







Nuts and Bolts of Water Gardening

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With thanks and appreciation to Steven Patrick, CEA

Learning objectives

- Site evaluation
- Pool design - overall landscape design
- Basics of water garden installation
- Basic pond maintenance
- Plant materials for water gardening
- Water garden problem troubleshooting

The First Three Rules Of Water Garden Installation Are???



1. Location !

2. Location !

3. Location !

Site Selection

Things to consider when selecting a water garden site.

- Sunlight
- Elevation and grade
- Power and water source
- Proximity to outside activity areas
- Style
- Safety



Sunlight

- 6 to 8 hrs
- Tree considerations



- Full Sun = 8-12 hours direct sun
- Part Sun/Part Shade = 4-8 hours direct sun
- Shaded = Less than 4 hours direct sun

Elevation & Grade

- Avoid low-lying areas
- Avoid areas where water from the lawn and landscape collect

Power & Water Source



Circuit Breaker



Receptacle

- Power source with ground fault circuit interrupter (GFCI)
- Convenient water source

Proximity

- Locate in areas where you spend time
- Consider views

Style

- Personal taste
- Style of house & garden
- Formal/Informal



Informal Style



Formal Style



Safety

- Check local ordinances
- Check homeowners Insurance
- Call before you dig (Better yet, before you select a site)

Selecting Materials & Supplies



Liners

- Cost not only consideration
- Several options
- Fish Safe

Flexible Liners

- PVC (poly vinyl chloride)
- EPDM (Ethylene Propylene Diene Monomer)
- Permalon

Underlayment

- Recommended for all water garden liners.
- Geotextile liner
- Builder's sand

Sizing Liner & Underlayment

- Length + 2 times Depth + 2' overlap = Liner Length
- Width + 2 times Depth + 2' overlap = Liner Width
- EXAMPLE Water Garden - 14' (L) X 9' (W) X 2' (Depth)
 - 14' + (2x2') + 2 = 20' (length)
 - 9' + (2x2') = 15' (width)

Pre-formed liners



Pumps

Low Efficiency

- Lower initial cost
- Uses more electricity
- Shorter life expectancy



Pumps

High efficiency

- Higher initial cost
- Uses less electricity
- Longer life expectancy



Skimmers



Filters



Filters

- Mechanical Filtration
- Biological Filtration
- Ultra-Violet Clarification

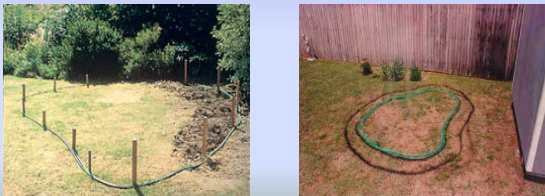
Waterfall Filtration Box



Layout and Installation



Layout



Excavation

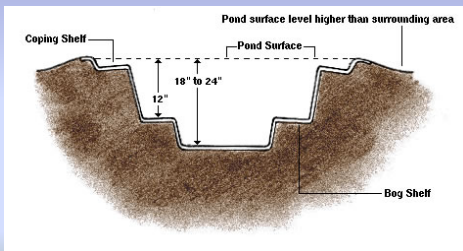


Leveling the Edges



**The water will be level.
Make sure the water garden edges are too!**

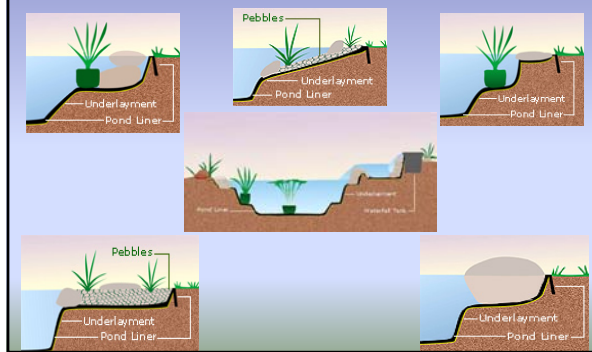
Plant Shelves



Installing Underlayment & Liner



Edging Treatments



Installing Stone



Ready For Fish & Plants



The Well-Planted Water Garden



Aquatic Plants Selection and Care

Aquatic Plant Types

- Floating
- Surface
- Submerged
- Marginal

Floating Plants

- Water Hyacinth
- Water Lettuce
- Duckweed




Water Hyacinth
Eichhornia crassipes



Water Lettuce
Pistia stratiotes



Surface Plants



- Water Lilies
- Lotus
- Floating Heart
- Water Clover
- Water Hawthorne

Water Lilies

Water Lilies

- Hardy
- Tropical

Tropicals

- Day Bloomers
- Night Bloomers

Hardy Water Lily

Nymphaea



Hardy Lily

Flowers



Growth Habit



Pads



Propagation



Tropical Water Lily *Nymphaea*



Tropical Lily

Flowers



Growth Habit



Pads



Propagation



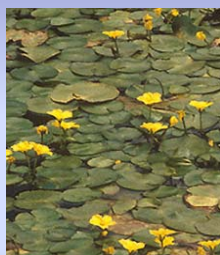
Lotus
Nelumbo



Parrot's Feather
Myriophyllum aquaticum



Floating Heart
Nymphoides peltata



Water Clover
Marsilea



Water Hawthorne
Aponogeton distachyus



Submerged Plants

- Anacharis
- Cabomba
- Hornwort
- Vallisneria

Anacharis
Elodea canadensis



Cabomba
Cabomba caroliniana



Hornwort (Marestalk)
Ceratophyllum demersum



Tape Grass
Vallisneria species



Marginal/Bog Plants

Star Sedge	Taro	Umbrella Palm
Sweet Flag	Cattail	Iris
Pickerel Weed	Arrowhead	Lizard's Tail
Ruellia	Horsetail	Forget-Me-Not
Golden Club	Water Bamboo	Cardinal Flower
Rushes	Bacopa	Chinese Water Chestnut

Water Irises

- I. laevigatae
- I. pseudacorus
- I. versicolor
- I. virginica
- I. fulva
- I. brevicaulis

Iris laevigata



Iris pseudacorus



Iris versicolor



Iris virginica



Iris fulva



Iris brevicaulis



Star Sedge
Dichromena colorata

A photograph of a Star Sedge plant, showing tall, thin green leaves and several small, white, star-shaped flowers.

Taro
Colocasia esculenta 'Black Magic'

A photograph of a Taro plant, featuring large, dark, heart-shaped leaves with prominent veins, growing in a garden setting.

Umbrella Palm
Cyperus alternifolius

A photograph of an Umbrella Palm plant, showing a dense cluster of long, thin, green leaves that fan out in all directions, resembling an umbrella.

Cattail
Typha species



Sweet Flag
Acorus calamus 'Variegated'



Grassy-leaved sweet flag
Acorus gramineus variegatus



Rush
Juncus effusus



Water Bamboo
Dulichium arundinaceum



Horsetail Rush
Equisetum hyemale



Golden Club
Orontium aquaticum



Water Forget-Me-Not
Myosotis palustris



Bacopa
Bacopa lenagera variegata



Cardinal Flower
Lobelia cardinalis



Bluebell
Ruellia brittoniana



Pickrel Weed
Pontederia cordata



Lizard's Tail
Saururus cernuus



Dividing hardy
water lilies



The older portion of the tuber has
been removed



Fill the pot with heavy garden soil
and add 2 aquatic plant food tablets



Now you are ready to gently lower
the pot into the pond



Pond Plants vs. Expensive Weeds

Weed = Plant in the wrong place

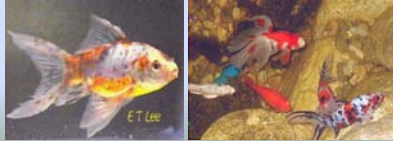
Garden pond owners **MUST** be
responsible with seeds and
clippings

RESPECT YOUR NEIGHBORS!!



Fish

Koi
Comets
Shubunkins
Sarassa



Koi

- Variety of colors and sizes
- Select
- A – Grade
- B – Grade
- Can be pricey



Comets, Fantails, Sarasas, and Shubunkins

- Inexpensive
- Some with long flowing fins
- Full grown at 12"
- More tolerant of WQ



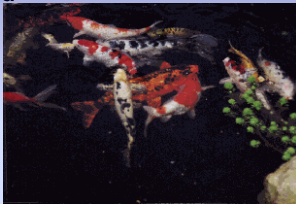
Gambusia – Mosquito Fish

- All fish eat mosquitoes and larvae
- Small
- Inexpensive
- Can take over



How Many Fish?

- Depends on the pond and filtration
- Generally 1" of fish per 5-10 gallons with filtration, about half without
- Larger fish need more room



Length X Width X Depth in feet X 7.5=
volume in gallons

Selecting Top Quality Fish

- Active and energetic
- Alert
- Full fins
- Good color
- Clean tanks
- Knowledgeable staff
- No nicks or scratches
- Eats readily

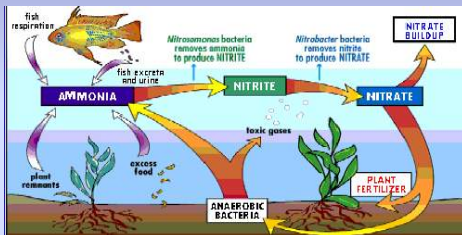


Feeding Your Fish Properly

- Feed only what is consumed in 3-5 minutes
- Limit feeding to once per day or less
- More feeding requires additional filtration
- Stop feeding at temps under 55 F
- Store food in cool dry place



Nitrogen Cycle



Algae



Dealing with Algae

- Algae multiply quickly!
- Water change doesn't work



Water Quality

- Keep rain run-off out of the pond.
- Full sun - shade 50 - 70% of the pond surface.
- Use one bunch of Anacharis per sq. ft.
- No more than one inch of fish per sq. ft. of surface area
- Add biological filtration and ultraviolet sterilizer.
- Remove dead organic matter

MOSQUITOES







