

## Creating Backyard Ponds for Veggies and Habitat

### The Water

From a permaculture or ecological gardening perspective we need to create a natural, diverse and healthy backyard to make them naturally productive, and there is no easier way to speed this up than by introducing a water feature. As long as it is not a chlorinated pool or clear water fountain any water will offer benefits to wildlife. Adding water to your yard also adds tranquility, cooling, beauty and it can also store clean rain water for irrigation in the garden.

Remember, frogs especially, but all garden life, is highly susceptible to chemicals and sprays, if you want a healthy environment you must avoid chemicals and even 'organic' concentrated sprays. One of the main benefits of a pond is all the predators it brings, so let them do their job and put away your sprays.

The best water for wildlife is a heavily planted (around the edges and aquatic plants within) medium sized pond and a separate safely placed bird bath nearby.

Attracting wildlife to your neck of the woods offers many benefits, anyone who has done it already will know the beauty and joy of watching wild creatures. When they arrive they vastly increase the diversity of your edible ecosystem and predatory protection of your plants.

More than just being a nice to have, water is critical if you want to attract wildlife to your yard. Habitat that appears good may be unused if no water is nearby. Water is necessary for drinking, breeding, bathing, and concentrated wildlife attraction/populations and the 'food supply' this creates locally. Water must be there all year round and is most important in summer when seasonal 'wild' supplies run low.

### The Wildlife

This highly productive water is unfortunately a great place for mozzis to breed so we need to introduce fish to the pond to control the breeding cycle. I like to think mozzis are everywhere so while people worry about attracting them with a pond I figure it concentrates them in one area and you can control their breeding cycle rather than have them breeding stagnant water everywhere else. So use your pond as a biological control hotspot.

Make the hotspot even hotter with a solar-powered light beside the pond to attract insects at night. This in turn will attract frogs, bats and other predators looking for an easy meal. You do lose some good bugs this way but once you have them there are normally plenty.

There are two good choices of fish types in small backyard ponds or barrel ponds, hardy non natives Goldfish or small native fish which are found naturally in WA. Both types can be purchased at pet or outdoor garden stores. Personally I find that the native species die out as part of their natural cycle whereas the goldfish survive and often multiply (keep fish numbers under control). A densely planted pond has plenty of fish safe wet areas, these are where the frogs and wild creatures naturally choose to lay eggs.

Ideally we should use native fish so try Western Pigmy Perch: *Edelia vittata* or Western Minnow: *Galaxias occidentalis* first. But frogs have been breeding with predatory fish in nature for ever, so provide them a decent pond and they will breed fine even if you have goldfish rather than small native fish.

Frogs are a highlight for many pond builders and Perth has many different varieties but you will mostly see the Motorbike Frog. It is important to provide dense strappy plants near the water so the frogs have somewhere to live, they don't 'live' in the water. Also frogs and other amphibians will use both water and muddy to breed in and live in so make sure one part of your pond is a shallow muddy end or you have a little bog garden somewhere.

Dragonflies and damselflies are drawn to areas where there is standing water, such as ponds, streams and wetlands. They breed in water and feed on insects found near water, such as mosquitoes, they like the frogs are a natural insecticides for troublesome insects.

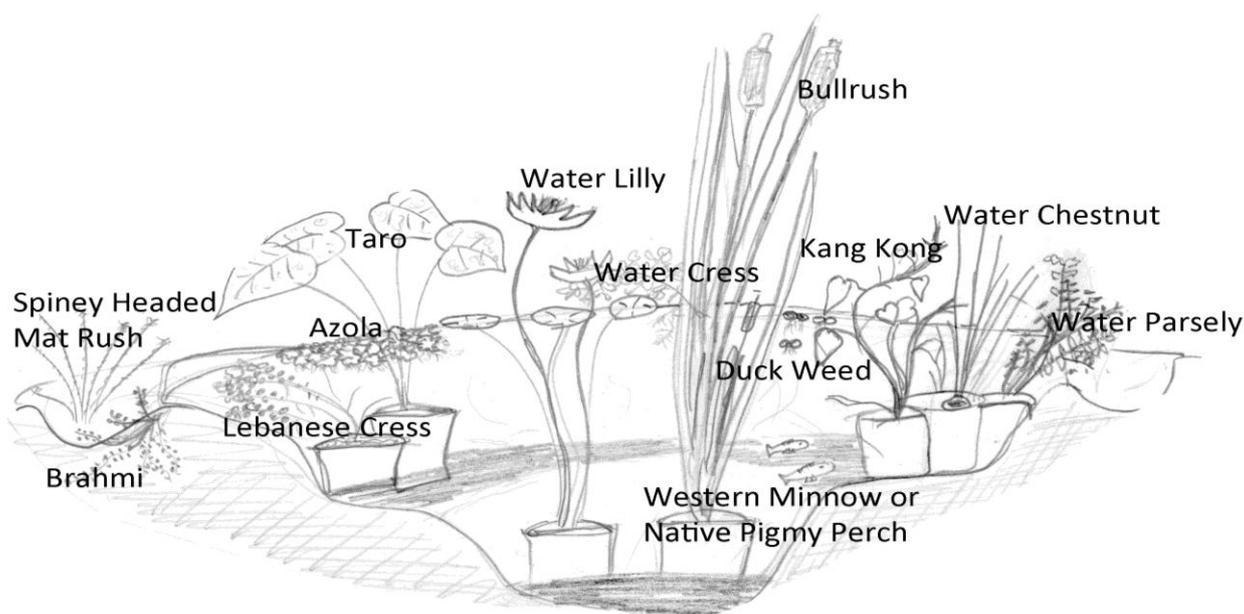
Bees and wasps always are attracted to water in summer so even if you have a pool its really worth having open safe water for them to drink at instead of landing on the edges of the pool where everyone is walking. They are smart enough to learn where the safe water is and will soon leave your pool alone.

Bats and birds often seek water not only for drinking but also because it attracts the insects they eat. While a pond is essential, a suspended birdbath will protect birds from cats and other predators. Place it in or under a tree so the birds have somewhere to land and be safe while bathing.

A shallow dish placed near bushy cover can supply water for small mammals, reptiles, bees, wasps and butterflies but a pond set into the ground gives the best results and be easier to keep water in.

### Building a pond-

Pick a spot in the garden that has more than 50% shade. Too much sun encourages algae. Try to have a small tree or shrub leaning over the pond to provide shelter for bird visitors. A highly productive veggie pond can be in full sun but does not need to as it just increases evaporation rates (water loss).



Many garden stores sell stiff, pre-shaped plastic ponds, as well as flexible PVC or butyl rubber liners that will conform to the shape of a pond you design yourself. Some of these pre-made ponds are too deep for frogs, so you will need to build a ramp so frogs can get in and out of the water. I have used 200 micron (the thick stuff) builders black plastic from a hardware store for cheap pond liner, but take care if you use a flexible liner, a layer of newspapers or old carpet under the plastic prevents punctures.

The pool can vary in size depending on your needs. It can be a small 1/2 olive barrel, a beautiful wine barrel, a bathtub sunk into the ground, a hole lined with plastic, or a concrete pool. It can be simply a hole filled with fresh water or a sophisticated pool complete with pumps and drainage controls. The level of sophistication is up to you.

The pool should be only 30cm-0.5m deep, placed in a sunny or partially shaded area, and surrounded by natural vegetation and rocks.

Fill the pond to the top. Do this before securing the sides if using a flexible liner so it can take up the slack. If using tap water, leave for a day to let the chlorine dissipate before adding plants, or a week before adding fish or tadpoles.

Place your native aquatic plants in the pond. Free floating species like Ferny Azolla and Duckweed can be just placed in the pond. Plants that need to be growing in soil need to be in a pot. Put a layer of sand in the bottom, then some good soil or compost, then the plant. Terracotta pots are handy for 'holding' plants down and stable in the beginning.

Put another layer of sand or gravel on top, to stop the soil and nutrients from escaping. Never use chemical fertilisers with aquatic plants, blood and bone is fine, if any fertiliser is needed.

You might want to put weld mesh over the top for child safety, it looks ugly to start with but plants soon grow through it and you wont see it..

### **Aquatic Plants and Planting them**

The trick to creating a stable aquatic ecosystem is the various types of plants in it, each of which plays a specific role to support and sustain aquatic life. Most people go wrong by not adding enough plants and end up fighting algae. To stack in the plants look at the four categories of water plants that can be included in a pond to achieve perfect balance.

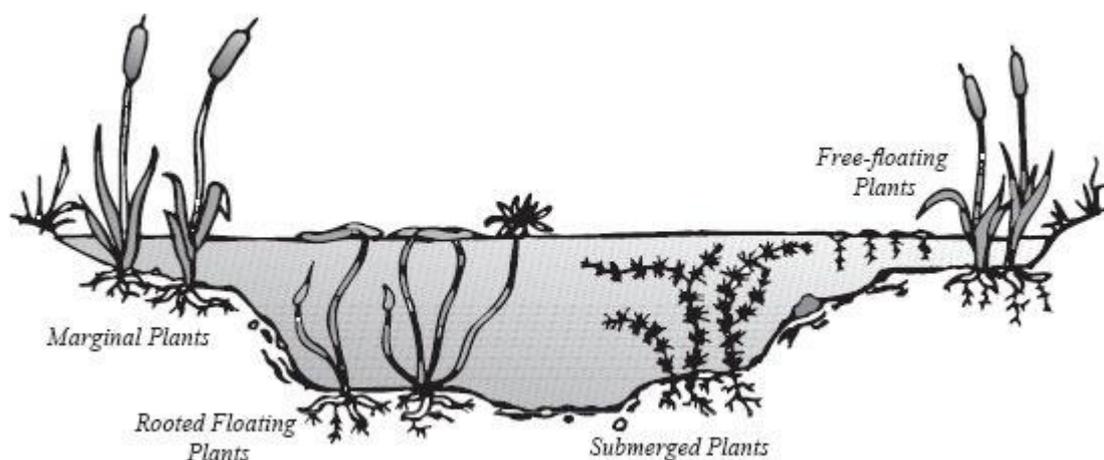
1. Rooted floating plants, (water lilies, Nadoo, Lotus)
2. Marginal plants (Bullrush, Spiney Headed Rush, Pickerel Rush, Vietnamese Mint, Water Chestnut)
3. Submerged (oxygenating) plants (Millfoil, Water Primrose)
4. Floating plants (Duckweed, Azola, watercress)

Rooted Floating Plants, are sun-loving plants and can survive with 10-20cm or more of water above the plant's crown. They produce floating leaves that shade the water, which reduces the growth of algae. They also provide shade and a hiding place for fish.

Marginal Plants grow in the shallow margins around the edge of a pond, and they can survive with up to 10cm of water over the plant crown. These plants do best in still to slow moving water. These plants can serve several functions. Adding height and shape to the water garden, as well helping to blend in the edges of a pond into the surrounding ground. They provide more practical functions, such as shelter

from the wind, and shade. They also serve as a barrier around the water's edge, providing protection to fish and frogs from predators.

Submerged plants also called Oxygenators, grow with their roots anchored in soil, but the leaves stay underwater. Oxygenators are essential for keeping the pond healthy and the water clear. Milfoil is the most common option in WA. These plants absorb carbon dioxide and release oxygen into the water, and by oxygenating the water they help it support more aquatic life such as fish and beneficial aquatic insects.



Floating Plants do not need soil, or anchorage and they grow by extracting nutrients from the water. They control algae in two ways, by shading the surface of the water restricting the light that algae needs to grow, and by removing excess nutrients from the water. Duckweed is a protein rich food source for fish, goldfish consume it greedily! Azola is a tiny fern which supports nitrogen-fixing bacteria just like legumes do, so it captures its own nitrogen from the air. This makes it a great nitrogen source.

Together these categories of plants create a balanced ecosystem, similar to the *stacking* of the seven defined vertical layers of a forest garden; an aquatic ecosystem has these four layers.

**For 1m<sup>2</sup> of pond surface area you should aim for:**

- **one Rooted Floating Plant,**
- **three Oxygenating Plants and**
- **two Marginal Plants.**

**For coverage of the water's surface to both avoid algal growth but allow oxygenation of the water**

- **Half of the water's surface should be covered with free floating and rooted floating plants.**
- **Or, conversely, *no more than half* of the water's surface should ever be covered with floating plants, however if with plants like azola that are cropped continuously for mulch this can be overlooked.**

## Edible Aquatics

There are many edible aquatics which serve the essential roles mentioned as illustrated on page 2 sketch. In summer you should be harvesting leafy greens fast and hard to keep the pond in check and your body healthy and vital. Water Cress, Lebanese Cress, Water parsley (celery), Water Chestnuts, Green Taro, Rice, Kang Kong (Water Spinach) Sweet Potato (leaves), Pickeral Rush, Brahmi, Gota Kola, Lotus, Nardoo, Bull Rushes, Water Mint, and Fish Mint are some but not all the edible vegetables and medicinal plants you should have in your pond. Some a mainstream veggies and others are aboriginal bush tucker.

### **Australian native waterplants.**

Some grow nowhere else in the World. Native aquatic plants do wonders to garden ponds, and dams. They improve water quality and visibility, and provide habitat and hiding places for small fish and animals. The species listed here are not normally invasive, but if they do outgrow a small pond they can be easily scooped out and composted. Never release any of you pond plant to 'wild' waterways. Aquatic plants are rich in nitrogen, easily composted, and make a very useful fertiliser.

\*Yellow bladderwort, Yellow waterwort,\* (*Utricularia gibba exolata*)

This is one of the World's most amazing water plants. It floats, submerged, and in summer, grows a small, but very pretty, single yellow flower, which protrudes above water. In flower, a colony of these plants presents a stunning and unusual sight. Some of the underwater segments of the plant derive nutrients by growing insect traps that catch and digest small aquatic animals. This enables the plant to survive in low nutrient ponds, by photosynthesis, as well as by obtaining the added uptake of nutrients through the insect traps!

\*Water Primrose\* (*Ludwigia peploides ssp. montevidensis*)

This is a very attractive floating perennial, with creeping or floating stems. Leaves often grow above the surface. As well, it produces pretty yellow primrose-like flowers, in summer. The seeds are an important water bird food supply, and the plants provide shelter for fish and small frogs. Water primrose needs to be potted in compost. It is a very good swamp garden plant. There has been some controversy amongst botanists as to whether this is a native plant or an exotic. Most experts now agree that there is enough evidence to suggest that it almost certainly a native.

\*Ferny, or Pacific Azolla, or Floating Fern\* (*Azolla pinnata*, *Azolla filiculoides*)

A small floating fern, red in full sunlight, green in shade, sometimes developing a red centre, and green edges. In garden frog ponds, and aquariums, they make an attractive and unusual display.

\*Duckweed Species\*

Duckweed is an important food for fishes and birds. There are two main species suitable for garden ponds. If duckweed becomes too prolific, scoop it out and compost it, or feed it to the chooks.

**\*Nardoo\* (Marsilea mutica, marsilea drummondie)**

An uncommon native fern, parts of which were once used as food by indigenous Australians. They grow in mud, and have long fronds, which spread over the water. Capable of drying out occasionally, and then growing again from rhizomes. Leaves float on the surface of the water, and can be mistaken for clover. A very attractive addition to a garden pond. Provides shelter for small frogs. This is an essential plant in a swamp garden.

**\*Native cress\* (Bacopa monnieri)**

A pretty green sprawling plant with edible, button-like leaves. Anchored in wet soil at the edge of the pond, it spreads over the mulch surrounding the pond, and provides shelter for ground frogs. Another good plant for swamp gardens. It does not like running water, and has a small very pretty white flower in summer.

**\*Water milfoil\* (Myriophyllum crispatum)**

This is another strange native plant. It grows in soil on the bottom of the pond, with leaves and flowers protruding above the surface. Underwater leaves are fern like, but the above water leaves are quite different. It has several small, pretty, yellow to white flowers on each plant. It may disappear in winter, and return in summer.

**\*Water parsnip, or water celery\* (Berula Sp.)**

This is an attractive, fernlike plant which grows in water or wet mud. The plant propagates by leaves dropping into mud, and then growing new plants from leaf nodules. Berula may have some commercial food potential. A very similar plant is used in stir-fries in Asia. Unfortunately, it is sometimes difficult to grow, and needs much care and attention.

**Sourcing and Planting Water Plants**

Get your water plants at places like Swan Valley Fish and Lilly or off your friends, fortunately water plants grow fast and propagate vegetatively very well. Find a friend with a pond and take small cutting when it warms up in spring and you will soon have a water feature full of plants. Most should be edible and others can be used as mulch/fertiliser so make sure you start harvesting so they don't take over your pond. It is easy to walk out one day and find there is no water left only plants and roots.

Most waterplants are purchased wrapped barerooted, in wet newspaper, then sealed in a plastic bag. Packed like this they will remain in good condition for more than a week. When you receive your plants, unwrap them and place straight into water. Plant them within several days if possible.

If planting into a pot, put several layers of newspaper into the pot, plant into some good soil, then put a couple of centimetres of sand or gravel on top--this keeps soil and nutrients from escaping. Do not use chemical manures on waterplants, only blood and bone, or a few compressed chicken manure pellets.

An alternative method of planting is to use sand only, but you must push several compressed chicken manure pellets into the sand. Many waterplants are floaters, and do not need to be planted in sand or soil.