

Aquatic Gardening: Construction and Maintenance

Introduction

Aquatic plants have been an important part of gardens since early history when they were first used in ancient gardens of the Far East, Egypt and India. Early herbalists extracted tannin from the roots of water lilies to calm a variety of nervous and digestive disorders. Many water lilies also provided some of the earliest fabric dyes which were extracted from their roots.

Contemporary aquatic gardening has received a lot of attention by homeowners and commercial landscapers. The development and increased availability of various types of preformed pools, flexible liners and other containers has helped to foster the current increased enthusiasm in aquatic gardening. These new materials are a great improvement over the old tedious process of building pools out of concrete.

The style and size of a water garden can range from a simple above ground tub garden, a small preformed pond, or to a large pond constructed with a flexible liner.

Pond location

The first step in designing a water garden is to consider where it will be enjoyed the most. Some good locations for a pond are near a patio, deck or within view from a window. A pond can be either formal or informal in shape. Informally shaped ponds are the most popular. Some common shapes are the classic kidney bean and the figure eight.

In addition to locating the pond for best viewing a pond should be located where it will receive at least five or six hours of direct sun if flowering plants are desired. As the hours of direct sunlight decreases, so do the blooms. The hardy and tropical bog plants will perform best in semi-shaded sites. It is generally recommended to avoid locating the pond directly under trees because of the leaves and other debris that will fall into the pond. Also, avoid locating the pond in a low spot because surface runoff may wash mud, lawn fertilizers and pesticides into the pond.

Pond Construction

A pond can be made almost any size or shape desired if a flexible liner is used. If a rigid preformed pond is chosen the size and shape will be limited by what is available on the market. The depth of a pond should be at least 18 inches in the center for the successful over-wintering of hardy aquatic plants. A shallow ledge should be provided along the outside edge of the pond for placement of potted marginal plants. These plants cannot tolerate growing in deep water. Make the ledge about 10 inches below the surface and wide enough to submerge potted plants in a stable manner.

Installing a Flexible Liner

The development of flexible pond liners has done much to make pond design and installation easier. It has played a major role in the growing popularity of aquatic gardens. A flexible liner is a thin rubber-like material cut from a large roll of material. Its flexibility allows it to conform to the contour of any size and shape desired. When properly installed, these liners will last for many years.

There are three types of flexible liners on the market: polyvinyl chloride (PVC), butyl rubber and ethylene propylene diene monomer (EPDM). PVC liners were one of the first liners to be developed. It ranges in thickness from 20-32 mils. PVC liners are the least expensive and will last 7 to 10 years. The most limiting factor of its durability is exposure to the sun. PVC is only moderately resistant to the effects of ultraviolet radiation and will eventually crack when exposed to prolonged sunlight. Always keep the pond filled to the top to prevent the liner from being exposed to direct sunlight.

Butyl rubber has also been used for a long time. It is a highly recommended synthetic rubber liner because of its resistance to ultraviolet radiation. It has a useful life of 20 years or more. It is 30 mils thick. It is easier to work with than the stiffer PVC liners because it is more flexible.

A more recent entry into the pond market, which is very similar to butyl rubber, is EPDM. This is also a type of synthetic rubber that is less expensive than butyl and has the same appearance and durability. It is the thickest liner available (45 mil). It is a dark charcoal gray or black and quite flexible and easy to install. EPDM was originally used in the roofing industry and was manufactured with an antifungal mineral talc coating. Some problems of fish toxicity have been reported with earlier EPDM. The products marketed as fish safe EPDM do not have these mineral talcs and are very safe to use for ponds.

Determining Liner Size

Flexible liners are cut from rolls that may be 10, to 25 feet or more in width. To determine the size of the liner required, determine the length and width of the proposed pond. Next determine the maximum depth in feet and multiply this by 2. Add this amount to both the length and width. Finally add at least one additional foot to both the length and width for the top edge overlap.

Formula:

$$\text{Liner width} = \text{pond width} + 2 \times \text{depth} + 1 \text{ ft.}$$

$$\text{Liner length} = \text{pond length} + 2 \times \text{depth} + 1 \text{ ft.}$$

The extra 1 ft is to allow sufficient quantity of the liner to go under the edging stones and behind them. Do not trim the liner until the pond is finished and the water level is adequate. Allowing the water level to submerge part of the rock edging helps to make a very natural-looking edge.

Remove all sharp objects like stones and tree roots to protect the pond liner from puncture. These liners are very tough but if a puncture or tear should develop, it is easily repaired with a pond liner repair kit.

For additional protection use a spun underlayment material made for this purpose. Rug padding or several layers of wet newspapers can also serve as a cushion under the liner.

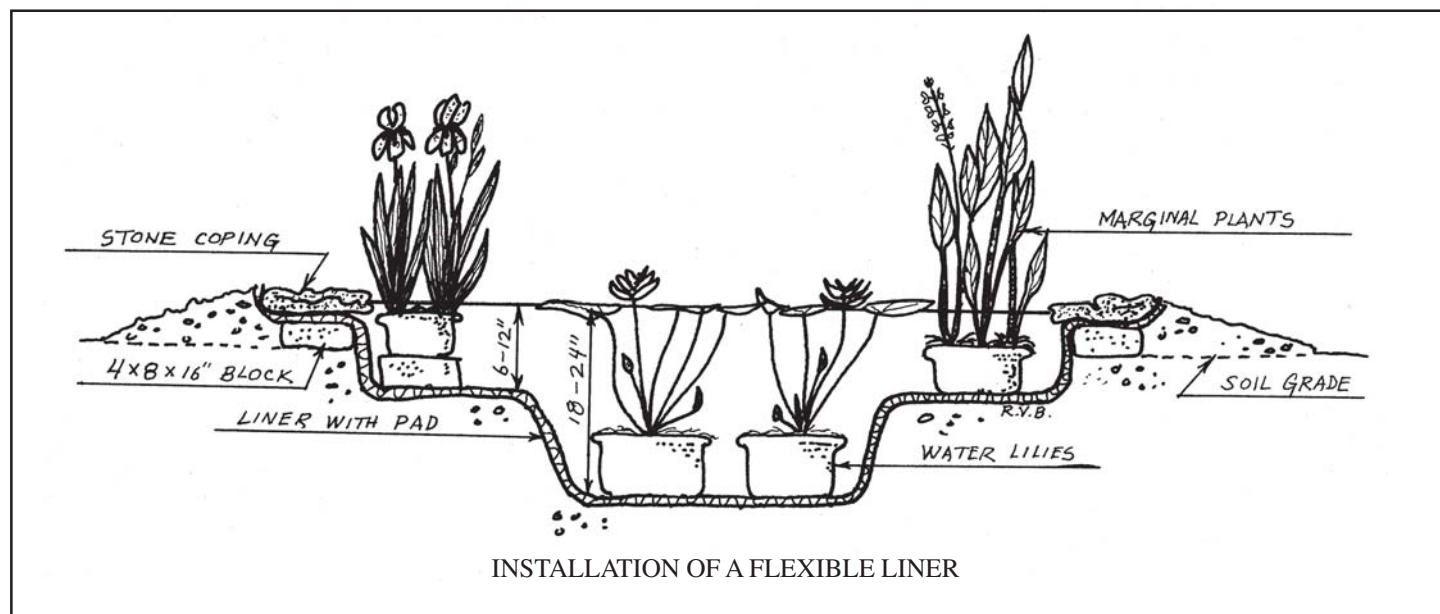
Carefully spread the liner to fit the contours the best you can to make the liner conform to the excavation. Don't worry too much about the unsightliness of the folds. They will lay flat with the weight of the water. When the pool is filled with plants, these folds will be difficult to see. Gradually fill the pond with water as the liner is folded into place.

Installing a Rigid Liner

Actually almost any water tight container if large enough can be a potential water garden. Many things, such as large ceramic pots, plastic horse trough, child's swimming pools, half whiskey barrels, etc., are suitable for above or below ground. New whiskey barrels should be aged by filling with water, emptying and refilling until the odor of alcohol is gone. There are plastic inserts that may be used in them to avoid the toxic effect of the alcohol. To assure the successful overwintering of hardy plants in above ground containers, install a stock tank or pond heater.

Using a rigid liner has merit because it is tough, durable, quick and easy to install, has a life expectancy of over fifty years (for fiberglass) and comes already molded into various shapes. Other types of preformed liners are made of molded semi-rigid plastic which are less expensive but also less durable than fiberglass. As with the flexible liners all sharp objects should be removed and the excavation be lined with an inch of sand. After the site preparation, place the pool so that the rim is slightly above the soil line. Level the pool from side to side using a carpenter level. Place soil around the pool exterior while filling the pool with water. This will help reduce stress on the pool as it is being filled with water. Edge the top with flat stones.

Constructing a water garden is really not a very difficult task. When the proper site has been selected and the pond properly installed, it will provide you with years of beauty and enjoyment.



Pond Maintenance Tips

Like any garden worth keeping, there is some basic maintenance techniques to practice. In the spring remove any debris that may have fallen into the pond during the winter. If there is an excessive accumulation over many years, the pond will have to be drained completely to remove this material.

Water lilies and other aquatic plants grow very rapidly and, in time, become crowded, reducing their vigor and bloom. Every two to three years they should be lifted from their containers and divided in the spring as new growth begins to appear. Give them their first fertilization at this time.

In the summer, remove dead plant debris. Water lilies, in particular, continually have older leaves dying as new leaves emerge. Excessive plant growth may need to be removed to make viewing the fish possible. Continue to fertilize lilies during the summer. Occasionally, insects specific to aquatic plants, such as the water lily aphid and the water lily beetle, will invade the pond. Fortunately their destruction is usually not very severe. There are no registered pesticides for home aquatic ponds. Simply dunk the leaves in the water or hose off the aphids. The fish will enjoy eating them. The water lily beetle is easily controlled by removing infested leaves. This will break the life cycle.

In the fall cut back the frost-killed tops of the hardy plants. The tropical plants can be discarded. Stop feeding the fish when the water temperature drops below 55 degrees F, this usually occurs in mid to late November. Move all plants into the deeper area of the pond (18 inches) for freeze protection. If the pond is in a location where tree leaves might fall into it, cover the pond with chicken wire.

And lastly, if there are fish in the pond, install a floating stock tank heater to keep a small portion of the pond free of ice in the winter. This is an automatic deicer that comes on when the temperature is a few degrees above freezing. A heater of 1500 watts is recommended for Maryland winters. One word of caution, the fish will group around the heater and those that get pushed against the heater element get burned. A good heater will have a small guard panel to keep the fish from touching the heating element. The fish will benefit from this ventilation hole which allows oxygen to enter. However in larger ponds the heater will freeze in place during very cold winters. If the pond should freeze over do not try to crack or break the ice. The shock may injure the fish.

Suggested References for Further Reading:

Waterlilies and Other Aquatic Plants. Frances Perry. 1989. Henry Holt and Co., Inc.

Water in the Garden. James Allison. 1991. Salamander Book Ltd.

Encyclopedia of the Water-Lily. Charles Masters. 1974. T.F.H. Publications., Inc., Ltd.

Water Gardens. Ken Aslet, John Warwick and Jan Bolders, 1977. Royal Horticultural Society

Pond and Water Gardens. Bill Heritage. 1981. Blandford Press, Ltd. Distributed by Sterling Publishing Co.

Public Display Gardens with Aquatic Plants:

Kenilworth Aquatic Gardens

National Arboretum

Brookside Gardens

Longwood Gardens

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