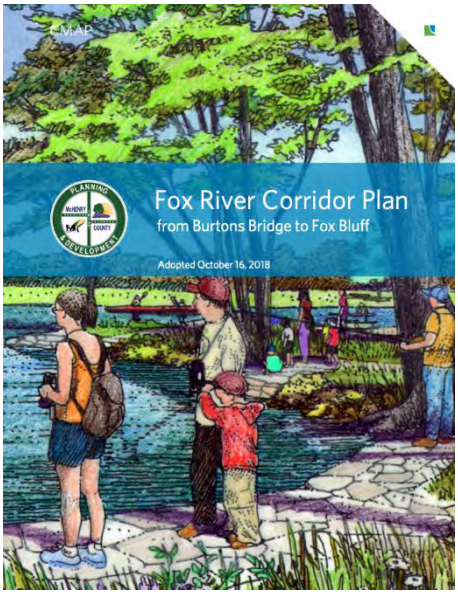
CASE STUDY

CMAP AND MCHENRY COUNTY - FOX RIVER CORRIDOR PLAN: BURTONS BRIDGE TO FOX BLUFF

The Fox River is one of the Chicago region's greatest natural assets. With assistance from the Chicago Metropolitan Agency for Planning's (CMAP's) Local Technical Assistance (LTA) program, McHenry County Planning and Development collaborated with Lake County and local agencies, governments, and organizations to create a corridor plan for the Fox River that reflects a shared vision for the future of the waterway. Building on previous planning in the Villages of Algonquin and Carpentersville, the Plan focuses on a scenic portion of the river that extends from Burtons Bridge in the north, just north of Route 176, to the eastern boundary of Fox Bluff Conservation Area in the south, which spans eight communities, conservation areas, forest preserves, and parks over a distance of 11 miles.



Over two years of planning for the future of the Fox River, residents, business owners, river users, community leaders, and environmental advocates contributed to the development of guiding principles. Implementation the Plan's recommendations will help corridor communities build toward a future where the Fox River is healthy, safe, and accessible; where a balance exists between the preservation and recreational use of the river and connected natural areas; where there is a culture of appreciation and stewardship among residents, businesses, and river users; where the area's rural and local character is preserved; where key areas of the riverfront and nearby commercial and downtown areas are vibrant; where high quality and diverse habitats are protected; and where river communities are resilient to the effects of climate change.

Specifically related to water resources, the Plan recommends that local governments and stakeholders:

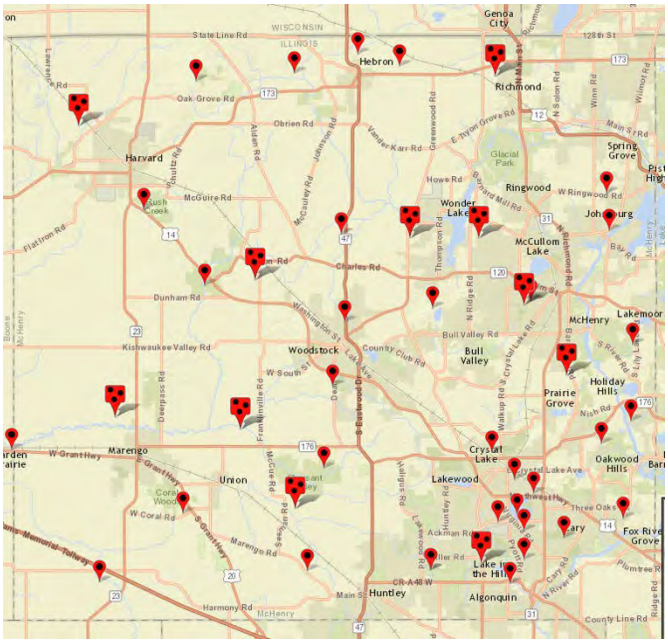
- Collaborate to leverage resources and maximize impact;
- Protect and restore green infrastructure, and;
- Maintain and enhance groundwater resources.

Project webpage: https://www.cmap.illinois.gov/programs/lta/fox-river-mchenry-lake

CASE STUDY

U.S. GEOLOGICAL SURVEY - MCHENRY COUNTY GROUNDWATER MONITORING NETWORK

In coordination with the U.S. Geological Survey (USGS), McHenry County, Illinois has a network of groundwater monitoring wells distributed across the county. The wells are used for monitoring water levels and water quality of the sand and gravel groundwater aquifers. McHenry County relies solely on groundwater for its potable water so understanding the groundwater is vital to sustainably managing the resource.



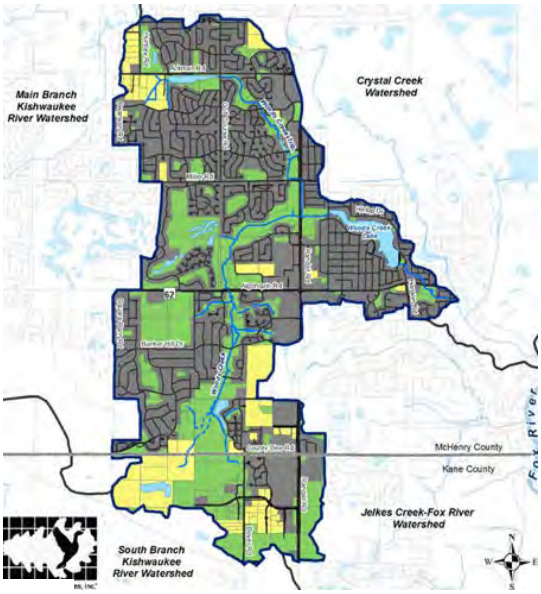
The McHenry County Groundwater Monitoring Network (MCGMN) currently consists of 43 monitoring wells, of which 37 are equipped with pressure transducers and real-time equipment (antennae, data-collection platforms, batteries, and solar panels) to monitor and transmit water level data every 15-minutes to the U.S. Geological Survey (USGS) National Water Inventory System (NWIS) Web interface. Data is managed by the USGS and can be accessed at: https://groundwaterwatch.usgs.gov/countymap.asp?sa=IL&cc=111

The monitoring wells are also used to monitor groundwater quality in the county. Every ten years, the USGS conducts water quality sampling at all the wells in the MCGMN. The USGS analyzes the groundwater samples for major ions, metals, and nutrients. A subset of these wells were also analyzed for other contaminants such as volatile organic compounds, pesticides and herbicides in 2010, and contaminants of emerging concern in 2020.

The MCGMN was made possible through funding from the American Recovery and Reinvestment Act in 2009. This unique county-wide network of real-time groundwater monitoring wells was built in cooperation with McHenry County, USGS, and the U.S. Army Corp of Engineers, in collaboration with the Illinois State Geological Survey. For more information on the MCGMN, please contact Amy Gahala, U.S. Geological Survey.

CASE STUDY

WOODS CREEK WATERSHED PLAN - ALGONQUIN, ILLINOIS



Seeing the signs of major degradation in Woods Creek, the surrounding communities formed a partnership to create the Woods Creek Watershed Plan. The jurisdictions recognized that watershed issues are so complex and inter-related that it is essential for stakeholders including individual landowners, organizations, and governments to work together to protect and restore the health of the watershed. The process of creating the Watershed-Based Plan for Woods Creek helped stakeholders understand the watershed and initiate projects that improve water quality and enhance natural resources and open space.

The primary scope of the plan was to develop an ecologically-based management plan for the watershed that focused on improving water quality by protecting or enhancing green infrastructure, creating protection policies, implementing ecological restoration, and educating the public. The information provided in the Watershed-Based Plan was prepared so that it could be easily used as a tool by any stakeholder including elected officials, federal/state/county/municipal staff, and the general public to identify and take actions related to watershed issues.

Since its completion, stakeholders have implemented watershed improvement projects that were listed in the Watershed Plan including the ecological restoration of 9,100 lineal feet of streambank along Woods Creek, the conversion of 11 acres of turf grass detention basins to naturalized basins, and the conversion of 10 acres of turf grass to pollinator habitat with native plant species.

CASE STUDY

VILLAGE OF CARY: INNOVATIVE TECHNOLOGY PROTECTS WATER RESOURCES

What is wastewater? A common misconception is that wastewater is just sewage. But in fact, wastewater includes every type of water that goes down the drain, including water from showers, toilets, and sinks. The average American produces approximately 50 to 70 gallons of domestic wastewater each day, with commercial businesses and industry producing wastewater in even larger volumes. In most urbanized areas, this wastewater is processed at a treatment plant using a variety of different methods before being discharged into nearby lakes, rivers, or streams; and oftentimes in a cleaner state than the receiving waters themselves.

Wastewater treatment plants are also tasked with protecting our water resources through various voluntary and regulatory limits on the amount of nutrients that reach our lakes, rivers and stream. One such nutrient of regional and national concern is phosphorus, which has been identified as a contributing factor to the hypoxic "dead zone" in the Gulf of Mexico where low-to-no oxygen levels in the water is impacting marine life. In 2014, the Illinois Environmental Protection Agency ("IEPA") developed the Illinois Nutrient Loss Reduction Strategy that established, among other things, a goal of reducing the total amount of phosphorus leaving the state by 25 percent by 2025, with an ultimate goal of a 45 percent reduction.

The Village of Cary operates a wastewater treatment plant in southeast McHenry County that treats an average of 1.4 million gallons per day that ultimately discharges into the Fox River, which is identified by the IEPA as impaired for several water quality parameters, including total phosphorus and dissolved oxygen. New IEPA limits on phosphorus required each wastewater treatment plant along the Fox River to meet a new annual average limit of 1.0 mg/L.

In August 2018, the Village of Cary completed improvements at the wastewater treatment plant to help reduce phosphorus levels in the Fox River that included new biological phosphorus removal ("BPR") facilities. BPR is a sewage treatment process that uses biological organisms that absorb phosphorus from wastewater and store it within their cells where it settles out and is easily removed from the wastewater stream. This is a natural process that does not require chemicals to be introduced to the wastewater and was the most cost-effective and environmentally sustainable means of meeting the new total phosphorus limit for Cary.

CASE STUDY

WRAP SIDEBAR: THE LIEBMAN SCIENCE CENTER AT MCHENRY COUNTY COLLEGE

In Augusts 2018, McHenry County College opened the Liebman Science Center, the college's first high performance green building. It is a 40,000 square foot LEED Gold certified building that provides an innovative environment to inspire the next generation of scientists and mathematicians.

LEED®, which stands for Leadership in Energy and Environmental Design, is a certification program focused primarily on new, commercial-building projects, and based upon a points system. Most importantly, a LEED® certification recognizes the effort to make a facility more sustainable, as well as offers the opportunity for potential cost savings over time. Here are the features pursued for LEED certification:

Sustainable sites category: bicycle racks, low emission vehicle parking spaces; two level 2 electric car charging stations.

Water efficiency - landscaping with no permanent irrigation systems providing significant water conservation; native plantings & trees selected to thrive within local climate without irrigation; indoor low water systems reducing potable water use by 41% saving 49,770 gallons per year.

Energy and atmosphere - reflective coatings & ceramic patterns applied to glass reduce glare and heat gain; white reflective roofing materials to reduce heat gain and cooling needs; long-lasting and energy efficient 100% LED lighting installed throughout the building and parking lot reducing energy consumption and labor costs.

Material & Resources - 22.68% of materials were manufactured using recycled materials; and, 27.91% of the building's material products were manufactured within 500 miles of the site.

Indoor Environmental Quality - Windows located in 96% of the occupied spaces; daylight sensors installed to reduce power consumption; low-emitting VOC materials used to maximize indoor air quality; exhaust hoods installed to improve indoor air quality and ventilation for labs

Innovation in Design - A wellness strategy was implemented through the layout, views, lighting and materials to encourage users to use stairs instead of elevators.

Other special features - Water bottle filling stations near bathrooms reduce plastic water bottle waste; carpet squares installed for ease of cleaning, removal and replacement; Forestry Stewardship Council certified wood installed throughout; Geoscene wall – one of a kind educational installation depicting our geological layers for a unique classroom and visitor experience.

CASE STUDY

CRYSTAL LAKE STORMWATER SOLUTIONS INITIATIVE

In the summer of 2017, the City experienced record breaking rainfall that resulted in flooding in some older sections of the City. These neighborhoods have experienced repetitive flooding from heavy rainfall in the past. Previous studies for some of these areas had proposed conceptual solutions, but consensus on the solutions was lacking. In an effort to implement projects to reduce flooding, the City took a different approach with an extensive and interactive public involvement process and launched the "Stormwater Solutions" initiative.

Ten study areas were identified based on the unique issues of each. A series of open house meetings were held for each area and a dedicated webpage developed for the initiative. The purpose of the meetings was to listen, understand, educate and jointly develop concepts to reduce flooding. Residents were encouraged to provide the City with photos, documents or historical information. Over 20 meetings were held during this effort. The meetings created an interactive dialogue that resulted in a general consensus of proposed solutions for each area. Once this consensus was reached, a multi-year program of projects with identified funding mechanisms was developed and presented to the City Council.

The consensus building approach taken in the Stormwater Solutions Initiative resulted in the City successfully constructing ten projects between 2017 and 2020 with an additional six more underway in planning or engineering stages. The projects not only reduced the flooding in these neighborhoods but also incorporated a green infrastructure component to improve water quality and provide infiltration of stormwater where feasible. Through this process, the City learned that building relationships and having community support is critical to the success of these types of projects.

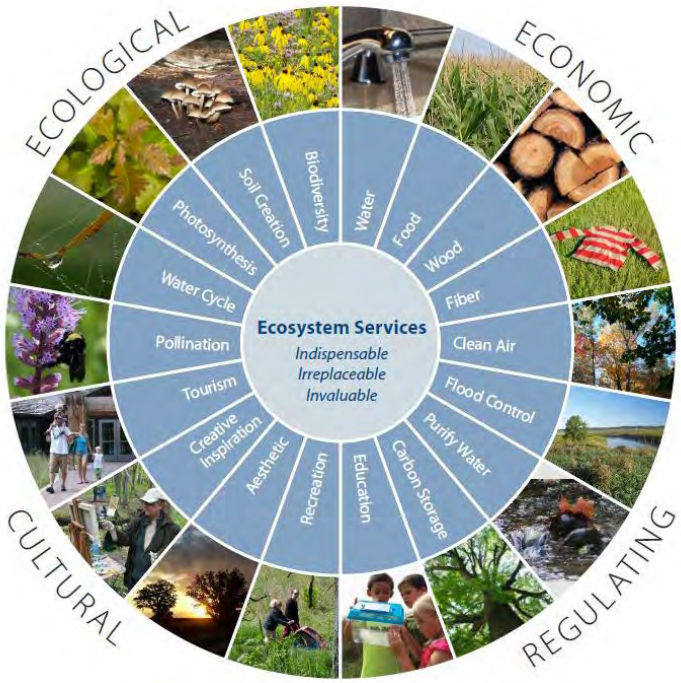
One of the projects involved installing a new stormwater system in the North Shore neighborhood which is located between the lake and Lippold Park. The neighborhood was originally constructed as summer cottages in the 1920's and 1930's and has very high groundwater levels. The new storm sewer system includes a connection at each lot to collect sump pump drainage. 11 vacant lots were purchased and converted to best management practice (BMP) basins that now provide stormwater filtration and storage for over one million gallons of stormwater.

CASE STUDY

ECOSYSTEM SERVICES: MCHENRY COUNTY CONSERVATION DISTRICT

Ecosystem services are goods and services that people receive from nature. There is a direct correlation with natural systems and their diverse benefits to human economies. Once we understand the impact and overall value of Ecosystem Services, we can better prioritize money and resources to protect ecosystems far into the future. When ecosystems are considered valuable, they are more likely to be preserved. Today, McHenry County Conservation District preserves over 25,500 acres. This public investment goes well beyond just protecting open space—it safeguards the quality of health and wellness on multiple levels for all residents far into the future.

The numerous benefits received from nature can be classified into four significant categories: ecological benefits, economic benefits, regulating benefits and cultural benefits. These ecosystem services are important to environmental health, as well as a significant factor in human health and well-being—yet they are often taken for granted.



ECOLOGICAL Services… Ecosystems natural processes are fundamental to sustaining everything from basic life forms, to entire ecosystems & ultimately people. • Pollination • Water Cycle • Photosynthesis • Soil Creation • Biodiversity • Nutrient Cycling	**REGULATORY Services…** Ecosystems provide benefits to communities: Plants clean air & filter water. Wetlands hold water & prevent flooding. Soils filter water & recharge aquifers. • Clean Air • Flood/Erosion Control • Clean Water • Carbon Storage • Climate Regulation • Decomposition
ECONOMIC Services… Ecosystems provide direct benefits to people that can be extracted from nature: • Drinking Water • Food • Timber/Firewood • Fiber • Medicinal	**CULTURAL Services…** The natural environment aids in our overall health & well-being. • Education • Recreation • Aesthetic • Inspirational / Spiritual • Tourism/Destination • Cultural Heritage

CASE STUDY

MAIN BEACH BUTTERFLY GARDENS - CRYSTAL LAKE PARK DISTRICT

Across the street from Crystal Lake Park District's Main Beach lies an irregularly shaped small parcel of land bordered by streets on two sides and residences on one side. Over a period of many years, the parcel was planted with an assortment of shade trees including green ash. The Emerald Ash Borer and old age took a toll on the tree population on the parcel and oak saplings have now been planted in their place. The parcel is low and frequently holds water for many days, after even a light rain, making it difficult to grow and maintain grass on the parcel.

Several years ago the park district worked with several community groups to establish two butterfly gardens on the parcel. With funding by a grant obtained by Friends of Hackmatack, volunteers planted Button Bush, Bee Balm, Cardinal Flower, Brown-eyed Susan, Obedient Plant, Purple Coneflower, Sneezeweed, Blazing Star and Swamp Milkweed to attract monarchs and other butterflies. Plans are being developed to expand the gardens and install paths, benches and interpretive signs throughout the planting areas. What was once an awkward and unattractive parcel of land has become a beautiful addition to the lakefront and neighborhood that provides important wildlife habitat.

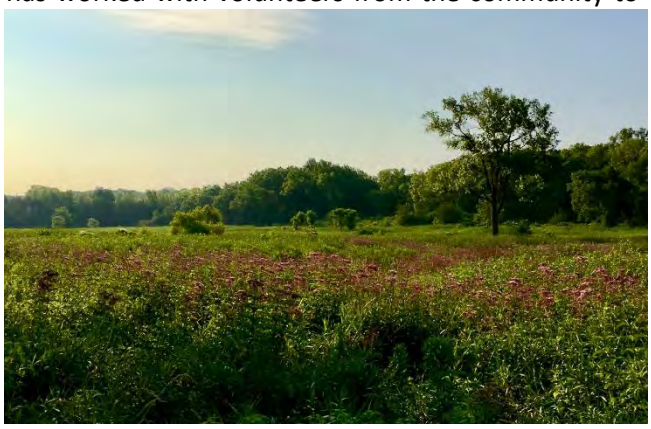
CASE STUDY

STERNE'S WOODS AND FEN/VETERAN ACRES WINGATE PRAIRIE – CRYSTAL LAKE PARK DISTRICT

Veteran Acres and Sterne's Woods and Fen combine to preserve a total of 325 acres of continuous open space. Within their borders are woodland, savanna, wetland, and prairie ecosystems, as well as traditional manicured park land with playfields and other recreational amenities. There are approximately 11 miles of trails located within the boundaries of the two properties. Veterans Acres Park also features a Nature Center that provides programs and nature-based recreational opportunities.

Wingate Prairie is an Illinois Nature Preserve located within Veteran Acres Park. This high quality gravel hill prairie is surrounded by pine plantations, oak savanna, and oak woodland. Sterne's Fen is a high quality gramanoid wetland fen that is also recognized as an Illinois Nature Preserve. The site supports nine species of wetland plants that are considered threatened or endangered by the Illinois Department of Natural Resources.

For several decades, the Crystal Lake Park District has worked with volunteers from the community to preserve, protect and restore these natural areas. School groups, Scout troops, environmental organizations, clubs, churches and dedicated individuals have donated thousands of hours to remove invasive species, repair trails, and improve habitat. Grants have been secured from local and state agencies and organizations, including McHenry County's Wetland Restoration Fund, to restore these unique and valuable sies.



Both sites are beloved by hikers, nature lovers and environmentalists and provide valuable open space in an otherwise dense suburban setting. The unique habitats of the fen and prairie provide homes for native plants, birds, insects and animals. Veteran Acres and Sterne's Fen have benefitted greatly from volunteer time and talent and are examples of successful collaboration between individuals, agencies and organizations.

CASE STUDY

RAINGARDENS: WOODSCREEK PARK PARKING LOT - CRYSTAL LAKE PARK DISTRICT

Woodscreek Park was first established in the early 1990s as a community park in the Crystal Lake Park District. After more than 20 years, it was time to replace the playground and make other significant updates and expansions to the park which is located in a heavily populated neighborhood in south Crystal Lake. The impervious surfaces being added were an expansion to the parking lot, a second tennis court and a splash pad play area. The park had been originally designed with storm water drainage pipes that emptied directly into the pond on site. It was decided to handle the runoff from the new facilities by constructing a series of rain gardens to capture the runoff.

Runoff from the splash pad, which operates from Memorial Day through Labor Day, flows into a rock "riverbed" before flowing through an underground pipe into a parking lot island rain garden. Parking lot runoff is collected into the depressed islands which are planted with a variety of rain garden-appropriate plants, most of which are native. The rain gardens store and infiltrate large amounts of the new runoff. When at capacity, they overflow into the existing storm sewer system.

The showy rain gardens are interesting and unusual features in what is otherwise a typical community park. Plants include Blue Flag Iris, Obedient Plant, Cardinal Flower, Joe Pye Weed, as well as Switch Grass, Salvia and Geranium on the slopes. The gardens are prominent examples to the public of stormwater best management practices.

CASE STUDY

ILLINOIS STATE GEOLOGICAL SURVEY – 3D MAPPING OF GEOLOGY AND AQUIFERS

Growth in water demand within the Chicago Metropolitan area, together with declining water levels in deep bedrock wells and strictly regulated use of Lake Michigan water, have led to a regional awareness of the need for science-based, sustainable water supply management. The Illinois State Geological Survey (ISGS) has been a primary scientific resource to local and regional decision-makers in the area, regarding the distribution and character of their groundwater aquifers.

Since McHenry County relies exclusively on groundwater aquifers to provide potable water, the County requested scientific and technical assistance from the ISGS. With inherent limitations in the deep bedrock aquifers, growth in the county will be increasingly dependent on the shallow sand and gravel aquifers. To better understand the distribution of sand and gravel aquifers across the county, as well as their sensitivity to pollution, the ISGS conducted 3D mapping of the sub-surface geology. The 3D mapping helps identify aquifers in the county, evaluate potential groundwater recharge areas, as well as areas with aquitards or aquicludes that limit recharge.

Since completion of the project in 2013, the ISGS has developed an online webviewer that allows a user to explore the 3-D geologic model. For example, users can draw a line anywhere in the county to produce a cross-section of the subsurface geology. Those cross sections show the modeled geologic layers, which include sand and gravel aquifer and non-aquifer units and the bedrock surface. The webviewer is also preloaded with many viewable cross sections and borehole data that were interpreted by geologists and are examples of major geologic features across the county. The webviewer is in continual development and upgrading to improve its function and utility: https://maps.isgs.illinois.edu/vxs/McHenry/