



## HOW-TO BOOKLET #3136

# MAKING A WATER GARDEN



### TOOL & MATERIAL CHECKLIST

- |   |  |                                       |
|---|--|---------------------------------------|
| <input type="checkbox"/> Spade            | <input type="checkbox"/> Wheelbarrow     | <input type="checkbox"/> Garden Hose  |
| <input type="checkbox"/> Tape Measure     | <input type="checkbox"/> Pond Liner      | <input type="checkbox"/> Sand         |
| <input type="checkbox"/> Plant Containers | <input type="checkbox"/> Edging Material | <input type="checkbox"/> Spirit Level |
| <input type="checkbox"/> Pea Gravel       | <input type="checkbox"/> Water Plants    |                                       |

***Read This Entire How-To Booklet For Specific Tools and Materials Not Noted in the Basics Listed Above.***

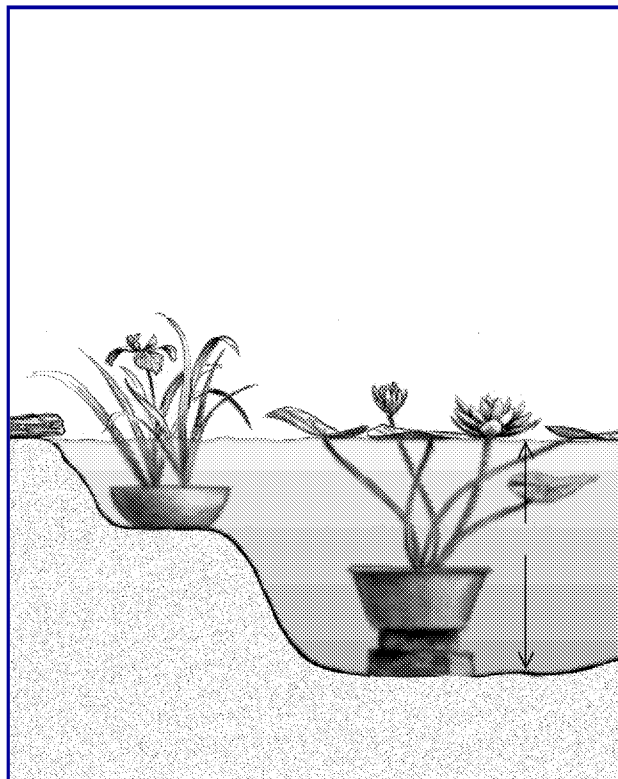
A garden pond is a pleasing addition to almost any home landscape. Water has a soothing quality, and a few minutes spent contemplating a garden pond can melt away the cares of the day. When the weather is hot, just the sight of a small pond can be refreshing, particularly in regions where water is scarce to begin with. In addition to the charms of water, garden ponds provide an opportunity to grow some intriguing and beautiful plants. Stocked with a few fish, visited by local frogs and birds, a pond is the hub of a thriving miniature ecosystem, a source of continual fascination for both children and adults.

In this How-To-Booklet, we'll describe how to install and plant a simple garden pond, and introduce a selection of plants to get your water garden started.

### PLANNING

Even a small backyard pond involves considerable effort and expense, and once installed, it is difficult, if not impossible, to move. Take time to think about how a pond fits into your landscape and into your family's activities. Talk with established water gardeners and learn from their experiences. (Inquire about local water-gardening groups, or ask staff at your local nursery if they know some water gardeners.)

While you're pondering your design and use preferences, remember a few practical details. Water plants are sun lovers—site your pond where they can receive 6 to 8 hours of sun daily. Don't locate the pond on your property's lowest spot, where it will catch the runoff and attendant debris of every rainstorm. Land lower than the pond can receive overflow and water drained from the pond when cleaning. Avoid areas filled with tree roots, rocks, or other impediments to digging. Water finds its own level; a relatively flat spot will save you a lot of grading.



The size and shape of the pond are determined largely by available space and personal preference. Plants and fish, however, impose certain requirements for a pond's depth. Water plants commonly grown in the garden must be planted at specific depths, ranging from just under the surface to several feet. Many pond designs incorporate a ledge for shallow-water plants and a bottom about 2 feet deep to accommodate water lilies and lotus. For fish, plan an area more than 2 feet deep. In warm climates, the extra depth provides cool water in summer; in cold climates it provides a place under the ice for plants and fish to overwinter.

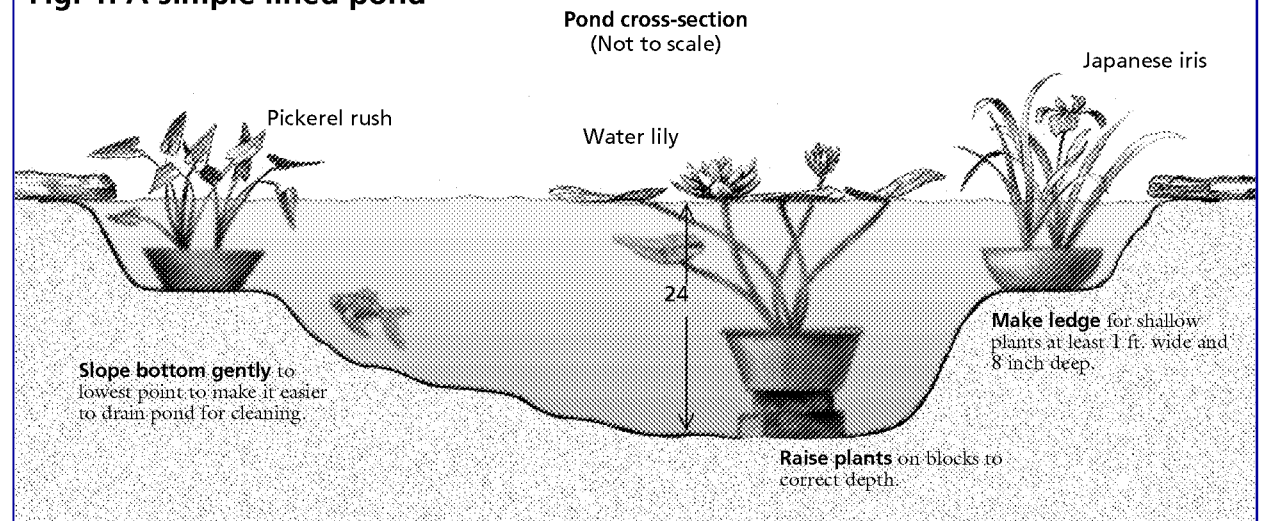
### BUILDING A LINED POND

Modern materials have made pond construction accessible to anyone with a shovel and a supply of elbow grease. Two kinds of pond liners are common. Preformed liners of rigid fiberglass are convenient, but they are expensive and are available only in a limited number of shapes and sizes. Sheets of thin, flexible plastic (polyvinyl chloride, called PVC) or butyl rubber (another synthetic material) offer far more design possibilities at less cost. A flexible liner isn't difficult to install—a small pond shouldn't take more than a couple of weekends. Here's how to do it.

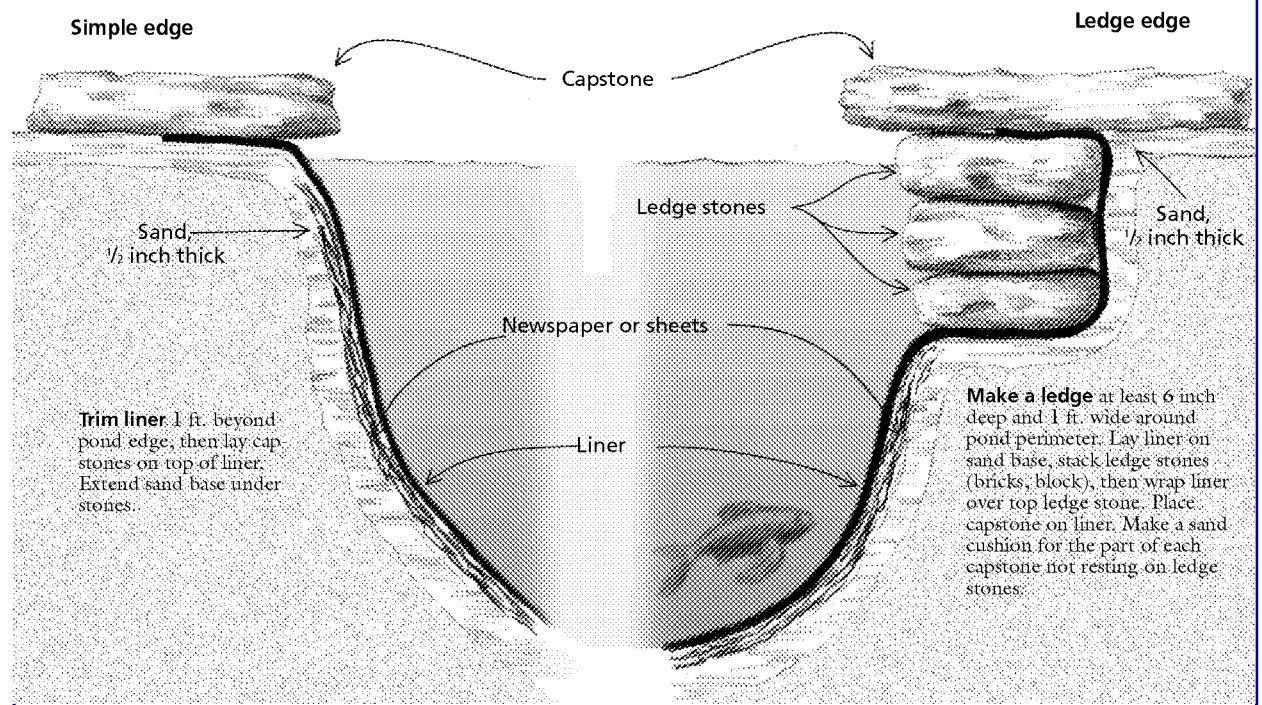
**1** To determine how much liner you'll need, add twice the pond's maximum depth plus 2 feet (for overlap) to the pond's maximum length; do the same for the width. Buy a liner specially made for ponds. Thicker material is more expensive, but it is also more durable and will last longer—20-mil PVC (0.020 in. thick) should last about 10 years before ultraviolet radiation degrades it. PVC that is 32 mils thick will last 15 to 20 years, and 45-mil butyl rubber even longer.

**2** Lay out the pond's perimeter on the site. A formal, geometric shape can be plotted with stakes and string. (Drive a stake and stretch a string for a radius to make a circle.) A length of garden hose is useful for making fair curves on free-form shapes. Establish the shape with the hose, then mark it on the ground with hydrated lime from a garden center.

**Fig. 1: A simple lined pond**



**Fig. 2**



- 3 Dig. Ground that is slightly moist is easiest to dig. Slope the sides of the hole in at least 75° from vertical. If you have the room, you may want to make part of the perimeter a gradual shallow slope, which mimics many of nature's ponds and provides an attractive spot for birds to visit. Remove rocks, roots, and other debris that might pose a danger to the liner.
- 4 Level the perimeter of the pond. Rest a spirit level on a long straight board laid across the hole to check. Fill low spots with earth removed from the hole. If you want the capstones to lie flush with the surrounding soil, dig a ledge around the perimeter to accommodate their thickness and that of the builder's sand or mortar in which they rest.
- 5 Spread a layer of builder's sand about 1/2 inch thick on the bottom and sides of the excavation. Layers of newspaper, old sheets, or blankets placed below or on top of the sand provide extra insurance against puncture.
- 6 Stretch the liner over the hole, weighting its edges with just enough bricks or stones to hold it in place. Now add water from the garden hose. The weight of the water will gradually sink the liner into the hole. As the water pushes the liner against the sides, make tucks and pleats where necessary to help the liner conform smoothly to the contours. (If your pool is large, you may need to stand in it to smooth the liner.)
- 7 To accommodate runoff after a rain, provide an overflow outlet. This can be as simple as a channel cut at water level through to lower ground nearby, with stones and pebbles to hold the liner in place and obscure it from sight. Or it can be buried drain pipe or tile that empties into a rock-filled dry well.

**Edging the pond.** When the pond is full of water, smooth the liner around the perimeter and trim it to overlap the surrounding soil about 1 foot. The simplest pond edge is made by laying capstones on top of the liner. Extend the capstones 2 inches or so over

the water to hide the liner and to protect it from ultraviolet light. If you want to walk on the capstones, and you live in a mild-winter climate, you can lay the capstones in several inches of mortar. Those in a cold-winter climate should consult with a concrete contractor about the advisability of reinforcing the mortar or digging footings to prevent frost heaving.

An alternative edging suitable for any climate is also shown in **Fig. 2**. Here, a submerged edge of mortarless stone, brick, or block helps hold the liner in place while providing firm support for the capstones and anyone walking on them. To install this edging, you'll need to cut a ledge deep enough to accept several courses of flat stones, bricks, or flat concrete pavers (it should be at least 6 in. deep and 1 foot wide). When the water reaches this ledge during installation, make final adjustments in its height using the water level as a guide. Resume filling the pond, placing the ledge stones on the liner, then trim and fold the liner over them. Lay the capstones in place around the perimeter, adding builder's sand where necessary to level them.

### PLANTS IN THE POND

With a bit of experience, you can make your pond into a self-sustaining miniature ecosystem, with a balance of plants and aquatic creatures that will keep themselves healthy and the water clear. When you select water plants, remember that some, such as irises and pickerel rush, grow vertically above the water surface. Others, such as water lilies, float on the water surface, and can take up considerable space.

Water plants are no more difficult to plant than garden plants. To restrain soil and to make the plants easier to maintain and, if necessary, remove for overwintering, water plants are usually planted in containers. You can buy plastic baskets made for the purpose or use regular plant containers or plastic dishpans (bore some holes for drainage). After filling the pond, let the water sit for a week or so before adding plants, so that chlorine in the water can dissipate.

Good garden soil, preferably on the heavy, clayey side, works well for water plants. Remove unde-

composed organic matter, and don't add organic amendments such as peat and compost, which break down and cloud the water. Don't use potting soil or soilless mixes.

### Planting a Water Lily.

- 1 Fill a container with about 10 qt. of soil, pressing it firmly in place. Line open-lattice baskets with burlap to prevent the soil from floating away.
- 2 Hardy water-lily rhizomes are usually shipped dormant. Trim damaged roots and place the thick rootstock horizontally in the soil, the top of the crown and new leaf shoots, if any, exposed. Hardy water lilies spread in one direction from the rhizome, much like irises do, so place the rhizome near one side of the container to allow for subsequent growth. Insert tropical lily tubers vertically in the center of the container; the soil should cover the base of the stems but not the crown.
- 3 Spread a layer of pea gravel, 1/2-inch thick, to keep soil from floating free and to prevent fish from disturbing the plant roots. The crowns of hardy lilies should remain exposed.
- 4 Soak the soil with water from the pool. Lower a hardy lily into the pool until the soil surface is from 6 to 16 inches under water (no more than 2 feet deep). Don't put tropical water lilies out until the water in the pool has stabilized at about 70°F. To lessen the shock of transplanting, you can lower tropical lilies gradually into the pond, so that their developing foliage stays on the surface. Stop when the plant reaches a depth of 6 to 12 inches.

**Other plants.** Shallow-water plants and bog plants are planted in containers much the same way as you'd pot up a begonia for the patio. Use heavy soil, as described above, spreading gravel on the surface to prevent soil loss. Most of these plants will do well on a shallow ledge with the soil surface under several inches of water; others may be planted

with the soil surface at or even above the water. Free-floating plants don't need soil to anchor them. Just toss them in (gently); some can be anchored in soil if you want to confine them to a certain spot.

## CARE AND MAINTENANCE

Like any container-grown plant, a water plant needs regular feeding; timing varies according to the plant and the type of fertilizer. Special tablets formulated for water plants are easy to apply—just push them into the soil.

Water plants attract certain pests, and you'll have to decide how much damage you can tolerate before controls are warranted. If your pool contains fish or other wildlife, most pesticides are out. You can control aphids on water lilies (or other plants) by knocking them into the water with a well-directed spray from the garden hose. Zap caterpillars with the biological control *Bacillus thuringiensis* (Bt); encourage birds and beneficial insects. Good hygiene keeps down pest and disease problems, and helps keep water clear and inviting. Remove diseased and damaged plant parts as soon as you see them. Keep water clear of leaves and other debris.

Within the first several months your pond is likely to bloom with algae. As the plants mature and shade more of the water, the bloom should subside. If not, try adding some oxygenating plants, which compete with algae for nutrients, or fish, which eat algae. As a last resort, you can try chemical controls—be sure to find one that won't harm other plants or fish.

Plants hardy for your region can be overwintered in the pond if it doesn't freeze to the bottom; the layer of ice serves as insulation. Cut back foliage after a killing frost and place plants on the pond bottom. Fish can also overwinter under the ice, but you'll need to maintain an unfrozen area with a pond deicer to allow gases harmful to the fish to escape. If the pond might freeze to the bottom, remove the containers and cut away all growth above the soil. Cover each container with moist newspaper, enclose it in a plastic bag, and store where temperatures stay below 40°F.

## SOME RECOMMENDED WATER PLANTS

Plant Names (Common/Botanical)	Comments
<b>DEEP-WATER PLANTS</b>	
Hardy water lilies ( <i>Nymphaea</i> spp.)	Numerous cultivars with striking, slightly fragrant star-shaped flowers in a range of colors. Leaves float on surface of water, flowers on or just above.
Tropical water lilies ( <i>Nymphaea</i> spp.)	Numerous cultivars producing larger flowers in greater quantities than hardy water lilies. Flowers are intensely fragrant. Look for night-blooming as well as day-blooming varieties. Night bloomers are particularly fragrant.
Nuphar ( <i>Nuphar</i> spp.)	Grown for their large (up to 2 ft. across) floating leaves.
<b>SHALLOW-WATER PLANTS</b>	
Arrowhead ( <i>Sagittaria</i> spp.)	Named for distinctive shape of leaves, which rise several feet above water. Smallish flowers borne on spikes in mid- to late summer. <i>S. sinensis</i> contributes oxygen to water; sword-shaped leaves grow to 3 ft. tall.
Cardinal flower ( <i>Lobelia cardinalis</i> )	Spikes of lovely red flowers rise 3 to 4 ft. above water in late summer.
Cattail ( <i>Typha</i> spp.)	A favorite of children, featuring long grassy leaves and familiar cigar-shaped catkins. Look for smaller <i>T. laxmanii</i> for smaller ponds.
Iris ( <i>Iris</i> spp.)	Beautiful flowering plants. Japanese, Siberian, and Louisiana irises will grow with "wet feet." <i>I. laevigata</i> 'Variegata' is grown for its striped leaves.
Lotus ( <i>Nelumbo</i> spp.)	Large, beautiful flowers and handsome leaves up to 2 ft. across rise above surface of water to heights of 5 ft. Equally attractive seedpods. Heat lovers, they bloom in late summer. Need large pots and lots of feeding.
Pickereel rush ( <i>Pontederia cordata</i> )	Lance-shaped leaves on 2-ft. stalks joined in late summer by spikes of starlike blue flowers that last a long time. Start plants shallow; increase depth gradually.
Japanese primrose ( <i>Primula japonica</i> )	Tall stalks bear flowers in a whorled candelabra.
Sweet flag ( <i>Acorus</i> spp.)	Grown for grassy, irislike foliage. There are striped (variegated) types as well as smaller varieties.
Marsh marigold ( <i>Caltha palustris</i> )	Cheerful buttercup flowers and bright green foliage in spring or early summer. Plant dies back and goes dormant about a month after flowering.
Watercress ( <i>Nasturtium officinale</i> )	Prolific plants grow free-floating in gently moving water. Buy seeds or plants from herb specialists.
<b>FREE-FLOATING PLANTS</b>	
Anacharis ( <i>Elodea canadensis</i> )	Excellent hardy oxygenating plant; grows submerged.
Water fern ( <i>Ceratopteris thalictroides</i> )	Edible leaves rise 1 ft. above water. Not hardy.
Water lettuce ( <i>Pistia stratiotes</i> )	Little lettuces look like a floating salad display.
Water milfoil ( <i>Myriophyllum aquaticum</i> )	An oxygenator with feathery leaves that are bright yellow-green, tipped red in autumn, and rise several inches out of water.