

Urban Ponds and Stormwater Retention Basins



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Urban Ponds and Stormwater Retention Basins

The primary purpose of most urban ponds is to capture rainwater (also known as stormwater runoff) and store it, at least temporarily. Stormwater runoff accumulates pollutants from streets, rooftops, and yards. These ponds serve the vital function of protecting water quality in our streams and drinking water. They also protect homes, roads, and bridges near waterways from flooding and erosion.

Ponds will suffer negative results of contaminants: poor water quality, reduced aesthetics, and decreased habitat value. Unfortunately, these problems can be costly to remedy. However, with some know-how and planning, they can be mediated.

The two main pollutant types that affect urban ponds are **nutrients** and **sediment**.

Nutrients

Phosphorus (P) and nitrogen (N) are nutrients naturally present in soil and water. They are necessary for plant growth and are abundant in fertilizer, animal waste, and decaying plant material. Unfortunately, excessive nutrient accumulation in a pond directly causes naturally occurring plants like algae and duckweed to become problematic. These problems usually worsen as the pond ages, which can lead to oxygen depletion and fish kills.

Pond algae need three things to survive: nitrogen, phosphorus, and sunlight. These elements are usually abundant in an

Algae are simple aquatic plants common to virtually all Missouri waters. Unlike other plants, algae lack true stems, leaves, and roots. Algae are a basic component of a complex aquatic food web, converting the sun's energy into a form useful to other aquatic life. During this process, algae also produce oxygen, which accounts for more than 50 percent of the oxygen in our atmosphere.

Read more about algae: [Short.mdc.mo.gov/ZNU](https://short.mdc.mo.gov/ZNU)



urban pond or stormwater basin. Yard fertilizers, pet waste, goose droppings, grass clippings, and faulty septic systems are common sources of nutrient contamination.

Sediment

Soil particles picked up by rain runoff end up in ponds. Sediment suspended in the pond gives the water an unappealing, muddy look that can last long after the rain. Sediment that settles out in the pond decreases the water depth. As with nutrient accumulation, sedimentation is progressive as the pond ages. Water temperatures become increasingly harsh in summer and winter, algal problems expand, and fish kills become more likely as water depth shrinks.

Surface erosion of bare soil, gully erosion, and stream bank erosion are frequent sources of sediment contamination.



Suggested Best Practices

Reduce Fertilizer Use

Most lawns are over-fertilized. Reduce application and/or switch to organic fertilizers. A community-wide effort is needed as storm drains carry runoff from yards throughout the subdivision.

Learn more at University of Missouri Extension: short.mdc.mo.gov/4aR AND short.mdc.mo.gov/4az

Yard Ethic: short.mdc.mo.gov/4ar



Canada geese

Pick Up Pet Waste

Pet feces that enter the pond increase the nutrient load. They also can elevate the risk of introducing pathogens and diseases.

Discourage Resident Goose Populations

Do not feed waterfowl. Geese, especially, love mowed grass and a clear line of sight around a pond. Landscaping around the pond with taller native grasses and wildflowers will keep geese from becoming too comfortable. (See *Landscaping for Pond Health*, Page 7.)

Keep Grass Clippings Out

Collect and compost clippings or blow them away from the water. Keep them off streets where they can be carried to the pond by the storm drain.

Update Septic Systems

If homes have septic tanks, ensure they are functioning correctly. They can leak and cause human waste to flow into ponds. County health departments maintain lists of licenses for local septic tank installers and inspectors.

Combat Soil Erosion

Revegetate areas with bare soil, and repair gully erosion. Depending on the size of the community, pond maintainers may be required to obtain a municipal separate storm sewer system (MS4) permit through the Missouri Department of Natural Resources (DNR) which has requirements for basin construction.

In addition, all projects disturbing at least 1 acre in Missouri are required to obtain a land disturbance permit through DNR, and any projects disturbing more than 10 acres must build a sedimentation basin to certain minimum specifications. Many cities/counties have their own permits with their own erosion control requirements.

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If areas in the pond's drainage are under construction, be sure erosion control regulations are being followed.

Learn more at Department of Natural Resources: short.mdc.mo.gov/4aV

Construct a Forebay

A forebay is a pond's retention basin. Stormwater enters the forebay, pollutants settle out, and cleaner water enters the main water body. The forebay is small and easier to dredge when it fills in. Consult an engineer for a project of this type.

Minimize Other Pollutants and Pests

- Reduce herbicide and pesticide use on yards
- Wash vehicles on the lawn rather than the driveway
- Don't dump anything down storm drains
- Don't empty swimming pool water into the pond or storm drain
- Never release aquarium plants or animals into the pond

Getting the Community Involved in Healthy Ponds

Community leaders are often responsible for making decisions and enacting plans to manage their ponds. Managing a pond for longevity and maximum community enjoyment requires knowledge and forethought. Below are some of the significant topics that trustees should consider.



Community Responsibility

Retention ponds serve the whole community and can only be managed properly if the entire community works together. While homeowners who live near the lake are most directly affected by the pond's health (or lack thereof), everyone in the pond's watershed is responsible for the contaminants that impact the pond.

Education

Most people are surprised to learn that their neighborhood "fishing pond" is actually a basin engineered to collect pollutants. Helping residents understand that what they do on their property directly affects the pond is often the best way to start managing pond health.

Managing Common Ground

Pond health is usually incompatible with the golf course-like manicuring many people expect. Pond-friendly common ground management involves incorporating the principles outlined in *Landscaping for Pond Health* (Page 7).

Find your local MDC contacts:
short.mdc.mo.gov/4ok

Aquatic Vegetation Control

MDC has information at offices and online to help you decide how best to control any nuisance and invasive vegetation in the pond. MDC staff, primarily fisheries biologists, can help identify the plants and determine the best control method.

Aeration

Shallow ponds (less than 8 feet) or those infested with algae often have oxygen depletion problems, which can cause fish kills. Aeration systems add oxygen to the water. Aeration is most critical at night and during hot weather. Shallow ponds may also need aeration in the winter because ice and snow cover can cause oxygen depletion.

Learn more at University of Missouri Extension: short.mdc.mo.gov/4a9

Stocking Fish

Some ponds are too shallow or too algae-infested for fish to survive. In other ponds, fish may be over-populated, making stocking unnecessary or even harmful. Consult a fisheries biologist before stocking any fish.





Renovation

Every pond eventually needs to be drained and dredged to remain a viable fishpond and functioning retention basin. Signs that a pond may need renovation include

- A water depth of less than 8 feet in the deepest part of the pond (The entire pond does not need to be this deep.)
- Severe and persistent vegetation problems
- Chronic fish kills

Before renovating a pond, check with local officials to see if any regulations or events affect renovation plans.

Outreach Ideas

Pond management often requires cooperation from all residents and stakeholders. Here are some ideas for engaging residents and encouraging best management practices in the community.

Soil Testing

Sponsor nutrient testing for homeowners' yards so they know how much fertilizer is necessary.

Pet Waste Baggies

Install pet waste stations on trails and common ground and ensure they are well-maintained.

Storm Drain Stenciling

Label storm drains with logos such the one to the right to help everyone understand drainage flow.



A Long-Term Plan

Every pond has a lifespan. Communities must plan for urban ponds and stormwater retention basins to be a living part of their neighborhoods.

Maximize the life span of your pond through sound watershed management. What drains into your pond can have long-lasting impacts. Learn what areas drain into your pond. If parts of your watershed are outside your control, advocate through municipal leaders and regulatory agencies for sound management of those areas.

Monitor the depth of the pond to know how quickly your pond is aging. This can be basic or complex.

- **Basic (Start here!):** Go out on a boat and drop a weighted rope to measure depth in several repeatable locations. Track those on a map or sketched outline of the pond and table, including locations and dates.
- **Advanced:** Use a depth finder to measure depth throughout the pond on a repeatable grid. Depth finders are readily available at some sporting goods stores and online.
- **Complex:** Hire a company to make a bathymetric map of the pond.

For nutrient testing, there are a variety of test kits you can order online, or you can hire a company to test the pond for you.

Plan and budget for the inevitable pond renovation. As this topic is complex, we recommend employing a reputable company for estimates.

Landscaping for Pond Health

Ponds are the product of their watershed. Urban and suburban ponds are particularly vulnerable to water quality problems because their watersheds are highly altered from a natural state. Enhancing yards, common ground, and even the pond with native vegetation can help improve water quality and fish health.

In the pond, the proper plant species will

- Compete with algae for nutrients. While this won't completely solve algae problems, it does help.



Gold finch

Download the *How to Establish How to Establish Aquatic Plants in Your Pond* pamphlet from MDC's website: short.mdc.mo.gov/4aC

- Control shoreline erosion. Native plants are an inexpensive and attractive alternative to rock or retaining walls for stopping bank erosion.
- Provide habitat for fish and wildlife. Fish, birds, and other wildlife will benefit from their shelter and food.

Benefits of Landscaping With Native Plants

- Native plants need very little, if any, fertilization or watering.
- Native plants are disease and pest-resistant.
- Native plants attract diverse wildlife, such as songbirds, butterflies, frogs, and dragonflies.
- Native plants add beauty to the landscape.



Blue flag

Native plants require less tending than nonnative plants, but they are not maintenance-free, especially when keeping out invasive species.

Yards landscaped with native plants require less mowing, watering, fertilizer,

and pesticides. Replace turf grass with large beds of wildflowers or manicured native gardens. Rain gardens are ideal for filtering stormwater before it enters a pond. Visit the Grow Native! website (grownative.org) for more ideas and information.

Common ground can be enhanced with native plantings similar to yards. The larger scale projects possible on common ground have a more significant effect and can serve as demonstration areas.



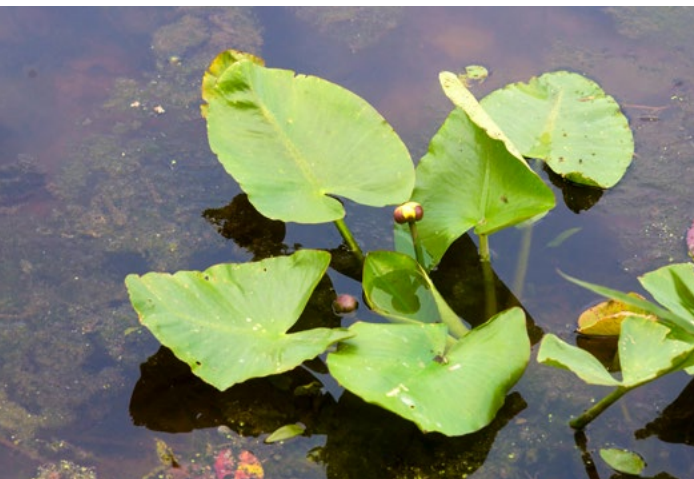
Arrowhead



Lizard's tail



Pickerelweed



Spatterdock



Squarestem spikerush

A strip of native grasses and wildflowers around the pond filters the water and deters resident geese. Mulched trails can provide residents with access to docks and fishing spots.

Trees planted around the pond provide shade for people and fish, as well as habitat and food for birds and other wildlife. (Note: Keep trees off the dam.)

Some Aquatic Plants to Consider

- Arrowhead
- Blue flag
- Lizard's tail
- Pickerelweed
- Spatterdock
- Squarestem spikerush
- Sweet flag

While urban ponds and stormwater basins may present their own unique challenges, these features are vital for connecting us to nature and our communities. With a bit of thoughtfulness and determination, these ponds can serve as areas of rest and relaxation for years to come.



Sweet flag

Urban Ponds Can Host a Wide Variety of Wildlife

Ponds create an ecosystem that can attract a variety of wildlife. Some animals come just to drink or bathe, while others come to live in and depend upon the pond for their survival.



Redear sunfish



Halloween pennant dragonfly



Red-winged blackbird



Raccoon



Widow dragonfly



Large mouth bass



Channel catfish



Northern leopard frog



Giant swallowtail butterfly



River otter

Online Resources for More Information About Pond Maintenance and Native Landscaping

- **Conservation Planning Tools for Missouri Communities (MDC):** short.mdc.mo.gov/4ay
- **Green Scaping: The Easy Way to a Greener, Healthier Yard (Environmental Protection Agency):** short.mdc.mo.gov/4at
- **Grow Native Website:** grownative.org
- **Missouri Department of Conservation's List of Local Contacts:** short.mdc.mo.gov/4ok
- **Pond and Stream Management (MDC):** short.mdc.mo.gov/4Ys



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