As winter sets in, Keith Holmes reveals his top tips on how to make sure your pond and Koi survive through the season, including in-depth information on heating, covering your pond and feeding your Koi...

Keith Holmes is Manager of Koi Water Barn and has been with the company for over 10 years. During this time he has co-written numerous books and has also had articles published in the aquatic press worldwide.

Not every Koi keeper heats their pond and, with increasing fuel costs, it is becoming more of a considered option. However, there are numerous benefits to pond heating, and with the price of more efficient methods of heating, like heat pumps, falling rapidly, I still think it is one of the most important pieces of equipment to add to a Koi pond, after a suitable filtration system.

Heating or no heating?
One of the main reasons for heating is that over the winter months, the water temperature in an unheated pond will fall below the level at which a Koi’s immune system will function. You will find that as the temperature starts to fall below 13–14°C (56–57°F), a Koi’s immune system will gradually start to shut down, and its ability to fight off any parasites or other infections reduces. This situation is only worsened by the fact that many of the things which will attack your Koi, such as parasites, remain active until much lower temperatures. So by heating, you can control the temperature in your pond and keep the water temperature out of this danger zone.

Not every Koi keeper feels that heating a pond is natural, as wild carp do experience both a winter and a summer period. This is true, although it is worth remembering that the Koi in your pond have probably been raised in mud ponds during the summer and then brought into concrete heated ponds for the winter, and so will not have experienced the sort of temperatures that we have in the UK. For Koi that fit into

Heat exchangers, like this one, are basically central-heating systems for your Koi pond.
This boiler is then used to pump hot water through a heat exchanger. There are usually two styles of heat exchangers – a unit that is submerged into a pond or filter and exchanges the heat directly into a pond via the water flowing around the unit, or an inline unit through which water is pumped – coming into contact with the hot water from the boiler results in the exchange of heat. The temperature is controlled via a separate thermostat unit which is used to fire up the boiler when the temperature falls below a set point. Many Koi keepers choose this method of heating due to the lower running costs compared to gas, but it must be said that there are the added installation costs on top of that. Having a boiler installed typically costs in the region of £1,500 – quite a large sum to pay out.

**Heat exchangers**

Heat exchangers are perhaps one of the most common methods of pond heating and the easiest way to describe them is as central-heating systems for your pond. Basically, a boiler has to be installed by a suitably skilled tradesman. This boiler can be fired by any means but typically by gas or oil, although in some cases a converted boiler may be installed to run off bottled gas (LPG).

**Inline electric heaters**

For ponds of 3,000 gallons and below, inline electric heating is still popular despite the increased running costs of...
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- using this style of heater. This is due to the fact that units of 3kW and below can be plugged into a three-pin plug, while units of 4kW and above have to wired directly to the consumer unit and so require installation via a qualified electrician. It must be said, though, that if you’re in doubt about anything, you should always consult a qualified electrician first. As a rule of thumb, you must allow 1kW of electricity for every 1,000 gallons of pond water.

These units work as the name suggests, by pumping the water through a unit which houses an electrical heating element. The units themselves house a thermostat, which can control the exact heating temperature of a pond. To help reduce running costs, many people will opt for a unit with a built-in timer so that they can take advantage of cheaper electrical tariffs like Economy 7. The problem with this is that the pond may lose 2–3°C of heat in the day, which means that your Koi are still subject to temperature fluctuations. It is critical, therefore, that you monitor the daytime temperature and program the heater to come on in the day for a short time, if the temperature falls.

**Electric heat pumps**

Electric heat pumps have been around for some time, but it is only in the past year or so that they have become a viable option for a Koi pond as they have fallen in price. Despite this, they are still a serious outlay; prices can often cost in the region of £1,000 for a small unit, and many thousands for a bigger unit.

If you do opt for this method of heating, remember that you won’t save any money until the second year of using it – but from then onwards you should save some 75% on running costs compared to conventional electric heating, and up to 50% compared to gas.

Heat pumps work without actually generating any heat themselves. Instead, they work like a reverse-cycle air conditioner, heating water instead of cooling air. Due to this, many units can in fact operate as both a heater and a cooler. Heat is absorbed from the ambient air, it is then amplified via the compressor and transferred to the water via the heat exchanger. This makes heat pumps very efficient, as an output of say 8kW of power can be achieved with as little as 1.8kW of actual power consumption. The problem is that these units rely upon the ambient heat in the air, so in the colder months of the year they are not able to heat the water like a correctly sized heat exchanger or traditional inline electric heater. Because of this, I’d suggest that you cover your pond as well. Some people are even installing a heat pump indoors, in a shed, greenhouse, conservatory or other outbuilding so that the air that is passing through the unit has a higher temperature than outside. If you choose to do this, it is vital that the exhaust air be expelled into the atmosphere and not into the building, as it can be very cold once it has had all the heat extracted from it.

Heat pumps are ideal for those who do not want to have higher temperatures all-year round as they allow for very cheap heating for around 6–8 months of the year. However, not all heat pumps work on the heat in the air – some work off geothermal heat found in the ground. Geothermal heat pumps are a very green way of heating (many new-build housing developments are looking into this type of free energy) but very expensive to install, and not really a viable option for Koi ponds.

**Winter feeding**

As the temperature drops you will need to consider changing the food you give to your Koi,
This will allow them to use up any two on a wheatgerm-based food. Even if you heat your pond, it is still a good idea to give your Koi a month or two on a wheatgerm-based diet if you're no need to change over to a year-round feeding; there is a risk that the food will not be processed, and this may cause internal problems in your Koi. Many of the foods which are offered for sale now as staple diets for Koi are suitable for year-round feeding; there is no need to change over to a wheatgerm-based diet if you’re using such a food. Even if you heat your pond, it is still a good idea to give your Koi a month or two on a wheatgerm-based food. This will allow them to use up any fat reserves acquired over the summer, which in turn will help maintain a good body shape and avoid “fat Koi.” Many Koi keepers will also choose to feed a sinking food at this time of year due to the reluctance of the Koi to come to the surface to feed in lower water temperatures. At temperatures of below 9°C (48°F) it is best to restrain from feeding your Koi, even on sunny days when they may venture up to the surface to look for food. In an unheated pond, it is best to stop feeding once temperatures fall below 9°C (48°F) and not start feeding again until water temperatures raise above that, and are likely to stay above this. A classic temptation for a Koi keeper is to go out in late February on a sunny day and see the Koi looking for food and start feeding, only to find that, after a hard frost the next day, the pond temperature has fallen again. I recommend waiting until the pond temperature stays above 9°C (48°F).

### Keeping costs down
With the popularity in pond heating, more and more people cover their ponds to help prevent heat loss, as a good cover alone can help keep temperatures 1–2°C higher than in an uncovered pond. Bubble wrap is a popular choice when covering your pond to help maintain heat, and can either be laid directly onto the pond surface or placed on a frame. There are numerous types of bubble wrap available, from the type used in greenhouses, which is relatively cheap, to the blue swimming-pool covers which offer the best heat retention but at a higher cost. If you opt to use standard bubble wrap, you must use a UV-suitable type, as otherwise it will simply fall apart after time. If you use a frame, ensure that it is slightly sloping and has an overlap on the pond, to help prevent condensation from falling back into the pond, as this may contain high levels of ammonia and nitrite. You could also use polycarbonate to construct a more substantial pond cover. It is available in numerous ‘wall’ thicknesses (the more ‘walls’ you have the better the installation) but, as a general rule of thumb, make sure your cover has a UV-suitable lining.

#### Freeze factors
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**NAME: FRANK COLLINS**

**HOW BIG IS YOUR POND?**
10,000 gallons.

**HOW DO YOU HEAT YOUR POND AND WHY?**
I heat my pond by oil as I am not on gas where I live. The pond has its own boiler which heats two large heat exchangers. I was losing big fish each spring so, bearing in mind the value of a big Koi, it was better to heat.

**WHAT ARE THE MAIN BENEFITS TO POND HEATING?**
If you heat all year, you can treat health problems with better results as the fish’s immune system is still active. You can also enjoy your fish for 12 months.

**HOW MUCH DOES IT COST TO HEAT YOUR POND?**
It costs next to nothing for seven months of the year, then the winter comes. I then get through a tank of oil every six weeks at a cost of £700.

**WHAT TEMPERATURE WILL YOU KEEP YOUR POND AT THROUGHOUT THE YEAR?**
The best temperature is 22˚C for those spring/summer months, dropping down to 18˚C in the winter. If there is a health problem at 18˚C, I increase it to 22˚C.

**DO YOU TAKE ANY STEPS TO REDUCE YOUR COSTS IN THE COLDEST MONTHS?**
In the coldest months, I use a pool cover suspended off the water.

**WHAT IS YOUR ADVICE ON HEATING TO OTHERS?**
Weigh up the benefits for yourself and then ask yourself, do I want to lose fish? With fish costing vast amounts of money I would not want to lose another one.

**NAME: JIM LITCHFIELD**

**HOW BIG IS YOUR POND?**
3,500 gallons.

**WHEN DID YOU DECIDE TO HEAT YOUR POND?**
About five years ago.

**HOW DO YOU HEAT YOUR POND?**
With a 3kW inline electric heater – I started heating to help my Koi survive through the winter.

**WHAT ARE THE MAIN BENEFITS TO POND HEATING?**
Simply improved health!

**HOW MUCH DOES IT COST TO HEAT YOUR POND?**
I have to say not a lot, but I’ve not kept a check on it.

**WHAT TEMPERATURE WILL YOU KEEP YOUR POND AT THROUGHOUT THE YEAR?**
The main reason I heat is to restrict the fluctuations in temperature and so I do not have a set summer or winter temperature – I adjust with the weather. I do, however, ensure that it goes no lower than 8˚C in the winter.

**DO YOU TAKE ANY STEPS TO REDUCE YOUR COSTS IN THE COLDEST MONTHS?**
In the winter I cover the pond with polycarbonate sheeting.

**WHAT IS YOUR ADVICE ON HEATING TO OTHERS?**
Ensure that your pond, as well as pumps, UV units and pipework, are insulated.

* twin or triple thickness is normally more than sufficient for a pond.
* The step up from this is to construct a polytunnel or greenhouse structure over the whole pond. Obviously this is not for everyone, but it will allow a mini environment to be created around the pond.
* It is important to ensure that, whatever method you use, you can get access to your pond for feeding and maintenance and, if possible, try to uncover a small section of the pond at least every day to allow air circulation, and to let any gases that may have built up escape.
* If you do cover your pond, make sure that you do some homework into the materials that you will use, be it netting, bubble wrap or plastic. Ensure that any exposed pipework is lagged and filters and equipment like pumps and UV units are also suitably insulated. For those of you lucky enough to be in the building stages, you can actually insulate the sides of a pond before you apply a waterproof lining.
* As with any material being used around a pond that may come into contact with the water, be sure to check that it does not contain any toxic chemicals that may leach out and affect the health of your fish. Make sure that your chosen cover is secure and will stand up to any adverse weather conditions, as the last thing you want to find is that your cover was blown from the pond, and in the process damaged the fish within and the actual pond in itself.

**Increased efficiency**
Whether your pond is heated or not, it is a good idea to ensure that your filters are running efficiently and are free from waste. Any waste within your filtration setup can act as a home for both parasites and bacteria, and it is better to remove this waste before going into winter. Ideally, any work you want to
carry out on the filters should be done well in advance of the decrease in water temperature. You can then safely add a filter-boosting product to help recolonise any beneficial bacteria lost during the cleaning process. Late September is an ideal time to be doing this, as your filters should not be turned off over the winter, whether you’re heating or not.

If your pond is unheated, you should look at turning off your water features, waterfalls and venturis once the water temperature falls to 10–14°C, as all these will be doing is pulling cold air into the pond and lowering the water temperature even quicker. If you can’t turn these off, then install suitable pipework so that the pond water is flowing through it and then returned to the pond below the water level to prevent splashing, which has the effect of lowering water temperature. If your pond is heated it is vital that waterfalls be turned off as already described. As winter passes and spring arrives, bringing with it improved water temperatures, you can turn your waterfall and venturis back on, as well as remove your pond covers.

You can leave your air pumps running, especially if they are housed in a filter chamber as, this way, they will not be pulling in cold air. There is also a school of thought that, as air pumps themselves generate a certain amount of heat, the amount of chilling from an air pump is minimal – the air that is being pumped is not cold. The benefits of leaving air pumps running certainly outweigh the savings by turning them off. At the same time as this, it is advisable to start increasing the heating temperature to ensure that there are no fluctuations in temperature caused by the pond water rising on a hot sunny day, but dropping on a cold night. Once again, any increase should be made slowly at the rate of a 1°C every two or three days.