

ACTIONS

- ***Promote sustainable forestry by providing technical assistance and incentives to private forest landowners.***
  - *Work to update and modernize assistance programs to private land owners who retain their lands in forest, flood plains and other open space.*
  - *Continue to provide State funding and pursue federal funding through the programs in the 2008 Farm Bill for private land forest and habitat management, and land conservation programs in partnership with the federal Natural Resource Conservation Service and State Technical Committee, local governments and land trusts.*

- ***Ensure that climate change policies support sustainable forestry as a carbon positive climate solution and support the use and development of new, environmentally friendly bio-based energy sources.***
  - *Explore ways that the Regional Greenhouse Gas Initiative (RGGI) and other state, federal and local government programs can help provide financial assistance and education to private forest land owners to promote long-term sustainable forestry (DEC).*
  - *Encourage RGGI and related federal initiatives to recognize forest management, avoided deforestation, afforestation and reforestation as legitimate offset categories (DEC).*
  - *Examine and develop new initiatives to establish financial assistance mechanisms for private forest landowners to calculate and manage the value of sequestered carbon in a market situation, in order to encourage sustainable forest management practices that result in enhanced carbon sequestration and long-term forest retention (DEC).*

Promoting Urban Forestry & Green Infrastructure

Open space initiatives and conservation efforts can effectively address climate change impacts unique to poor communities and communities of color. These environmental, health and socio-economic impacts such as heat related mortality, elevated asthma rates, economic and cultural displacement due to flooding and rising energy costs, air pollution, water pollution, and loss of traditional medicinal plants and animal species relied upon for subsistence, can all be mitigated through open space planning and prioritization of open space initiatives that target these impacts. For instance, more green open space and green infrastructure in Environmental Justice (EJ) communities can ensure overall carbon reductions, mitigate urban heat island effect, improve air quality, reduce combined sewer overflows that compromise water quality, and enhance quality of life in these communities.

URBAN & COMMUNITY FORESTRY

All of the trees within a town, village, or city make up the "community forest." The community forest can include street and yard trees, parks, cemeteries, golf courses, school grounds, and undeveloped green spaces. Urban and community forestry is the management of community forests to establish and maintain healthy trees for air and water quality benefits, energy savings, environmental health, as well as to enhance the quality of life in our urban areas where a majority of our State's citizens live and work.

Trees have numerous effects on human health and quality of life. They add aesthetic benefits which soften the gray infrastructure of urban landscapes. When people utilize parks and shady tree-lined streets, they are more likely to meet and establish bonds with their neighbors, which helps to create a sense of community. When people enjoy spending time in their neighborhoods, they develop pride and a sense of ownership in their communities.

The presence of trees and the proximity to parks has been shown to increase residential and commercial property values. Thus, 'greening' our urban areas and communities helps to enforce our State's Smart Growth initiative (*see Fostering Green, Healthy Communities*) to combat urban sprawl, to make our existing urban areas and communities more attractive; and to respond to the concern of open space conservation areas in

rural areas attracting sprawl developments by targeting these locations to increase real estate values.

www.milliontreesnyc.org

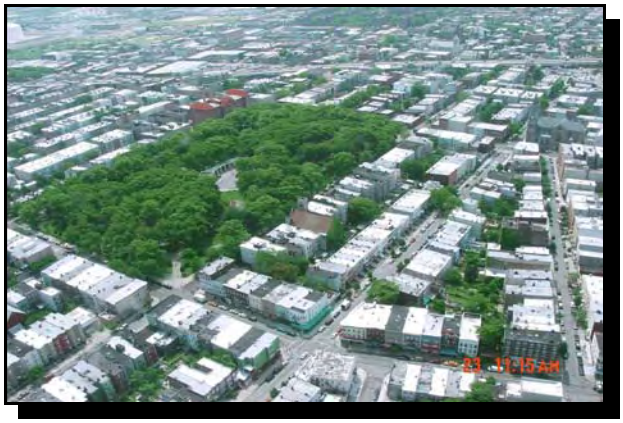
Social benefits are supplemented with environmental and health benefits. Trees remove air and water pollutants through both their root systems and their leaves. Tree canopies shade buildings, sidewalks, streets and other structures keeping them cooler, reducing air conditioning and other energy needs in the summer; and reducing the overall *"urban heat island effect."* Strategically placed trees of appropriate species will shelter buildings from cold winds in winter months, reducing heating costs.

URBAN HEAT ISLAND EFFECT

The heat island effect is a term used to describe the effect caused by a concentration of buildings, concrete and asphalt, such as those in urban areas, which absorb and then radiate the heat of the sun, causing temperatures to be higher for an extended period of time compared to surrounding rural areas. Where there are fewer trees in cities and large communities, solar energy is more readily absorbed into manmade structures, causing higher urban area temperatures. Trees and urban green spaces help to reduce the urban heat island effect, while providing additional benefits which improve the quality of life in urban areas.

Trees act as nature's air conditioners by helping to cool the surrounding air in two ways: (a) providing shade to keep street and building surfaces cooler; and (b) through evapo-transpiration, the process by which trees transpire from both the leaves and the root systems. As the water evaporates it dissipates heat in and around the tree leading to cooler air around the tree.

Higher urban temperatures along with increased air pollution can result in the formation of smog, which has been shown to cause severe respiratory problems for many, leading to increased health costs. Tree leaves can help reduce air pollution by "capturing" airborne particles found in smog such as nitrogen oxide, hydrocarbons, sulfur dioxide and other particulates, while at the same time releasing oxygen.



New York State Energy Research & Development Authority
www.nyserda.org/programs/Environment/EMEP/home.asp

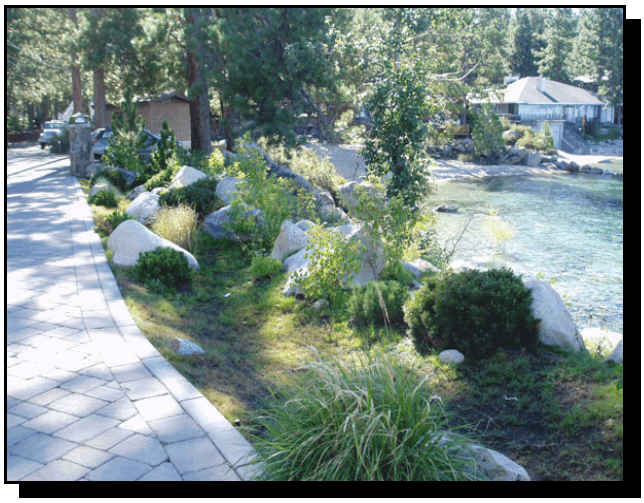
GREEN INFRASTRUCTURE

www.greeninfrastructure.net

Increasing the utility and benefits provided by trees and their leaf foliage has led to the coining of a new term, *"Green Infrastructure,"* to describe the concept of strategically planned and managed networks of natural lands, working landscapes and other open spaces that conserve ecosystem values and functions, providing associated benefits to human populations.

Although green infrastructure is a landscape scale enterprise, smaller scale implementation of this approach is being recognized at the urban level. Within our cities, "green infrastructure" uses plants and natural systems versus man-made, typical concrete-and-steel structures, to perform functions of cooling, air and water purification, stormwater management, and physical aesthetics. In the form of green roofs, green infra-structure reduces the urban heat island effect; in rain

increases property values – it's the closest thing to a cure-all for a myriad of problems that we have in our urban areas; and it may be cheaper than traditional engineered solutions.



http://efc.syracusecoe.org/projects/index.aspx

Environmental Finance Center, Syracuse University

A thick garden of vegetation absorbs stormwater and protects the quality of our water sources.

One of the most popular and extensively used forms of green infrastructure seen throughout Europe are vines used to shade and cool buildings. With the development of modern trellis systems made with stainless steel cables or modular screen structures, it is now possible to use vines on tall modern buildings, keeping them away from the wall. Along with green roofs and vegetated green walls, green facades (the term for walls that use vines), provide a quick way to enhance the effectiveness of urban forests by providing additional foliage coverage on the vertical structures that make up our urban landscape.

Perhaps most importantly, green infrastructure treats fresh water as the valuable resource that it is, rather than as a waste product to be drained away and disposed of.

ONONDAGA COUNTY

The need for infrastructure improvements for water quality in Onondaga County has provided an opportunity to explore the use of green alternatives. A collaborative effort among state agencies, local governments, educational institutions and non-profits is underway to address the various questions that come with new solutions to old problems. Lessons learned in Onondaga County will assist us in a Green Infrastructure initiative statewide.

THE COST OF MANAGING STORMWATER

www.epa.gov/owow/nps/lid/costs07/documents/reducingstormwatercosts.pdf

The cost effectiveness of green infrastructure techniques concerning stormwater management has been thoroughly documented by the USEPA's 2007 report "Reducing Stormwater Costs through Low Impact Development (LID) Strategies & Practices." This report offers detailed financial information on benefits of LID. In the majority of 17 case studies of various municipalities in the country, the cost of LID techniques were 15 to 80% cheaper than conventional techniques used to manage stormwater. Similarly, Riverkeeper's 2007 Report,"Sustainable Raindrops," (www.riverkeeper.org/special/Sustainable_Raindrops_FINAL_2008-01-08.pdf) demonstrates the effectiveness of stormwater source controls

ACTIONS

- ***Expand State assistance programs for urban and community forestry to increase the tree canopy in New York's communities.***
  - *Establish, research and support the propagation and use of native tree, shrub and vine species at our State's Saratoga Tree Nursery to provide native species in the commercial market especially for use in urban forestry and green infrastructure applications (DEC).*

- *Develop a comprehensive green infrastructure program including technical assistance and web-based resources to local governments, state agencies and commercial nurseries and private citizens.*

Online Resources

The Conservation Fund
www.greeninfrastructure.net

United States Environmental Protection Agency
http://cfpub.epa.gov/npdes/greeninfrastructure/technology.cfm#greendev

NYC Department of Parks & Recreation
www.nycgovparks.org/sub_your_park/trees_greenstreets.html