



Aquatic gardening can be a new and exciting realm to dive into. Expanding your landscape to include water-loving and bog plants adds a new dimension to your outdoors experience. In addition, water features often include falls or fountains which in turn bring new, refreshing sounds to the area.

STEP 1 — Locating the Pond

The most important decision in planning the water garden will be the location. Try to place it where you can enjoy it the most. For example, place it near a patio or window from which you can view the pond year-round. Ponds do best with 6 - 8 hours of sunlight and away from overhanging trees. If you must place the pond under trees, remember to select pond plants that can tolerate shade and to clean the fallen leaves out of the water regularly.

STEP 2 — Installing the Pond

Now that you have the location, it's time to figure out the size liner you will need and install it. The pond shape is really up to you, but it's always a good idea to keep it fairly simple with gentle curves.

Installing a Flexible Pond Liner:

1. It's always a good idea to have "Miss Utility" come out before you do any deep digging and make sure there aren't any buried electric, cable, phone or water lines in the way.
2. Outline the pond's shape with a rope or garden hose. Once you know the shape you like, it's a good idea to use some kind of spray paint or ink to draw it permanently on the ground. That way it won't shift around as you dig.
3. Measure the pond, length at the longest point and width at the widest point, and determine the depth at the deepest point. Pond depth should be at least 24 inches to allow for overwintering plants and fish. (Check local building codes to determine if fencing is required.)

-
-
4. Calculate the right size liner you will need. See *Helpful Formulas*.
 5. Excavate the pond site. At this point you can determine where you want any “shelves” around the outside of your pond for marginal plants or which end may be shallow for fish. Shelves are usually between 9 and 12 inches deep. You can add shelves at different levels. It’s always a good idea to keep the shelves and the bottom as level as possible, using gentle slopes when curving downward. Avoid sharp angles.
 6. Remove any debris or sharp stones from the excavated hole that might puncture the pond liner. Firmly tamp down the soil at the bottom of the hole.
 7. Line the shelves and bottom of the pond with about 2 inches of firmly packed sand and a pond underliner.
 8. Install the liner (lay it over the hole).
 9. Slowly fill the pond with water, making adjustments as needed to the liner. There should be at least 12 inches of overlap around the top edge.
 10. Conceal the overlap at the top edge with your choice of edging, such as large, flat rocks.

HELPFUL FORMULAS

Determining Liner Size:

Liner width = pond width + 2 times depth + at least 2 feet.

Liner length = pond length + 2 times depth + at least 2 feet.

Determining Volume of Pond:

Multiply the length by the width by the depth in feet, then multiply the resulting number by 7.5 to estimate the number of gallons of water in the pond.

length (ft.) x width (ft.) x depth (ft.) x 7.5 = gallons of water in a pond

STEP 3 —

Determining the Size of Pump Needed

Rule of thumb:

When recirculating water through a filter, the pump should circulate the volume of the pond every two hours.

EXAMPLE:

$$\frac{\text{total volume of the pond (gallons)}}{2 \text{ hours}} = \text{number of gallons per hour}$$

$$\frac{1,000 \text{ gallon pond}}{2 \text{ hours}} = 500 \text{ gallons per hour}$$

However, when choosing pumps you must consider many factors such as how much sunshine the pond receives every day, added water features (fountains and waterfalls) and the depth of the water, which may force you to install a larger pump. When in doubt, buy a pump larger than you think you need. You can always slow it down, but you can not make it any stronger.

Estimating Waterfall Flow Rates:

This table below provides a guideline for waterfalls. Consult with Behnke Nurseries' staff for further advice on pump selection.

You can duplicate a given waterfall flow rate by filling a standard two gallon bucket with water and pouring it out as evenly as possible:

Pours Out In	Gallons Per Hour
1 minute.....	120
40 seconds.....	180
30 seconds.....	240
20 seconds.....	360
12 seconds.....	600

STEP 4 —

Choosing The Plants

Floating Plants

Floating aquatic plants simply float on the top of the water with their roots suspended freely. Many floating plants multiply quickly to cover the surface of a pond. These plants provide hiding places for fish, shade the water and keep it cooler, and help to reduce the growth of algae. Floating plants such as water lettuce and water hyacinth are tropical and will not survive the winter.

Hardy Water Lilies & Lily-like Aquatics

Water lilies are the mainstay of water gardening. Available in shades of yellow, white, pink and red, most bloom from late spring until late summer. They provide valuable leaf cover to shade the water during the summer, which helps to reduce algae growth. For best results, space pots to provide coverage of 50% to 60% of your pond surface with these plants. Hardy water lilies need to be placed in a water depth of at least 16 inches in the winter to survive.

Marginal Plants

Marginal plants, such as sweet flag, pickerel rush and cattails, grow in boggy or flooded areas. Place in the shallow end of the pond, with no more than 1-inch of water over the top of the pot. They provide a vertical accent to the horizontal surface of the pond, and they also provide some shade and protection for fish, depending on the plant species. Marginal plants are available in many different growth habits and bloom colors.

Lotus

Lotus are spectacular plants with incredibly large blossoms held high above the water surface. Lotus are hardy and treated as perennials. Lotus do not like deep water. They prefer to be submerged 4 to 6 inches.

Tropical Water Lilies

Tropical water lilies start to bloom when the weather gets very warm. The water temperature must also get to 70°F before they start to grow. Tropical lilies come in red, white, pink, yellow, blue and purple. Their blooms are much larger and more fragrant than those of the hardy water lilies. The flowers usually stand above the water surface. Day-blooming tropicals open mid-morning and close at dusk, and night-bloomers open at dusk and close in the morning. Once tropicals

start blooming, they will bloom until the fall. The tubers, which are removed in the fall, are usually discarded.

Submerged Plants

Submerged aquatic plants, such as *Cabomba* and *Anacharis*, are also known as oxygenating plants. They provide oxygen for the fish, but their most important function is that of absorbing nutrients from the water, which will help keep algae growth to a minimum. One bunch of oxygenators per 1 to 2 square feet of water surface is adequate.



STEP 5 —

Care Tips for Pond, Plants and Fish

Pond Care

Just like fertilizing, mulching and cleaning your regular flowerbeds is essential for a healthy garden, proper pond maintenance is a *must*.

- **Spring**

Pull off pond nets, clean out any leaves and other debris that have fallen into the pond over the winter, and remove the de-icers. Inspect the pond to see if you just need a water change or a complete cleaning. If your water is relatively clean, you may want to do a partial 25% water change. When changing the water use a chlorine and chloramine neutralizer to make the water safe for the fish and critters. If you are using well water, add a chlorine and heavy metal neutralizer. To help get rid of the sludge on the bottom of the pond, use Pond Zyme. You should also consider using a stress coat to help the fish adjust to a stronger water disinfectant. Also it is *very important* to clean the pump especially the intake area and check the filter pads. They may need to be replaced. When the water temperature reaches 60°F you can add biological filters and beneficial bacteria to the water.

- **Fall/Winter**

An electric pond de-icer is a good idea to keep the surface of your pond from freezing solid. This allows oxygen to enter and water gases to escape. And pond nets will make it easier to clean out debris in the Spring.

Plant Care

Spring is also a good time to get your plants ready for the new season. Most aquatic plants need to be divided every 2 to 3 years. During the growing season, remove all spent blooms and unsightly leaves.

- **Repotting**

We sell only pre-planted aquatics. If you need to repot, consider the following: a good, heavy garden soil is the best soil for planting your aquatics. A soil mix that is too high in organic matter, such as most commercial potting mixes, will leach into the pond and cloud the water. After planting, cover the soil with about an inch of gravel to help hold the soil in the container and keep large fish away from the plant.

When repotting in the spring, it is best to place the plant close to the water surface where the water is warmer and lower it to its desired depth over a several week period. Tropical plants should not be planted until the water temperature is at least 70°F.

- **Fertilizing**

Aquatic plants are heavy feeders and will need to be fertilized monthly, with aquatic plant food, during the summer growing season. Proper water pH is important for healthy fish and plants. The pond pH should be between 6.5 and 7.8 for best results. Test every 2 weeks with a water test kit.

- **End of Season**

In the fall, keep up with falling leaves and other debris with a skimmer or pond net. Place your hardy lilies at the bottom of the pond and remove all tropical plants. (Consult a book on water gardening for detailed information on overwintering tropicals.)

Feeding Fish

- **Spring**

When the water temperature reaches 42-45°F you can start feeding the fish again. Don't forget that the water temperature will be different from the air temperature. Check it with a thermometer. You should feed the fish a food formulated for the cooler water temperature which is easily digested as fish come out of dormancy (Pond Care Spring and Autumn Food or Tetra Wheat Germ are good choices).

- **Fall/Winter**

When water temperatures drop below 45°F, you should stop feeding your fish, as they have difficulty digesting food.



Garden Centers
Beltsville, MD
(301) 937-1100
Potomac, MD
(301) 983-9200



www.Behnkes.com

Behnke Florist
Potomac, MD
(301) 983-4400

