

## KEEPING IT CLEAN

A water garden should not be as clear as a swimming pool, but instead should be clear enough to see the bottom. In the beginning stages of establishment, expect the pond water to change from green to clear and have some green slime on the sides. Some slime, string algae, is necessary as it provides 60% of the oxygen in the water.

During the first month or two, the pond may produce a foam of the surface that has a sulfur smell. This is a natural and necessary process for an ecologically balanced pool. It may take an entire season to become balanced.

In cool weather, spring and fall, the pond will have an algae bloom making it look like 'pea soup'. This can be solved by adding Microbe-lift® which is bacteria that eat excess nutrients that cause algae bloom.

Entirely emptying the pond is not necessary every year. The sludge at the bottom has beneficial bacteria that consumes excess nutrients in the water from which algae would otherwise feed.

## DESIGNING A POND

A well designed water feature includes:

- 1) mechanical and/or biological filtration
- 2) a pump and plumbing
- 3) a pond liner
- 4) hardscaping (placement of rocks)

Location and size are the two most important decisions about a water garden. Almost 90% of original water gardens installed are later replaced with larger ones, so plan for a larger pond than initially considered. Trace the prospective pond on the ground with a garden hose to assist in visualizing the finished size.

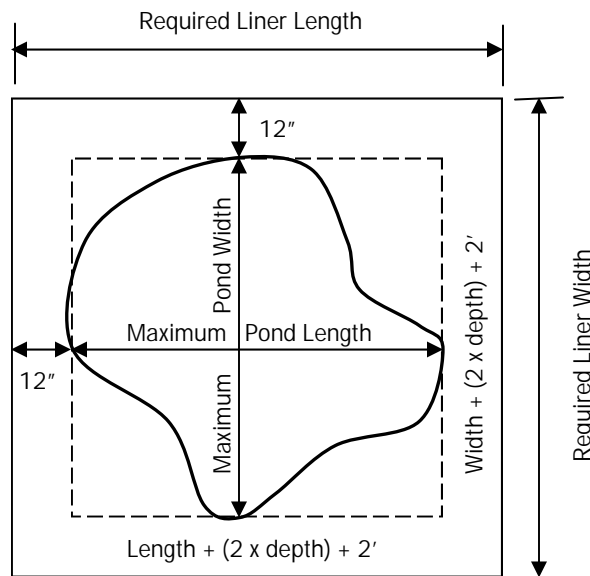
## HOW TO MEASURE A POND

When measuring a pond to determine the size of the liner proceed as follows.

- 1) Determine the maximum length and width.
- 2) Determine the pond's maximum depth.
- 3) Figure the liner's minimum dimensions  
With the following chart:

Desired Pool Depth	Add to Rectangle's Length and Width*
18" deep	5 ft.
24" deep	6 ft.
30" deep	7 ft.
36" deep	8 ft.

\*This allows for a 12" overlap on all sides.



To calculate the number of gallons in a pond, multiply the cubic feet by 7.5

example: 100 cubic feet = 750 gallons

# PONDS AND WATER GARDENS



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## WHAT IS A WATER GARDEN?

In a water garden there is a balance, a symbiotic relationship which must be maintained; just as there is a balance in all of nature. This balance is achieved by introducing four types of aquatic plants into your water garden. There are plants which release oxygen into the water, and plants that absorb pollutants. There are plants to keep the water temperature cool, and plants which absorb excess nutrients in the water; both of which assist in reducing algae. And aside from these roles the plants play in the balancing act of the water feature, they are beautiful.

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## DEEP WATER PLANTS

These plants are typified by both hardy and tropical lilies. The hardy lilies are all perennial and will bloom year after year. Resting at the bottom of a pond, they will survive harsh winters under a foot of ice as long as their roots do not freeze. The flowers come in shades of red, pink, white, and yellow. Their degree of fragrance varies greatly and all are day blooming, opening repeatedly for 3 to 5 days. The floating foliage of lilies aids in reducing the abundance of algae.

Tropical lilies can be considered the annuals of a water garden. There are both day and night blooming varieties, and the flowers are larger and more abundant than the hardy lilies. Tropical lilies, along with any other tropical aquatics mentioned, are endangered by temperatures below 65 degrees Fahrenheit. It is possible, but difficult to overwinter tropical lilies, and they are often treated as annuals in our climate.

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## FLOATING PLANTS

Water features should be situated in full sun for best performance of plants, but sunlight also promotes algae growth. Shade directly on the water surface will discourage algae growth. This can be created with lush and prolific floating plants. These plants simply float on the water's surface with their roots dangling to obtain nutrients from the water with no soil contact. By shading the water these plants keep the water temperature cool which helps the water retain oxygen. Water lettuce and water hyacinth are examples of these floaters, which can be prolific requiring occasional thinning.

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## MARGINAL OR BOG PLANTS

These plants border a pond's inner perimeter creating a natural border. Marginals assist the water by absorbing heavy metals and other pollutants, as well as absorbing nutrients in the water thereby preventing algae growth. Usually they will only tolerate being submerged an inch or two under the water surface. Hardy varieties include iris, pickerel, arrowheads, and cat-tails. Including some tropicals such as umbrella palm or papyrus adds a pleasing upright element to a water feature. Water poppies and parrot feathers create a blanket of foliage that floats on the water's surface.

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**60% - 70% of the pond surface should be covered with lilies, floaters, and marginal/bog plants**

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## SUBMERGED PLANTS

These plants grow entirely underwater, and release oxygen into the water. Their plumes and whorls undulate gracefully beneath the surface. Anacharis, cabomba, and hornwort are particularly tough plants.

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## PLANT CARE

The best way to grow aquatic plants, except for floaters, is to plant them. Plant them in a fine meshed basket, simple plastic container, or right in the rocks of the bottom. A premix aquatic soil or heavy garden topsoil should be used for potting. Place a layer of gravel or stones on top of the container to prevent soil from floating to the surface.

Marginal/bog plants, floating plants, and submerged plants do not need supplemental feeding. They absorb enough nutrients from the air and water. However, water lilies can be fed monthly.

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## FISH, SNAILS, FROGS, OH MY!

The presence of fish and other critters in the pond brings it to life. The fish will eat small insects and mosquito larvae from the surface. Snails will help eliminate algae and any plant debris that falls into the water. The only thing you may need to add are the fish. Eventually frogs, snails, and other wildlife will appear as if by magic.

Fish have plenty of food in the pond via algae, microbes, and other tasty snacks. If supplementing their feeding, decrease feeding as temperatures fall. In cold water fish do not feed much, and the excess food will only incite algae growth.

Also important in colder temperatures is keeping open water. When a pond freezes over, it is difficult for oxygen to enter the water for fish survival. A pond deicer is recommended.

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