

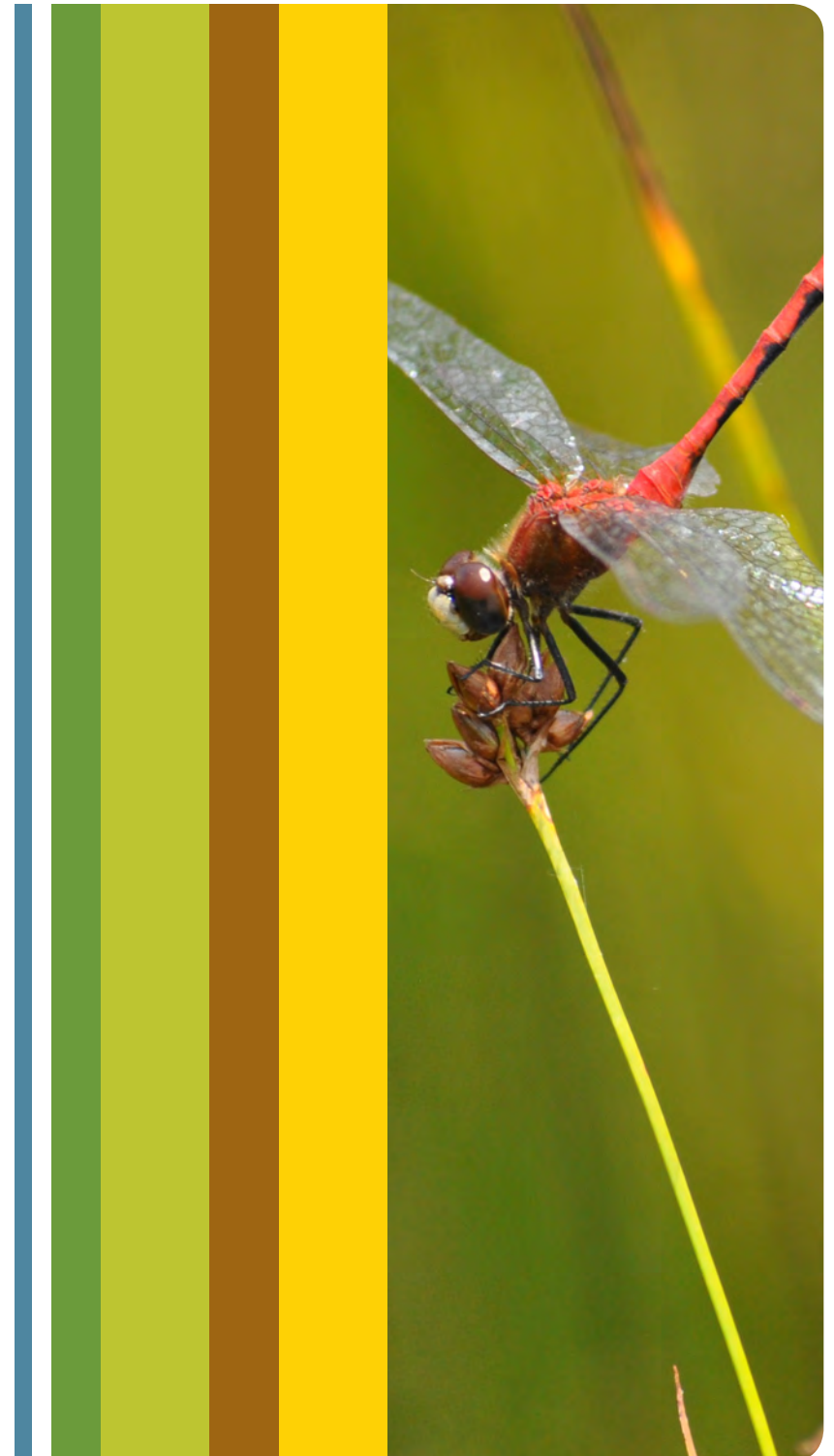
Chicago Wilderness

CLIMATE ACTION PLAN FOR NATURE COMMUNITY ACTION STRATEGIES



CHICAGO COMMUNITY
CLIMATE ACTION TOOLKIT

Find this and other climate action tools at
climatechicago.fieldmuseum.org



COMMUNITY ACTION STRATEGIES

Climate change is affecting both people and nature in the Chicago region. Chicago Wilderness, a regional alliance of more than 250 organizations, created a plan called the Chicago Wilderness Climate Action Plan for Nature (CAPN)¹ to address the impacts of climate change on local nature and identify strategies to help humans and nature respond and adapt to changes in our climate.

This document outlines how residents of the Chicago region can help implement the goals of the CAPN in their own community through the following ways:

1. Climate-Friendly Gardens and Lawns
2. Water Conservation
3. Monitoring
4. Stewardship
5. Climate Change Education

These community action strategies are designed to assist individuals and communities to:

1. **mitigate**, or lessen the future impacts of, climate change by reducing greenhouse gas emissions,
2. help plants and animals adapt to climate change, or
3. both.

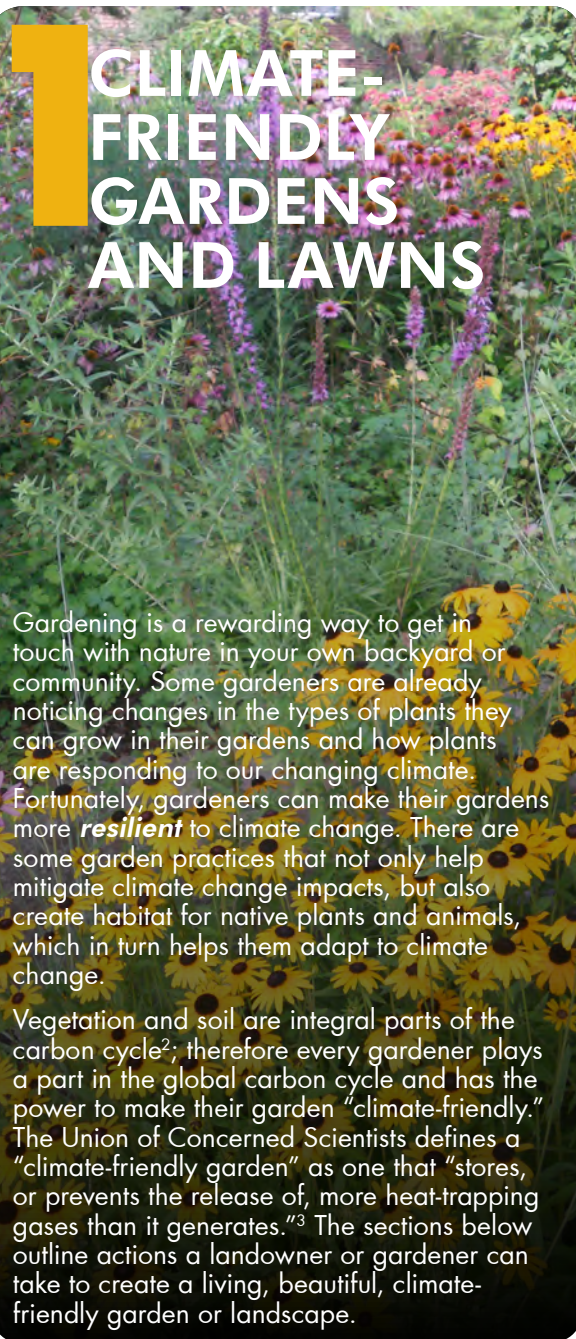
For example, converting lawn into gardens can help people, plants, and animals both mitigate and adapt to climate change. Gardens do not require mowing and can provide natural habitat (homes) for birds, butterflies, and other insects.

Each strategy is described in detail in the sections below, including specific examples of action items and links to more resources. Technical terms are included in italics and defined in the glossary at the end.

- 1 CLIMATE-FRIENDLY GARDENS AND LAWNS
- 2 WATER CONSERVATION
- 3 MONITORING
- 4 STEWARDSHIP
- 5 CLIMATE CHANGE EDUCATION

Did you know that the Chicago region has two additional plans that address climate change? The Chicago Climate Action Plan (www.chicagoclimateaction.org) is the City's roadmap to reduce greenhouse gases to 25% below 1990 levels by 2020 and 80% by 2050. GO TO 2040 (www.goto2040.org), our comprehensive regional plan, provides guidance for seven counties and 284 communities in the Chicago region to plan together for sustainable prosperity through mid-century and beyond.

¹Chicago Wilderness Climate Action Plan for Nature. Chicago Wilderness. June 2010. http://www.chicagowilderness.org/pdf/CAPN_Brochure-FINAL_singlepages_WEB_6.21.10.pdf



Gardening is a rewarding way to get in touch with nature in your own backyard or community. Some gardeners are already noticing changes in the types of plants they can grow in their gardens and how plants are responding to our changing climate. Fortunately, gardeners can make their gardens more **resilient** to climate change. There are some garden practices that not only help mitigate climate change impacts, but also create habitat for native plants and animals, which in turn helps them adapt to climate change.

Vegetation and soil are integral parts of the carbon cycle²; therefore every gardener plays a part in the global carbon cycle and has the power to make their garden "climate-friendly." The Union of Concerned Scientists defines a "climate-friendly garden" as one that "stores, or prevents the release of, more heat-trapping gases than it generates."³ The sections below outline actions a landowner or gardener can take to create a living, beautiful, climate-friendly garden or landscape.

Photo: Courtesy of Dennis Page

PLANT SELECTION AND ARRANGEMENT

Use native plants

Planting native plants in a garden can provide many environmental benefits. Native plants are species that have lived in the Chicago region for thousands of years and are well adapted to local growing conditions. Some native plants have characteristics that make them climate-smart garden choices, such as the ability to withstand summer droughts.

Once they have taken root and matured, native plants do not require mowing, intensive watering, or fertilization, making them less resource-intensive, more sustainable options for the climate-friendly garden.

Native plants are good options for maximizing a garden's **carbon sequestration** (ability to remove carbon from the atmosphere and store it in the garden's plants and soils). Many native plants are long-lived and have long, complex root systems that are able to sequester more carbon than short-rooted plants like lawn grass and annuals. Since these plants are continually growing and shedding old plant parts, they are helping add organic matter, or carbon, to the soil. Much of this carbon is returned to the atmosphere through **respiration** and **decomposition** processes, but some carbon remains captured or bound in the plant tissues and soil. This carbon will remain stored in this form unless otherwise distributed.

Additionally, the long, complex root systems of native plants create pathways in the soil that help rainwater to soak directly into the ground instead of flowing into a nearby sewer or waterway. This increases a garden's capacity for **stormwater infiltration** (amount of rainwater the garden can absorb).

Use climate-smart plants

Climate change scientists predict that the Chicago region's climate will become hotter and drier, with more precipitation occurring in large storm events



R E S O U R C E S

Watch a **Native Plant Garden video** featuring a Field Museum scientist, on *Chicago Tonight*. <http://chicagotonight.wttw.com/2011/08/18/native-plant-gardens>

Conservation @ Home is a program for homeowners looking to incorporate native plants and other sustainable practices into their yard. <http://www.theconservationfoundation.org/conservation--home.html>

The **US EPA Green Landscaping** site is a clearinghouse of information on native landscaping. <http://www.epa.gov/greenacres/index.html>

Wild Ones is a nonprofit organization that promotes environmentally sound landscaping practices. <http://www.for-wild.org>

Blue Thumb provides resources on designing and selecting plants for your native garden. <http://www.bluethumb.org>

²"The Carbon Cycle." Landscapes For Life. 2011. http://www.landscapeforlife.org/give_back/3a.php.

³"The Climate-Friendly Gardener: A Guide to Combating Global Warming from the Ground Up." Union of Concerned Scientists. April 2010. http://www.ucsusa.org/assets/documents/food_and_agriculture/climate-friendly-gardener.pdf.

resulting in more frequent floods. When planting gardens, select plant species that are able to withstand periods of drought and a wide range of moisture; they will be better able to adapt to climate change.

Plant trees and shrubs

All plants store carbon in their tissues—leaves, stems, wood, and roots—but long-lived, healthy, large trees and shrubs are able to store more carbon for longer periods of time, making them climate-smart choices. Also, well-placed trees and shrubs can provide shade and reduce energy use in homes and buildings. The city of Chicago’s trees—our “urban forest”—remove about 888 tons of air pollutants and 25,200 tones of carbon per year. They are also estimated to store 716,000 tons of carbon. Planting trees and shrubs is an important climate action strategy for the Chicago region.⁴

Create bird and wildlife habitat

Any backyard or vacant lot can become a sanctuary for local wildlife. Creating a backyard habitat is a wonderful way to invite nature into your community while providing critical places for birds, insects, and mammals to feed, rest, and raise their young.

Over thousands of years of living together, our region’s plants and insects have become very dependent on each other. Often a butterfly or insect species requires a specific native (or “host”) plant to complete its life cycle. By planting specific host plants, a garden can provide essential habitat for our native insects that may be stressed by climate change. Creating a network of native gardens can

create corridors for migration through our urban areas.

Plant arrangement and diversity may also influence the habitat quality of a garden. Multi-layered gardens that incorporate mature trees, small trees, berry or fruit-bearing shrubs, grasses, and flowers are attractive to birds, and groups of colorful, flowering, native plants are attractive to butterflies. Providing a water source in the garden can benefit both. Rather than cutting off all your plant’s flower heads in the fall (“fall clean-up”), consider leaving seed heads on to provide a natural food source for winter birds.

Planting a variety of native plants will help create balance in your garden. A complex garden will support a variety of insects, birds, and bats that eat harmful insects, naturally keeping these populations in check.

Grow your own food

Growing your own food is often more climate-friendly than purchasing food, because it cuts down on processing, packaging, and transportation—all of which require energy. But not all local food is grown in a climate-friendly way. To grow a climate-friendly, edible garden, take steps to maximize carbon storage and minimize use of chemical fertilizers and pesticides, which require large amounts of energy to produce.

Try companion planting: for example, fragrant herbs can keep many harmful insects away from nearby fruits and vegetables. In large vegetable gardens, rotating the location of crops each year can also

make pests and diseases easier to manage without chemicals. To minimize fertilizer use, consider planting cover crops like cereal grains in the fall. Cover crops are not harvested; their purpose is to store carbon and nourish soil over the winter, making soil more productive and drought-resistant in the spring.



Nodding Onion
(*Allium cernuum*)

R E S O U R C E S

Bringing Nature Home is a website by Doug Tallamy, a professor at the University of Delaware who has been studying insects and their role in the environment for over 20 years.
<http://bringingnaturehome.net/native-gardening>

“The Climate-Friendly Gardener: A Guide to Combating Global Warming from the Ground Up” by the Union of Concerned Scientists.
http://www.ucsusa.org/assets/documents/food_and_agriculture/climate-friendly-gardener.pdf

Guide to a Climate-Friendly Diet, another tool produced by The Field Museum as part of the Chicago Community Climate Action Toolkit, provides more information and local examples about the link between your diet and your carbon footprint.
climatechicago.fieldmuseum.org/food

National Wildlife Federation has a website and series of YouTube videos on how to create certified wildlife habitats in your yard.
www.nwf.org/gardenforwildlife <http://www.youtube.com/NationalWildlife#g/c/66088158FF933E91>

⁴Assessing Urban Forest Effects and Values. USDA Forest Service. February 2010. <http://www.itreetools.org/resources/reports/Chicago%27s%20Urban%20Forest.pdf>

Many popular fruits grow on woody trees and bushes that have a high capacity for carbon storage. Consider planting these and other perennial edibles: because they return each year, they are generally less resource-intensive than annual crops, which die each year and then must be re-planted. Heirloom varieties of fruits and vegetables are worth exploring too, as they often are less dependent on fertilizer.

CARE & MAINTENANCE

Minimize mowing and watering

Mow lawn grass high in order to encourage longer roots, or consider replacing underutilized lawn areas with more drought-tolerant grasses, groundcover, or low-maintenance native species that do not require mowing. Consider using a low-impact push or electric mower for areas that must be mowed, and reduce or eliminate lawn equipment that produces carbon dioxide emissions such as leaf blowers and diesel lawn mowers.

In the city of Chicago, up to 40% of summertime water use is attributed to watering our gardens and lawns. Water your lawns during the coolest part of the day to reduce evaporation. Use mulch around planting beds to retain moisture and reduce the need for watering.

Nurture plants naturally

Lawn maintenance can be resource-intensive. To minimize environmental impact, avoid chemical fertilizers and pesticides, choose natural products, and use fertilizer only as necessary.

Avoid planting mixtures and soils that contain peat, a slow-forming type of organic matter that is harvested from northern peat bog wetlands. Peat harvesting can destroy the wetlands and release carbon that was previously locked up in the soil.

Compost

Composting is a simple way to reduce the amount of waste added to the municipal waste stream. Up to 30% of our household waste is food scraps that can be composted. Yard trimmings and leftover food constitute approximately 26% of total municipal waste in the United States. Composting food scraps and landscape waste on-site means fewer garbage trucks, fewer landfills, and fewer **greenhouse gas emissions**. Composting produces organic, nutrient-rich soil that can be used to help improve a garden's soil quality and reduce the need to purchase energy-intensive chemical fertilizers.

LOCATION

Create a green roof

Rooftop gardens help lower a building's cooling costs in the summer—and lower heating bills in the winter. They can also absorb stormwater and reduce runoff, decreasing the demand on the municipal water treatment system. In urban areas like Chicago, rooftop gardens and green space help cool the neighborhood and reduce the urban “**heat island**” effect.⁵



R E S O U R C E S

National Wildlife Federation's Green Landscaping Tips: <http://www.nwf.org/Global-Warming/Personal-Solutions/Green-Landscaping.aspx>

Chicago Home Composting, hosted by University of Illinois Extension, provides general information on composting as well as specific guidance for city of Chicago residents. <http://urbanext.illinois.edu/homecomposting/>

City of Chicago's Guide to Rooftop Gardening: http://www.artic.edu/webspaces/greeninitiatives/greenroofs/images/GuidetoRooftopGardening_v2.pdf

GreenNet Chicago is a coalition of nonprofit organizations and public agencies committed to sharing information and resources. It serves as a clearinghouse for information about green space in Chicago. <http://greennetchicago.org/>

NeighborSpace is a non-profit organization that can help community groups work with private and public partners to preserve and expand community managed open space in Chicago. <http://neighbor-space.org/>

Watch **Lawns**, an animated video from The Field Museum's *Restoring Earth* exhibition, to learn more about creating a healthier, more sustainable backyard: <http://vimeo.com/31040373>

Photo: Courtesy of Jane and John Balaban



As part of the **Chicago Community Climate Action Toolkit project**, organizations in the Pilsen and Forest Glen communities designed and installed native gardens. In Pilsen, a daycare center, a Mexican hometown association, and an environmental justice organization came together to install a native plant garden on a reclaimed vacant lot. The garden will be used as a play space for the daycare center and to educate the community about climate change. In Forest Glen, a Boy Scout troop planted a native garden at a local nature center, where it will be used to educate visitors about the benefits of native plants to the environment. To learn more, visit:

climatechicago.fieldmuseum.org/pilsen
climatechicago.fieldmuseum.org/forestglen



Transform underutilized space

There are many unused spaces in our neighborhoods that can be transformed into a garden. The Chicago region has a strong and growing community of gardeners who are creating gardens in vacant lots, parkways, parks, at sidewalk corners, and along railroad corridors. These gardens take a strong commitment from a dedicated group of community members. But they can provide neighborhoods with shade and cooler temperatures in summer, beauty and animal habitat, a place to socialize with neighbors and educate youth, and fresh food.



Nodding Onion
(allium cernuum)



R E S O U R C E S

Landscape for Life Website and Workbook shows how to work with nature in your garden: <http://landscapeforlife.org/>, http://www.landscapeforlife.org/publications/LFL_Workbooks_Print_downloadable.pdf

City of Chicago's Sustainable Backyard Program provides education on environmentally-friendly landscaping and rebates for Chicago residents on trees, native plants, compost bins, and rain barrels: <http://www.cityofchicago.org/rainbarrel>

WATER CONSERVATION

The Chicago region is expected to become warmer and drier in the coming decades. Even though Chicago sits on the shores of Lake Michigan, one of the world's largest freshwater bodies, this does not mean that we have an unlimited amount of water. Although intense storms and flooding are expected to become more common, much of the precipitation will end up leaving the region in the form of **stormwater runoff**. This is because we have greatly altered the natural **hydrology** of our landscape by replacing pervious spaces (allowing water to pass through) such as natural areas and green spaces with impervious surfaces like concrete and pavement.

Unfortunately, the status quo for decades has been to design systems that send stormwater off-site as quickly as possible and into sewer and drainage systems. These drainage systems carry water away from the site, and eventually our region, resulting in less precipitation soaking into the ground where it falls to replenish groundwater levels. Instead our water washes downstream in the form of runoff.

This shift in water availability will affect not only our own demand for water, but also which plants and animals are able to thrive. Practicing water conservation and increasing the permeability of our landscape can greatly help reduce the magnitude of this impact on our region.

Improve stormwater infiltration

One way to help retain **groundwater** is to create pathways for water to soak into the ground where it falls to recharge water levels. This can also help reduce basement flooding. Stormwater can be managed on-site through a variety of practices, including replacing impervious surfaces such as concrete with permeable pavers or gardens. In addition, **rain gardens** of native plants can be planted where water tends to collect.



Photo: Courtesy of NeighborSpace

Practice efficient watering

Water the lawn or garden during the coolest part of the day (early morning/late evening is best), and only water the lawn when necessary: once a week, if rainfall isn't sufficient. Avoid watering on windy and hot days (to reduce evaporation) and do not over water: water no more than one inch each week. This watering pattern will encourage healthier, deeper grass roots.

Capture rainwater

Capturing rainwater to use in the garden or yard is an excellent water conservation strategy. It also decreases stress on the sewer system during heavy storm events. Consider disconnecting your downspout and/or installing a rain barrel or cistern to capture rainwater.

Special Note on Watering Food: Water collected through a rain barrel generally contains some polluted materials from the roof. Though the pollution is not very different from the air pollution that also lands on soil and plants, to be safe it is best to water your edible plants around the roots (rather than showering on top). Also always make sure to rinse your vegetables and fruits in the sink before cooking or eating them.





RESOURCES

What Our Water's Worth is an ongoing campaign led by the Metropolitan Planning Council and Openlands to raise awareness about the value of water in northeastern Illinois and northwestern Indiana.

<http://www.chicagolandh2o.org>

The Field Museum's Water Calculator provides easy-to-use tools for adults and kids to calculate their water usage.

<http://watercalculator.fieldmuseum.org/>

Water: From Trouble to Treasure, A Pocket Guide to Green Solutions, published by the Center for Neighborhood Technology (CNT), is a field guide to understanding and advancing "green" stormwater.

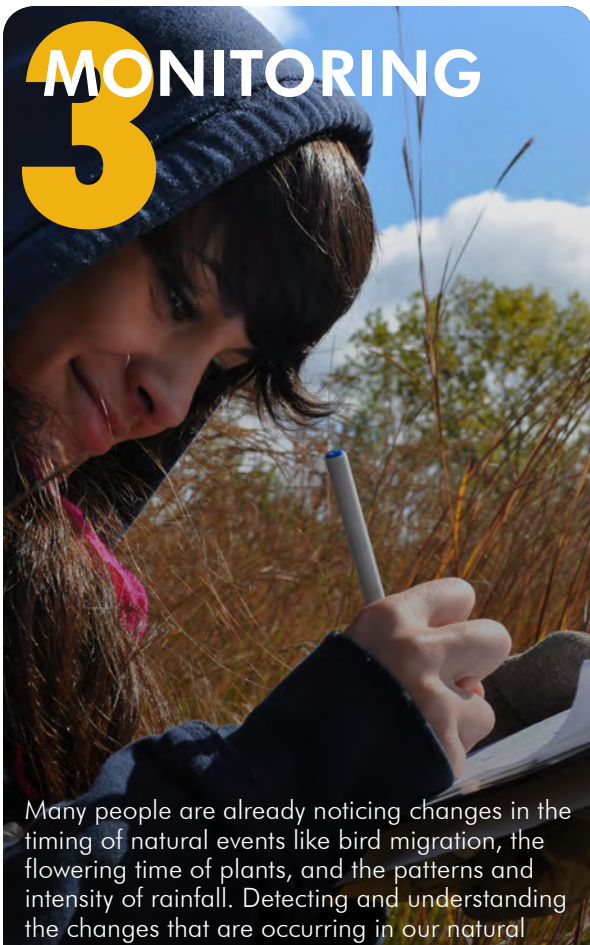
http://www.cnt.org/repository/Water_booklet_final.pdf



As part of the Chicago Community Climate Action Toolkit project, a Boy Scout Troop installed 40 rain barrels at homes, schools, and businesses throughout the Forest Glen community. During installation, they educated homeowners about how rain barrels help to conserve water and reduce flooding. To learn more, visit climatechicago.fieldmuseum.org/forestglen.



3 MONITORING



Many people are already noticing changes in the timing of natural events like bird migration, the flowering time of plants, and the patterns and intensity of rainfall. Detecting and understanding the changes that are occurring in our natural world is key to successfully adapting to climate change.

There are several community-based monitoring programs that encourage individuals and organizations to become everyday scientists by collecting data in their neighborhoods. Volunteer observations create a large set of data that can help us better understand, mitigate, and adapt to climate change. Plus, volunteers develop stronger skills of observation and scientific study while spending time outside, learning, and having fun.

Participate in a community-based monitoring program

Project Budburst invites volunteers to share observations of the timing of plants' first leaf, flower, and fruit. This data helps scientists monitor plant responses to a changing climate.

Here are some monitoring programs in our region:

- The Chicago Wilderness Habitat Project provides information about regional monitoring programs for plants, birds, frogs, butterflies, dragonflies, and squirrels.
- CoCoRaHS is a grassroots volunteer network that collects data on rain, hail, and snow at sites across the country. This data is important to understand how the timing, distribution, and intensity of precipitation is changing with climate change.
- The Illinois Volunteer Lake Monitoring Program and Illinois RiverWatch Network train volunteers in techniques for assessing the health of local waters.

All of these programs provide training and resources to individuals or groups who are able to commit to monitoring a specific site for a set period of time.



R E S O U R C E S

Project Budburst (plants):
<http://neoninc.org/budburst/index.php>

Chicago Wilderness Habitat Project:
 (plants and animals): <http://www.habitatproject.org/opportunity/monitor.html>

Illinois Volunteer Lake Monitoring Program: <http://www.epa.state.il.us/water/vlmp/>

Illinois RiverWatch Network:
<http://www.ngrrec.org/riverwatch>

CoCoRaHS: <http://www.cocorahs.org/>

4 STEWARDSHIP



Your backyard garden provides environmental benefits and **ecosystem services** (such as shade, clean air, butterfly habitat, etc.) to your community. Similarly, parks, forest preserves, and community gardens provide important benefits to our neighborhoods and cities on a larger scale. Green spaces and natural areas clean the air and water, reduce pollution, decrease flooding, and provide habitat for native plants and animals. These areas also retain carbon that otherwise would be released into the atmosphere as carbon dioxide, a major contributor to climate change.

While all green space is valuable, healthy natural areas are able to provide more ecosystem services per acre than parks and lawns. Healthy, diverse natural areas are more resilient to climate change than degraded natural areas.

Restore and manage healthy urban natural areas

Join a volunteer stewardship group to enhance or maintain healthy, diverse natural areas in your community. Volunteers from all walks of life help restore health to local nature in parks, preserves, and natural areas across the Chicago region. Under the guidance of regional experts, stewardship volunteers help plant native species, collect seeds, control **invasive species**, build trails, and assist with environmental education. The region has a strong and growing community of stewardship volunteers, and a volunteer workday can be a great way to meet new people and learn first-hand about local plants and animals.

Create and/or install wildlife habitat structures

When creating or improving natural habitat is not an option, urban communities can help create corridors for wildlife migration by installing artificial wildlife structures, such as nest boxes for owls or bats. Installing wildlife habitat structures can create nesting opportunities in areas that may not otherwise have suitable nesting locations. For example, some birds nest and raise young in the hole of a mature tree (tree cavity); but in urban areas without old trees, providing nest boxes that mimic these natural cavities is a way to help local wildlife. Strong, healthy wildlife populations will be better able to adjust to changes in their environment associated with climate change.

Getting involved in stewardship is easy!

1. Find a park, garden, or forest preserve with an active stewardship group. Explore the resources below for more information.
2. Contact the landowner or volunteer site steward to find out when the next stewardship workday is scheduled. Stewards can help with directions, transportation options, and workday details.
3. Get outside and have fun!

Stewardship opportunities in the Chicago region:

Field Museum Stewardship:
<http://fieldmuseum.org/explore/departments/ecco/getinvolvedinstewardship>

Forest Preserve District of Cook County Volunteer Opportunities:
<http://www.fpdccvolunteers.org/>

Chicago Park District Volunteer Opportunities:
<http://www.chicagoparkdistrict.com/>

STEW-MAP, The Stewardship Mapping and Assessment Project, includes information on groups throughout the Chicago region that conserve, manage, monitor, advocate for, or educate others about local environments.
<http://stewmap.cnt.org/map.php>





As part of the **Chicago Community Climate Action Toolkit project**, a Boy Scout troop in the Forest Glen community installed bat boxes in their community. To learn more, visit: climatechicago.fieldmuseum.org/forestglen.



Increase the quantity and quality of green space in your community

Create or get involved with an existing community garden or convert an underutilized area of lawn grass into a native garden or prairie planting. Remove unnecessary concrete such as unused patios, parking lots, or medians and use the space for a garden instead. See the “Climate-Friendly Gardens and Lawns” section of this document for more information about community gardening.

Plant resilient species

Select plant species that are able to withstand periods of drought and a wide range of moisture requirements (resilient species); they will be better able to adapt to climate change. See the “Climate-Friendly Gardens and Lawns” section of this document for more information on climate-smart plants.



Nodding Onion
(allium cernuum)



R E S O U R C E S

Tweet Home Chicago was a bird house building competition in Chicago. The website has helpful information about which birds benefit from nest boxes and how to build the boxes. http://www.cityofchicago.org/city/en/depts/doi/supp_info/tweet_home_chicagobirdhousedesignbuild-competition.html

Bat Conservation International has guidelines for installing a bat house. <http://www.batcon.org/index.php/get-involved/install-a-bat-house.html>



5 CLIMATE CHANGE EDUCATION

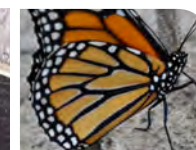
With each passing day, there is an ever-growing body of evidence indicating climate change will have serious impacts on our planet, making it the defining challenge we face in the 21st century. To inspire action, we need to work with communities and public officials in meaningful ways on this issue and effectively communicate how climate change will impact communities, individuals, and natural habitats.

Educate your community and elected officials about climate change impacts to plants and animals

Since the impacts of climate change are not always immediately visible, it can be difficult for people to connect climate change to their daily lives. Schedule a tour or nature walk and use the assets in your community, such as a local natural area or park, to talk to community members about how climate change is predicted to impact these assets.

Educate neighbors, communities, businesses, and the horticulture industry about how to be climate-friendly

Constructive action is often hampered by lack of information and access to resources. Be the force that advocates for local stores to carry products and materials such as native plants, rain barrels, composting bins, etc. Two-way communication and education between individuals and businesses is important to encourage local stores to carry these products. Educate nurseries and community members about the potential for invasive species to have more of a competitive advantage as the climate changes. To limit the potential pathways for invasive species, it is important that local gardening centers do not sell plants known to be invasive (e.g., purple loosestrife, Japanese barberry).



R E S O U R C E S

The Chicago Community Climate Action Toolkit project includes a number of additional resources that you can use for climate change education—all of which relate climate change to the Chicago region and people's everyday lives. They include a short booklet, *Climate Change in the Windy City and the World*, and a comic book, *The Amazing Adventures of Chicago's Climate Action Heroes*. Materials are available at: climatechicago.fieldmuseum.org

The Chicago Botanic Garden Climate Change Education Project has age-specific climate change curriculum for grades 4-12
<http://sites.google.com/site/cbglimate/>



COMMUNITY ACTION STRATEGIES GLOSSARY

Adaptation

Modifying the built environment (roads, buildings, sewage pipes) or natural systems (gardens, forests, wetlands) to help them become better suited to changes in the environment. Adaptation is also important for human communities: we need to anticipate climate change impacts, such as increased heat, and improve or implement new social systems for coping, such as checking on elderly neighbors or increasing emergency response time.

Carbon sequestration

The uptake and storage of carbon. Trees and plants, for example, take in carbon dioxide from the atmosphere, release the oxygen, and store the carbon in their leaves and roots. Fossil fuels are ancient stores of decomposed and compressed organic matter that continue to store the carbon until burned.

Decomposition

The process of rotting and decay that causes the complex organic materials in plants and animals to break down into simple inorganic elements, which can then be returned to the atmosphere and soil.

Ecosystem services

The benefits that nature provides to human life. For example, when fungi, worms, and bacteria transform the raw “ingredients” of sunlight, carbon, and nitrogen into fertile soil, they are providing us with an ecosystem service. If we allow natural resources to decline, so do the benefits. Conversely, if we look after and maintain our natural resources, we will benefit from greater returns.

Greenhouse gas emissions

Greenhouse gases (GHGs) are heat-trapping gases, such as carbon dioxide and methane, that trap heat inside the lower atmosphere, raising the Earth’s temperature. People emit GHGs primarily by burning fossil fuels (e.g., oil, coal, natural gas).

Groundwater

The portion of the water beneath the ground surface stored in soil pores and in the fractures of rock formations. Groundwater is recharged from precipitation that collects on the surface and permeates into the ground. Springs and seeps are areas of groundwater discharge that can form wetlands.

Heat island

Urban area where heat emitted by the built environment (buildings, pavement, concrete, etc.) results in higher temperatures than rural areas, especially at night.

Hydrology

The study of the occurrence, movement, distribution, and quality of water.

Invasive Species

Aggressive, weedy species, often originally from other parts of the world, that are capable of crowding out desirable species.

Mitigation

Measures taken to reduce greenhouse gas emissions released into the atmosphere. Mitigation helps reduce the severity of future climate change impacts on people and the natural environment.

Rain gardens

A planted depression that absorbs rainwater runoff from impervious urban areas like roofs, driveways, walkways, parking lots, and compacted lawn areas. Rain gardens reduce rain runoff that would normally go into the sewer system by allowing stormwater to soak into the ground.

Resilient

Able to withstand or recover quickly from difficult conditions. Resilient plants, animals, people, and communities are able to survive despite a changing climate.

Respiration

The process of metabolizing (burning) sugars to yield energy for growth, reproduction, and other life processes. Respiration involves transporting oxygen from the outside air to the cells within plant tissues, and transporting carbon dioxide in the opposite direction. Both plants and animals (including microorganisms in the soil) need oxygen for respiration. This is why overly wet or saturated soils are harmful to root growth and function, as well as the decomposition processes carried out by microorganisms in the soil.

Stormwater infiltration

The penetration of water through the ground surface into sub-surface soil.

Stormwater runoff

Stormwater runoff occurs when precipitation from rain or snowmelt flows over the ground. Impervious surfaces like driveways, sidewalks, and streets prevent stormwater runoff from naturally soaking into the ground.

