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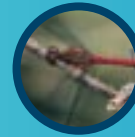
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Enjoy Your Pond



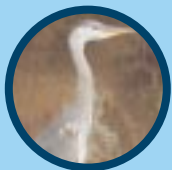
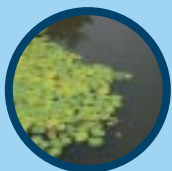
Care for our environment



**ENVIRONMENT
AGENCY**

Ponds give pleasure

Apart from giving great pleasure to homeowners, garden ponds also provide a valuable habitat for most of our native wildlife. This is particularly so in rural areas where natural ponds are fast disappearing due to modern farming practices.



Today's garden pond is a follow-on from the Victorian aquarium that used to be found in conservatories. The advent of cheap pond liners during the 1960s made garden ponds much more easily accessible to homeowners.

A garden pond, be it large or small, provides a small patch of tranquillity in our gardens. In addition, it also acts as a home for many amphibious and aquatic creatures. It can also be a watering hole for passing birds and mammals.

Pond watching can be a relaxing way of spending some spare time. You could be rewarded with the sound of a frog chorus or the sight of dragonflies emerging from their nymphs. You could even spot the odd kingfisher in the right location. Water edge plants provide attractive foliage and also a haven for some of the water-loving creatures to be found around the pond.



Where's the best place to put your pond?

A small pond could be made almost anywhere in the garden, but some thought should be given to whether it is open to full sun. If it is going to be shallow, a day's sunlight will make it very warm. If you opt for a deeper pond in partial shade, this will keep the water cooler throughout most of the year.

Many people find the thought of disposing of soil dug out for deep ponds a real problem, but it needn't be. A little creative thinking and you could create a raised bed, a small embankment near the pond, or use it under a new patio, so your pond waste can create another attractive feature for your garden!

What shape should it be?

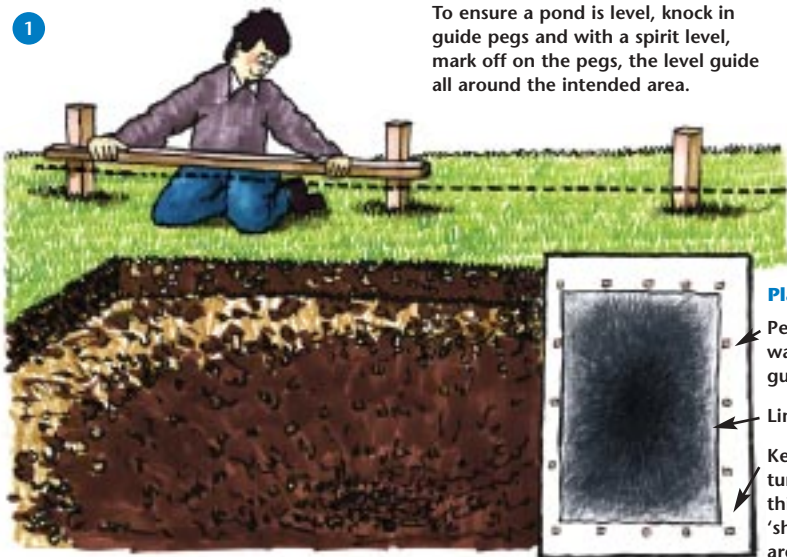
To give protection to certain animals and plants from extreme heat or cold, you need a deep part to your pond, probably 60cm deep. If you build a pond that is too shallow, apart from it warming up too much, you will constantly be having to top up the water to replace that which has evaporated.

Shallow edges should be maintained however, so that eggs and young animals can benefit from warmer water. Try to make the edge of the pond very variable, so that you have a range of shallow areas.

A level pond will ensure less maintenance work in the future. It is well worthwhile using pegs and a spirit level when construction starts. A bit of time spent on creating an attractive shape will help prevent problems later and give you the satisfaction of knowing that the pond was designed to your own specification.

Siting of your pond is important as wildlife and plants need a good mixture of light and shade.

Keep the turfs you take off the 'shoulder' of the pond. You can use these around the pond later - see no 5.

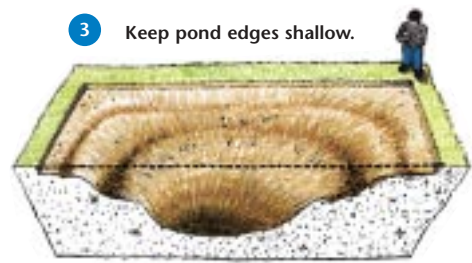


To ensure a pond is level, knock in guide pegs and with a spirit level, mark off on the pegs, the level guide all around the intended area.

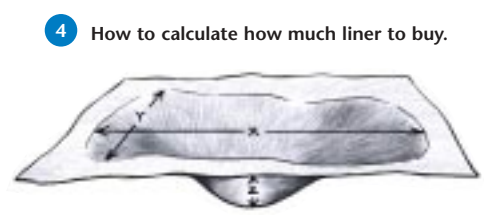
Plan
 Pegs for the water level guide
 Liner
 Keep the turfs from this shallow 'shoulder' area



Keep the topsoil too - use this to shape the edge of your pond and on other parts of your garden.

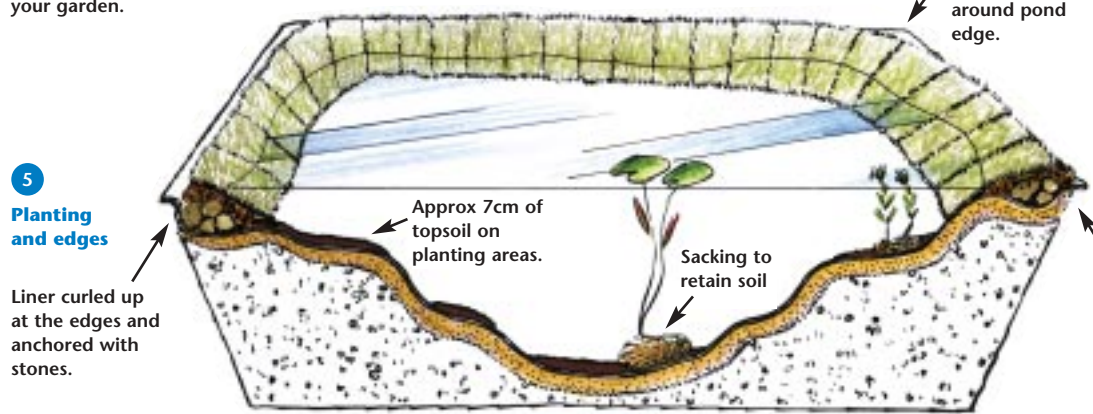


Depth of pond: 50cm.



How to calculate how much liner to buy.

Z = deepest part of pond to water surface
 Add X plus 2xZ multiplied by Y plus 2xZ (X = length of pond at its surface. Y = width of pond at its surface)



5 Planting and edges

Liner curled up at the edges and anchored with stones.

Approx 7cm of topsoil on planting areas.

Sacking to retain soil

Turfs run down under water all around pond edge.

Layer of soft sand under liner to protect it from puncture by sharp stones.

liners

What type of liner should you use?

There are many types of pond liner on the market today. They vary from the firm shaped fibreglass type to the more flexible sheeting.

Flexible liners can be cheaper than the preformed type of ponds. Care should, however, be given to your final choice of liner. The table below gives an idea of cost and durability of different materials.

Once you have dug out the shape of your pond and are ready to place a liner, check first that there are no sharp stones around that could puncture the material and cause an unwanted leak. Providing a cushion of sand is a good method, or even a layer of old carpet (as long as it isn't rubber backed. Underlay is no good either).

Good lining guide

Lining type	Typical price per sq. metre	Notes
1000-2000 gauge polythene	£1 - £2.50	Short-lived and prone to puncture/splitting. Hard to repair.
Standard PVC	£1.40 - £2.20	Stretches. Two thicknesses with 15- to 25-year life expectancy.
Polyethylene (LDPE)	£3.50 - £4.50	UV-stabilised plastic liner. Stretches. Lasts 20+ years.
Butyl flexible liner	£4.50	Stretches. Long lasting (20+ years). UV-resistant. Available in lightweight and heavyweight grades.
EPDM rubber (Ethylene Propylene Diene Monomer)	£6 - £8	Stretches. New material similar to butyl. Life expectancy of 30+ years.
Precast liners made from plastic or fibreglass	£10.30 approx	Need sand/loose soil underneath; hardened, predetermined shape limits the scope of wildlife ponds. Long-lasting (20+ years).
Polyester protective matting (bidum)	£1.30	Rot proof – 3mm thick. Can be used under and on top of liner as puncture protection.
Bentonite clay held in woven sheet (raw mat)	£6	Natural. Vulnerable to puncture but repairable. Hard to install (must be buried at least 30cm deep).
Concrete	£10 - £15	Vulnerable to cracking – skilled process to get right. Can last 50+ years.

What about the water?

Your pond is dug and lined, so now comes the exciting time of filling it with water. You can fill your pond with tap water without any worry. Any chlorine will soon disappear, especially if you spray the water into the pond. During the first few weeks after the pond is filled, you may experience some problems with algae. These are tiny microscopic plants that can either float in the water to giving it a green to brown colour, or form large mats of tangled filaments called blanket weed. Usually this problem is short lived. It is caused because the algae are very quick to colonise any water body and can start using the nutrients in the water before any other aquatic plants can become established. (See photos of blanket weed and microscopic algae on pages 14 and 15.)

To maintain a clear looking pond, you need to introduce several different types of aquatic plant. These will compete with the algae for the nutrients and light in the pond and should help establish stable conditions in the pond, which will discourage excessive algal growth.

Rushing off to buy chemicals to try and deal with algal problems is not the best solution. If possible, it is always better to try and establish a stable plant community in the pond. As a rule, you need to get a good mix of native submerged, floating leaved and emergent plants. You may need to thin these out to ensure that none of them become too dominant.

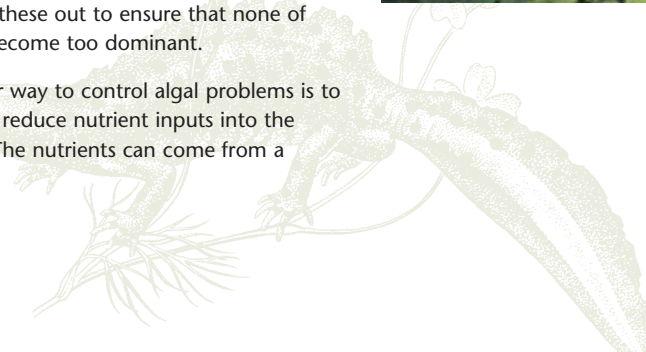
Another way to control algal problems is to try and reduce nutrient inputs into the pond. The nutrients can come from a

variety of sources such as dead and decaying plant matter e.g. leaves, fish waste or food.

Pumps connected to filters are a way of keeping the water clear, but they can be expensive and need to be left on all through the summer and cleaned out regularly to work properly.

Topping up the pond in very hot weather should be done a little at a time at regular intervals. A big injection of very cold tap water could be a shock to the pond.

There are all types of products on the market that can be bought to rectify pond problems. A lot of these, however, are produced for ornamental fishponds and are not very suitable for wildlife ponds. 'Pour in tonics' are not really advisable for wildlife ponds either.

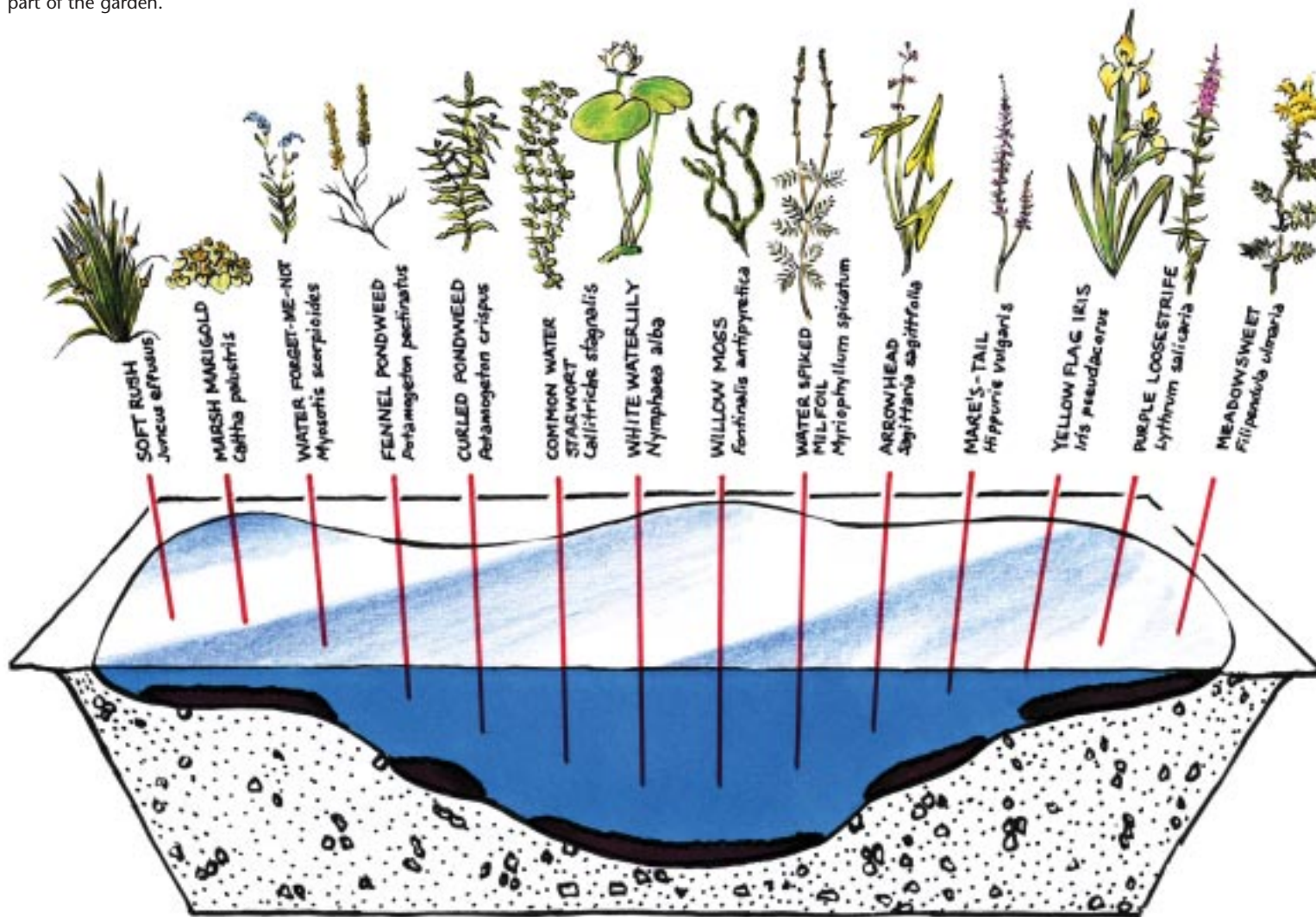


Which plants do you need?

Careful selection of plant material when you first create your pond will provide a healthy and trouble-free water environment. Do remember that cutting back and splitting up plants when they grow too large for the pond is important. Ponds need maintaining just like any other part of the garden.

To achieve a good balance and attractive marginal area, you need a selection of deep-water, marginal, floating-leaved and marsh-loving plants. There are a vast number of native plants that are easily

obtainable at most garden centres, so there is really no need to look for 'exotic' varieties. Native species usually don't bring the problems normally associated with foreign 'alien' plants.



Common native water plants suitable for small garden ponds

Marsh/edge plants

- Bogbean *Menyanthes trifoliata*
- Brooklime *Veronica beccabunga*
- Marsh marigold *Caltha palustris*
- Rushes *Juncus* spp.
- Water mint *Mentha aquatica*
- Water plantain *Alisma plantago-aquatica*
- Yellow flag *Iris pseudacorus*

Floating-leaved plants

- Arrowhead *Sagittaria sagittifolia*
- Broad-leaved pondweed *Potamogeton natans*
- Floating sweet-grass *Glyceria fluitans*
- Water soldier *Stratiotes aloides*
- White waterlily *Nymphaea alba*
- Yellow waterlily *Nuphar lutea*

Shallows/ledge plants

- Mare's tail *Hippuris vulgaris*
- Spearwort *Ranunculus lingua*
- Water forget-me-not *Myosotis scorpioides*

Deeper water

- Curled pondweed *Potamogeton crispus*
- Hornwort *Ceratophyllum demersum*
- Water crowfoot *Ranunculus aquatilis*
- Water milfoil *Myriophyllum spicatum*
- Water starwort *Callitriche stagnalis*
- Willow moss *Fontinalis antipyretica*

Friendly tip:
A chat with neighbours when they are thinning out their ponds can be a cheaper source of material for your own!

Encouraging wildlife

If your garden is big enough, provision of a wildlife area around the pond will attract all sorts of creatures. An open compost heap provides a haven for slow worms or grass snakes. Both these creatures help keep down the slug population in the garden. Use up some of that surplus soil and build a small rockery nearby. This will be a pretty feature in the garden and will give perfect cover for frogs, newts and toads. A small pile of logs give good winter cover to hibernating creatures such as hedgehogs and also provide a nice damp environment for emerging insects and amphibians.

A good mix of long and closely mown grass provides a varied habitat for different species. Planting a few wildflower seeds on the lawn near the pond also provides cover for some insects. Long leaves floating in the water allow newts to have somewhere to lay their eggs. If you look carefully in spring, you will find some of these leaves bent over and creased up, where the females have folded the blades over the eggs for cover.



Right: Shining ram's horn snail
Above: Kingfisher

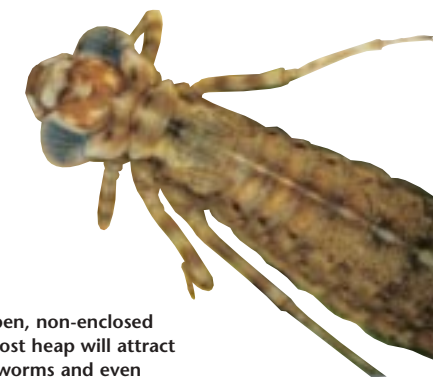
Pond invertebrates live and hide in the root structure of grasses which grow into the pond edge.



Who will be inhabiting or visiting your pond?

Wildlife ponds don't just provide a home for amphibians and aquatic creatures, they are also a watering hole for birds and mammals. In the case of birds, the resident insects can also be a source of food. A good tip if you want to attract the best wildlife is best not to stock the pond with fish.

Top right: Hairy dragonfly
Above: Heron
Right: Great crested newt, a protected species
Far right: Dragonfly larvae



Logs and twigs that are allowed to go into the water create more wildlife habitats.

An open, non-enclosed compost heap will attract slow worms and even grass snakes.

Frogs, toads, newts and all sorts of bugs love to hide in a rockery. Let the stones go down into the water.



The pond calendar

In spite of your careful preparations for building the pond, like the rest of the garden, a certain amount of maintenance throughout the year is necessary to keep your pond healthy and not too overcrowded with plants.

During the **summer**, there is not much to do. The pond should be disturbed as little as possible, as the various species are breeding and growing.

Just the excuse needed to pull up a deckchair and pond watch! Warm summer evenings are also a good time to spot animal activity. If your pond is reasonably clear, shining a torch at night is a good way to see right to the bottom. This can be just as entertaining as daytime viewing.

Keeping some longer grass around and near the pond helps protect young amphibians. Lawnmowers claim a large number of young amphibian's lives. Having said that, you should keep other areas well cut so that some of the small animals can run across quickly and feed on worms and other insects.

In **autumn**, your pond needs a bit of attention. If the depth of water is being reduced by a build up of silt, clear out some of it but not all, as this will contain a lot of eggs and larvae. Clear out fallen and dying leaves so that the pond stays clean. These and the silt can be placed on your compost heap. If you put some netting over the pond, you will save some effort as leaves will be prevented from falling in. Also herons and other larger birds such as owls enjoy a tasty fish or frog! Neighbouring cats are also another predator to be wary of.

Netting can cause other problems if it is in place all year round. Grass snakes can get entangled, as could other small birds. It is worth checking for casualties on a daily basis if you retain netting all the time. Also, if you net all the year round, you prevent larger animals getting to the pond for a drink.

Check your water levels at the beginning of autumn and top up if they are low. Deeper water acts as a protection against freezing in harsh winters.

When **winter** arrives, your main concern is going to be the pond freezing over. In really harsh conditions, a couple of weeks of freezing weather will cause the pond to freeze up to a depth of 15cm. If this happens, the fragile ecosystem of the pond can change dramatically. At least one opening should be made in the ice as there is a danger of oxygen levels dropping if the pond is completely frozen over. Rather than bashing the ice with a shovel, just place a pan of hot water on the surface and allow the ice to melt



more slowly. The easy way of keeping the pond ice-free is an electric pond heater, but this can be an expensive solution. The hot water container idea can be just as effective. Do not resort to a chemical solution (antifreeze).

Spring usually offers the first sighting of shining frog spawn and a chorus of adult frogs and toads in the evening. Plants start to sprout green shoots and soon water fleas get busy on the algal growth, clearing away the winter murkiness.

Maintenance work in this season is probably the greatest challenge as you will have to combat blanket weed and duckweed. This can smother the surface of a pond and shut out the light for all underwater plants and wildlife. If it is allowed to become extremely thick, it can affect plants around the edge as well.

You can control duckweed with a small net, but this can be very tedious. The best method of control is planting larger plants. Blanket weed needs to be teased out of the water using a stick. However, animal life can be caught up in the strands. Laying it on the side of the pond or on a grid over the pond allows the small creatures a chance to get back into the water. Vigorous plants need thinning throughout the year; thinnings can be put on the compost heap.

If doing that with blanket and duckweed, make sure they are mixed with other vegetation to ensure they break down adequately.

During March, April and May, a trip down to the pond with a torch at night will reveal all sorts of lively activity going on.

How often should you clean your pond?

Regular removal of small amounts of silt should avoid the necessity of a complete desludging and desilting operation. If sludge and silt are allowed to build up, it can reduce the water depth and eventually affect the whole pond ecosystem. In most wildlife ponds, it may take many years before any significant desilting is required.

If you have to carry out this process, late autumn is the best time. During the spring there is a lot of activity with new life emerging, and during the summer insects and larvae are maturing as are froglets and other small creatures. In winter, you would risk disturbing creatures that are trying to hibernate in the deeper areas of the pond to protect themselves from the freezing conditions.

When tackling pond cleaning, wear old clothes, and if possible, get the help of a couple of other people. Start by removing any fish or other creatures as well as plants. Use a pump or buckets to empty out the water and then clear away the silt or sludge. This can go onto the compost heap. The area round the pond will look pretty wrecked for a while, but a downpour of rain will soon clear it up and the pond will quickly become re-established.

Care

Stocking the pond

Take great care when planting for the pond and avoid the invasive and exotic plants illustrated below. They may look pretty in a small pot, but within a very short space of time they will overrun your pond.



Parrot's feather *Myriophyllum aquaticum*



Blanket weed *Filamentous algae*



Water fern *Azolla filiculoides*



Floating pennywort *Hydrocotyle ranunculoides*

If you can get hold of some silt from an established pond, you will have a head start with some of the invertebrate wildlife. As a rule, it is best to allow creatures to come and inhabit the pond at will. They will all come along naturally in time.

There is always an element of risk when buying animals and plants, as there is just a chance that they could be carrying some form of disease that may infect your pond.

We usually associate ponds with fish, but in general, if you want a wildlife pond, you should not stock it with fish as they tend to eat the other pond life and restrict the variety of species. Wild fish can also be hazardous: stickleback and perch are voracious feeders and can quickly strip a pond.

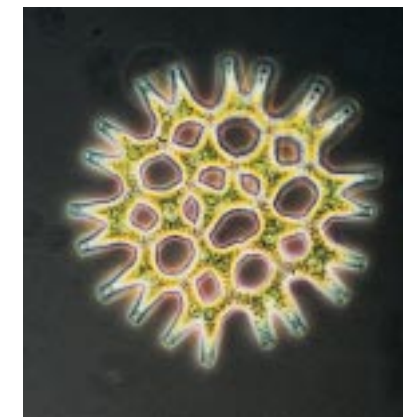
Damselfly



Before stocking any wild fish (or fish spawn) in England and Wales, you **must** obtain written consent from the Environment Agency. You can contact your local office for information: the general enquiry line number is 0845 933 3111. If you have a fairly large pond and are keen to keep wild fish in it, contact the Agency to obtain advice on native species that are under threat of extinction.



Snail



One of the tiny microscopic plant cells called algae that can turn pond water green - *Pediastrum Duplex*

Keep within the law

There are several pieces of legislation that control which animals you can and can't put into your garden pond. There is also legislation controlling where you can take animals and plants from to stock the pond.

Certain species are under protection, whilst others may have a damaging or destructive nature. Long-time pond owners and natural history sources can provide good advice, such as the Environment Agency or other nature conservation authorities.

In fact, transferring fish and some amphibians requires a licence or consent. Avoid trouble by seeking advice in advance. If you think you are going to move and the new owners will remove the pond, try and get the animals

transferred to a neighbour's pond. Do not transport animals long distances or release them on a nature reserve. This is illegal and could result in prosecution and a fine.

Never release non-native species of animals into a local park or river. The release of exotic bullfrogs and red-eared terrapins is an offence.

Although exotic plants are not covered by such stringent laws, their release into the wild could have far reaching effects, so you should be vigilant and discourage others from doing this.

Hopefully all the tips and information contained in this leaflet will be of help and you will soon be able to sit back and enjoy a wildlife pond of your own making!