

Pond Maintenance



Ponds decline through the years, fish populations change, banks erode, and aquatic vegetation grows. However, there are things that can be done to extend pond life and optimize the benefits desired from the pond. An annual maintenance plan can help locate and solve pond problems at early stages before they become difficult or unmanageable.

Natural Pond Succession

Without human intervention, ponds go through a predictable series of changes called successional stages. The new pond gradually fills in with silt and organic matter from washed in leaves, and decayed aquatic vegetation. Pond banks erode producing increasingly large areas of shallow water that grow aquatic vegetation. The open water area shrinks with passing years. Willows and other tree species line the banks and young seedlings and shoots advance into the pond as it becomes bog-like near shore. Eventually, open water disappears and a swamp or bog often filled with cattails, is all that remains of the original pond. As more trees invade and absorb available water, the swamp may become a part of the surrounding woodlands.

Time necessary for succession varies with many factors, however, the average useful life of a pond is about 25 years. The life of the pond can be extended indefinitely with proper pond management and maintenance.

Bank And Spillway Maintenance

There are a number of things that can be done to maintain the structural condition of the pond dam, banks and spillway.



A neglected pond in need of substantial rejuvenation.

It is important to keep trees from growing on the pond dam. Tree roots die and decay, leaving channels that fill with water and eventually cause the pond dam to leak or fail entirely. Yearly removal of young seedlings and saplings prevents this problem from occurring. Waiting to remove trees until they become large may actually cause additional problems

because roots left in the dam after tree removal are certain
aased structural strength in the dam.

A few trees around the pond are a welcome shade in summer and add scenic value to the pond. However, it is best to place these trees several feet away from pond banks to reduce the amount of leaf fall entering the pond and also to protect pond banks from destruction caused by growing roots. Leaf litter adds to the organic load of the pond causing it to fill in faster. Heavy layers of leaves prevent oxygen from reaching the pond bottom. Anoxic conditions under the leaves allow hydrogen sulfide, a gas toxic to fish, to build up. When the leaf layer is stirred, hydrogen sulfide may be released in sufficient quantity to kill fish. Heavy leaf fall in the pond also can contribute to low dissolved oxygen problems during the summer; because oxygen is required to decompose leaf litter.

Trees that are rooted in ponds can remove large amounts of water through the roots and out into the atmosphere through pores in leaves in a biological process called transpiration. The rate of transpiration increases with temperature, wind and dry air masses; conditions that are associated with summer drought. Pond water loss can be significant and noticeable from transpiration during periods of hot summer weather. Trees can remove as much as 50 gallons of water per day from the pond. It may be beneficial to remove trees that are directly along the shoreline in ponds subject to severe fluctuations during period of drought. See the section “Conserving Water In Ponds” for more information on measures that can be taken to conserve water.



Trees on pond dam.



Willow roots degrading pond dam.

necessary to maintaining the structural integrity of the pond dam. Bare, earthen spillways, often the result of cattle paths, can rapidly erode during heavy rain events. Erosion eventually cuts a path through the pond dam, drains the pond and floods areas below the dam. A properly constructed emergency spillway will help prevent erosion problems. The emergency spillway should be gently sloped and covered in dense grass. Spillway size is dependent on pond size, watershed and precipitation patterns. Bermuda grass is most often used in Oklahoma as a spillway and pond bank

cover.

Place a layer of 3 inch diameter or larger rock riprap to prevent erosion in areas of the emergency spillway

that can not maintain sufficient grass cover,. Remove brush, trees and shrubs from the spillway; and use a spillway screen to keep desired fish in and unwanted fish out of the pond.

Maintaining a well covered grass spillway is

Pond bank slopes should be gradual with no more

than 5:1 and not less than 3:1 slopes to help control erosion and prevent excessive aquatic plant growth. Avoid activities near the pond that strip vegetation from the watershed such as crop production. Erosion caused by these activities results in a muddy the watershed such as crop production. Erosion caused by these activities results in a muddy pond. Eroded soil entering the pond reduces pond depth and shortens the useful life of the pond.

Plant and maintain a thick stand of perennial grass on all pond banks, dams, and dikes to prevent eroded soil from entering and filling the pond and to prevent soil loss on the pond dam and banks. Vegetative cover should extend into the watershed around the pond for at least 100 feet.

Wind and wave action on exposed pond banks are another significant cause of pond bank erosion. A layer of rip rap, (large crushed stone), in a band 2-3 feet above and below the water line on the prevailing downwind edge of the pond will reduce much wave and wind created erosion and add years to the life of the pond.

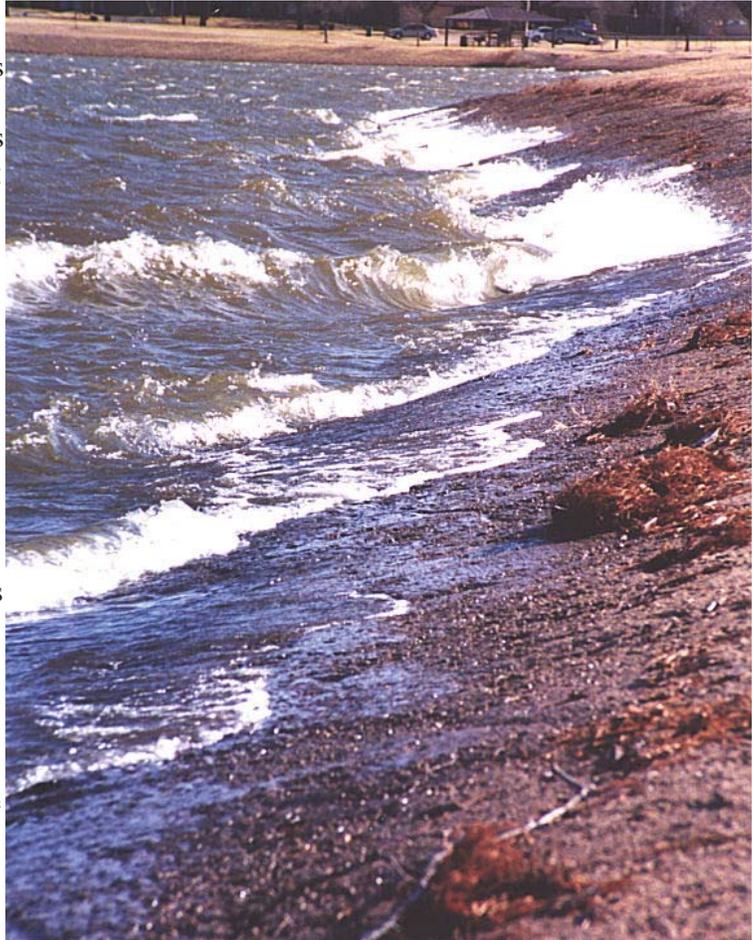
Wind breaks planted on the prevailing windward side of the pond can substantially reduce, wave created erosion, especially on smaller ponds. However, do not plant trees on the pond dam.

Mow pond banks in areas where fishing access is desired. Short grass will reduce tick and chigger populations, improve angling convenience and remove preferred snake habitat.

Mow all pond banks when fish production or aquaculture is the primary purpose of the pond. Heavily fed ponds are best managed with full sunlight; no shade trees should be on the pond banks. Shoreline vegetation that may interfere with fish harvest must also be removed also. All pond banks are best maintained in grass cover.

It is not necessary to mow around ponds built primarily for wildlife habitat. Although it is

important to remove trees that grow on the pond dam. Grass, cattails, trees and shrubs provide shade,



Wind driven waves can quickly erode vulnerable pond dams.

food and nesting habitat for a variety of wildlife species.

Leaks in Ponds

Leaks in ponds can be difficult and expensive to repair. Where possible, prevention is always easier and less expensive than repairs after the leak has become a problem. Most leaks occur through the dam, a porous pond bottom or through channels in rock shelves in the pond.

Leaks in dams can occur along trickle tubes or other pipes that go through the dams. Small water channels form along the pipe, especially when poor soils deficient in clay are used in the pond dam. The channels enlarge over time and may eventually cause failure of the dam.



Ponds constructed in sandy soil often develop extensive leaks.

Well constructed anti-seep collars installed on all pipes as they are placed in the pond dam will prevent leaks from occurring along drain surfaces. Repair leaks from the inside of the pond. It may be necessary to drain some or all of the water out of the pond depending on the position of the pipe. Remove soil from around the pipe for about 4-6 feet. Install an anti-seep collar if possible. Refill the exposed area with clay or a mixture clay and bentonite, or clay and cement.

Leaks in the pond bottom are most likely found in sandy soils or soils containing large amounts of rock and gravel. Minor problems may be repaired by spreading bentonite over the pond surface at a rate of 1-6 lb/ sq. ft. It is more likely however, that the pond must be drained to make effective repair. Options include lining the pond with about 12 inches of clay or working bentonite or other pond sealants into the pond bottom.

Fractured rock strata can be a source of leaks in some ponds. Repair is difficult and may not be cost effective. It may be possible to remove some of the rock layer and refill with at least 12 inches of clay. Another option is to coat the rock outcropping with a layer of Portland cement. Never apply large amounts of cement into ponds containing fish. Cement will raise pH of the water high enough to kill fish and other aquatic organisms.

Most leaks in the pond are the result of improper construction or poor soils. Please refer to section titled “Stopping Leaks In Ponds” for more detailed information on repair.

Wildlife Damage

Muskrat and beaver are responsible for most wildlife pond damage. These animals dig burrows in search of roots for food and shelter. The beaver constructs bank dens for rearing young, food storage and sleeping.

Little damage is caused by burrowing activities in the pond banks; however, burrowing in the pond dam and spillway must be discouraged. Burrows in pond dams should be dug out and refilled with clay as soon as they are discovered.

Muskrat and beaver populations can usually be controlled by habitat modification. Regular mowing, removal of cattails and shrubs deprives the muskrat of much of its regular food supply. It also reduces natural cover from predators.

Beavers feed on a variety of vegetation and may enter agricultural fields to feed on corn, soybeans and other crops. Tree bark also is an important food source. To control beaver populations eliminate



Livestock eroded trail and beaver dam located in the emergency spillway.

potential food sources if possible. Remove all trees near the pond that may be used for food. Desirable trees should be protected by surrounding the trunk with hardware cloth or other protective metal barriers.

Beaver can be discouraged further by lowering water levels in ponds and by immediately removing all beaver construction projects.

Trapping and shooting beaver and muskrat is an effective means of control in situations where damage is occurring and other control methods are not practical. Consult with your local game ranger for laws and specific information regarding these activities.

Aquatic Vegetation

Many older, and some relatively new ponds are choked with aquatic vegetation; sometimes called “moss” or “water weeds”.

Angling is difficult, the pond often has a foul smell and it is aesthetically displeasing. Most often, the problem is caused by excessive nutrients that enter the pond from the watershed,

usually from cattle waste or fertilizer applications. Clear, shallow water also boosts aquatic plant growth.

Shallow water may result from several factors:

Improper pond construction

A large influx of silt from the banks of a newly constructed pond

Pond banks trodden by livestock

Years of leaf litter and silt accumulation

Shallowest areas of the pond should be at least 3

feet deep to deter aquatic plant growth. Many new ponds begin with this specification, however, heavy rains may come before ground cover is established on pond banks and much soil can be washed into the pond basin, reducing total depth and filling in shallow areas. It is very important for this reason to quickly establish a dense, grass ground cover. Bermuda or rye grass is often used.

Livestock are a common cause of shallow water in ponds. Their hooves crumble and compact banks causing erosion that fills pond edges with soil.



Algae closeup.



Algae choked pond.

Old ponds may be shallow because leaves, aquatic vegetation and eroded soil have accumulated in the pond for many years.

Regardless of the cause, ponds containing large areas of shallow water are in need of renovation or even reconstruction.

Renovation requires at least partial pond draining and dredging of accumulated material. It may cost only a little more to completely drain and rebuild the pond.

Excess nutrients are commonly found to be the underlying cause of dense aquatic vegetation.

Fertilizer runoff and septic systems are common urban sources of nutrients in ponds. In rural areas, livestock and fertilizer runoff are the predominant source of these nutrients. Livestock use ponds for water and for summer cooling. Their waste fertilizes

the pond and stimulates aquatic plant growth. To a lesser extent, crop fertilizers enter the pond during runoff rain events and cause excessive pond fertilization. These problems are best controlled by removing the nutrient source which requires fencing cattle and other livestock out of direct pond access and allowing a buffer strip of at least 100 feet between pond and agricultural crops.

Where a direct solution to the problem is not practical or not sufficient to control aquatic vegetation, other control methods are needed. For more information refer to section titled "Aquatic Plant Identification And Control".

Clearing Muddy Ponds

Muddy ponds are caused by:

- Erosion in the watershed
- Natural clay turbidity
- Fish feeding activities
- Livestock

Natural clay turbidity caused by negative electrical charges on soil particles is common in many areas of the state.

Ponds can be cleared with flaked alfalfa hay bales scattered around the edge of the pond. Agricultural gypsum also can be used to clear muddy ponds. Although it is more expensive than hay it usually clears water faster. Application rates depend on average water depth but average about 2,000 lb. per acre.

If turbidity is caused by erosion from the watershed, it will be necessary to control erosion and / or reapply materials after each runoff rain.

Fish most likely to cause turbidity in ponds are bullhead catfish, grass carp and common carp. Populations of these species must be reduced or eliminated to clear the water in the pond. (See section titled "Clearing Muddy Ponds" for more information.)

A routine annual maintenance plan can extend the useful life and enjoyment of your pond. Each year take time to briefly examine your pond and fix potential problems before they require expensive or difficult repairs.

Annual Maintenance Checklist

- **trees on dikes**
- **check for muskrat or beaver burrows**
- **eroding dikes or dams**
- **excess aquatic vegetation**
- **leaks in the pond**
- **condition of drain pipes**