

Swimming pool equipment manufacturer Waterco has been involved in supplying equipment for the pond market for a number of years. Group marketing manager Bryan Goh offers some advice on the differences between ponds and pools.

The first thing he says is that there are a number of important differences between swimming pools and koi ponds, and he would advise any pool builder looking to branch into this area to properly understand and research the market.

"Like a swimming pool, a koi pond is basically a hole in the ground filled with water, but there the resemblance ends," says Goh.

"A koi pond has a single purpose and that is to provide a suitable environment for keeping koi, and because koi are fast-growing fish that produce a great deal of waste, the main aim is to create and maintain a large volume of water which is well oxygenated and filtered, so the fish can grow and show off their colours."

Goh says it's important that swimming pool builders understand the major differences between koi ponds and swimming pools, so they can ensure the end product meets the expectations of the pond owner by creating a suitable environment for the fish.

"If the swimming pool builder totally understands what is required and how to build a koi pond, then it's not a problem if they want to branch out into this new line of business. However, if they don't understand the technicalities, the consequences can be enormous and, at worst, result in fish deaths and or infections."

Goh says there aren't too many major similarities between swimming pool filtration and koi pond filtration, because the filters are used in two totally different environments. One similarity however is the need for pre-filters – something that has only recently caught on in the residential



Don't be coy ABOUT KOI

Fish ponds are becoming an additional earner for some pool builders. We look at some of the similarities – and differences – between ponds and pools, and how builders can add this new revenue stream to their business.



Ponds attract all sorts of wildlife to a garden



Koi ponds have been popular in Asia for centuries. This image is of a koi pond as a major feature of a housing development in Malaysia. Photo by Amrul Isham Ismail.



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Koi have been bred for centuries to bring out their many and varied colours

swimming pool market, mainly through the success of Waterco's MultiCyclone.

"The filtration is very different as you are filtering totally different material which is much larger in mass such as pond weed, fish food and fish waste. The choice of filtration will depend on whether the pond is to be a pump fed or a gravity fed system. In many cases, large pre-filter systems are required such as vortex chambers and/or sieves as well as a main filtration system that in many cases is used both as a mechanical as well as a biological filter. This literally traps the solid wastes and removes them from the water flow and provides a large surface area to support the growth of beneficial bacteria that breaks down pollutants in the water.

"Such filters can be single or multimedia chambers as well as bead filters. Bead filters may look like a sand filter but in fact work in the complete reverse such as Waterco's Aqua-biome skid pack. The filtration system is not only designed based on the volume of water but also the quantity and size of fish, anticipated feeding cycles and the amount of fish waste."

New ponds and conversions

Matthew Lai is the principal of The Fish Works, a water garden specialist located in Sydney's Terrey Hills. His company specialises in the building, filtration and maintenance of koi ponds. They also breed and sell quality koi.

Although they mainly build ponds, they have also consulted for pool/pond conversions, which the pool builder would then undertake under The Fish Works' guidance.

"People build ponds in their backyards for many different reasons," says Lai. "Ponds attract

birds, lizards and insects, and can provide a home for fish, tadpoles, frogs and yabbies.

"And of course, some people who build large ponds often choose to keep koi carp, which the Japanese have selectively bred for hundreds of years to produce many different colour varieties, often with their own mythology surrounding them.

"Koi swim with grace, and add to the aesthetic qualities of the pond; but they need space to thrive and be healthy. A pond of at least 1000 litres is necessary and a quality filtration system is essential to ensure that the water they live in remains crystal clear."

Lai says he's found it increasingly popular for people to convert their swimming pool into a fish pond, particularly for retirees or people who don't use their pool as often as they used to.

He agrees with Goh that koi ponds have very different filtration requirements than swimming pools, as they have to deal with fish waste, algae etc, without the use of chemicals that would harm the fish and plants in the pond (such as chlorine).

"The filter must be converted into a biological filter, which utilises good bacteria to break down harmful waste chemicals. An ultra-violet (UV) system can also be used to kill single-celled algae in the water. Advice should be taken from your local pond shop if you are thinking of undertaking a project such as this."

Lai says that the pump should push the water through at a turnover rate of at least 1.5 times per hour to ensure good circulation, aeration and filtration.

Ponds can be constructed from a variety of materials, such as EPDM rubber liner, concrete, brick etc, or a prefabricated plastic or fibreglass moulded pond. Lai says that if choosing a liner, it's important it be EPDM,



Fountains and bubblers help increase the oxygen in the pond



Surface plants help restrict the growth of blanket weed

"The air we breathe contains about 21 per cent oxygen – the water fish 'breathe' has less than one thousandth of one per cent oxygen."

which is the only one that is UV-stabilised, meaning it should last at least 20 years.

Once a good filtration system has been installed, maintenance on the pond is relatively easy.

"The filter needs to be backwashed periodically and the leaves scooped out of the pond. Yellowing leaves on water plants should be trimmed and discarded. The water should be tested about once a month to make sure ammonia levels are at zero, and the pH is close to neutral (approx pH =7). The fish must be fed everyday in the warmer

months, but only a couple of times per week in the winter. If the owner is away on holidays, the fish can go a couple of weeks without food. There are pond maintenance services available."

Koi can mix happily with most other pond fish, such as goldfish and native fish including silver perch, bass and rainbow fish.

"But koi can sometimes eat softer floating plants such as waterlilies, so if the owners have their hearts set on a waterlily pond, then native fish and/or goldfish may be better bets.

"If you want your pond to be a frog pond, then only small fish such as rainbows, pacific blue eyes, mountain minnows etc, can be kept. Larger fish eat frogs' eggs and tadpoles."

Lai recommends a variety of possible water plants, including iris, rushes, lilies, lotus and water poppies.

Lai says another thing to consider is that in most council areas, ponds will still need to be fenced if they are deeper than 300mm; so you'd have to check with the local council.

Let the fish breathe

Clearpond has been in the watergarden business for nearly 20 years, focussing on residential garden ponds and water features, as well as large public and commercial fountain displays, and more recently on lake man-

agement. The company is headquartered in Perth, with distribution centres in Melbourne and Auckland and account managers based throughout Australia and New Zealand, providing local support and service to a dealership network of more than 100 stores.

Managing director Michael Cave offers some advice regarding the building and maintaining of koi ponds.

As with swimming pools, the first thing to consider is siting.

"If you have both sun and shaded areas that you were considering installing a pond, the shaded areas would be preferable," says Cave. "Most plants prefer a little shade, and it is only the lilies that prefer at least half a day of full sun.

"If the pond is in full sun, accessories such as UV filters can guarantee clear water when used correctly. They work on a principal of radiating water containing algae cells, effectively killing algae before it can bloom in your pond. The chance of a pond in full sun getting too hot is almost negligible when a pump is moving water, as moving water releases stored heat more quickly than a stagnant pond, and if a minimum



A Fish Works' koi pond under construction

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Slow pumping

Pentair suggests that, in the case of ponds which usually require constant turnover, traditional pumps run at maximum speed no matter how much is really needed to meet the turnover requirement. They suggest a variable speed pump such as their IntelliFlo could optimize flow and use only the electricity that is necessary to get the job done.

depth has been applied then you should have no worries."

Cave says that it's very important to ensure fish have enough oxygen in the water to be healthy.

"The air we breathe contains about 21 per cent oxygen," he says. "But the water which our fish 'breathe' has less than one thousandth of one percent oxygen – normally from 6 to 10 parts per million, depending on the temperature.

"Fish have to pump a great deal of water through their gills to extract this oxygen. In fact rainbow trout expend 32 per cent of their total energy just breathing! This helps to explain why an oxygen shortage in your pond can be disastrous for the health and growth of your koi.

"We think of oxygen as a gas, but it's no use to your fish unless it is dissolved in the water. Fish can't breathe bubbles. Oxygen is absorbed at the surface of the pond, but this happens only very slowly and certainly much too slowly to meet the demands of the fish, algae and mulm."

Mulm is the undecomposed fish wastes and other solid matter that accumulates in

the pond as a fine, brownish, fluffy material. Algae and mulm compete with the fish for oxygen in the pond and can use up a great deal more oxygen than the fish.

Cave offers some numbers as a rough guide:

- 1000 litres of water saturated with oxygen at 8 parts per million contains only 8 grams of dissolved oxygen.
- With no wind, one square metre of pond surface will absorb just one one-hundredth of one gram of oxygen per hour – that's 0.01 grams per hour.
- Fish health is compromised when oxygen falls below 6ppm. Ten kilos of fish will consume about 3 grams of oxygen per hour which will deplete 1000 litres of saturated water to unsafe levels in about forty minutes.
- 1000 litres of green water with a biological oxygen demand (BOD) of 20mg/l will consume around 20 grams of oxygen per hour – that's the same amount of oxygen as would be consumed by about 70kg of fish.
- A mulm-laden pond bottom, settling tank or filter void will consume 3 grams of oxygen for every square metre of muck-laden bottom surface area.

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“Bubblers, venturi, waterfalls and splash aeration are all good and should be included in any pond design.”

- Each kilogram weight of fish produces about one gram of ammonia per day, which requires more than four grams of oxygen for total assimilation into the biological filter.

“With so many organisms competing with the Koi for the available oxygen and such a tiny amount of oxygen available from the pond surface, it’s easy to see why fish die so quickly when there’s a pump failure – even for just a few hours,” he says. “It’s also easy to see why supplementary aeration is so important. Bubblers, venturi, waterfalls and splash aeration are all good and should be included in any pond design. Air pumps provide far more aeration than do water pumps of the same power consumption. Oxygen tests are cheap and easy to use and you should test your water if in any doubt about the quality of the aeration.



A bank of MultiCyclone pre-filters



A koi pond plant room featuring Waterco equipment

“With proper aeration, fish are more active, school and linger longer in backwater areas, eat more, and grow faster – after eating they are far less lethargic and, in the longer term, will be far healthier and resistant to disease.”

Aquatic plants

Cave says that before stocking the pond with fish it is essential to plant it to provide a healthy environment for the fish.

“Aquatic plants produce oxygen, offer shelter, food and a good spawning environment,” he says. “Most important of all, they help prevent the water from going green.

“Green water is a perennial problem and the answer to clear water is the right balance of plants and/or filtration methods. Green water indicates the presence of masses of algae, microscopic forms of plant life not harmful to the fish but unsightly to the human eye. Their energy sources are light and mineral salts, both of which are found in abundance in a newly filled pond. Deprived of these, algae will be starved out of existence and the water will clear.”

To achieve the correct biological balance in the pond, Cave recommends a collection of the following:

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Oxygenating plants:

These are important – they thrive on mineral salts and other nutrients in the water. So once established, the oxygenators will help take care of the algae problem. Oxygenators are also beneficial to fish as they give out oxygen during the day.

Deep water aquatics:

The most well known in this group is the lily. With its large colourful blooms it will form a focal point in the pond. Half to two-thirds of the water surface ideally should be covered with lily pads and other floating foliage at the height of the growing season to help combat the problem of excess light.

Floating plants:

These help to control blanket weed and algae as again they help to cut down the amount of sunlight on the water surface.

Marginal plants:

These are more for decoration than for balance. They help breakup the formal edges of a pool, giving a more natural appearance. There are many varieties providing striking contrast of foliage and colour.

Cave says that shortly after planting a new pond, you'll witness the balancing act at work.

"First it may turn pea green," he says. "Don't worry, it nearly always happens, but be patient! Do not change the water as you will be introducing a fresh lot of mineral salts and you will be back to square one. A reddish tinge will appear around the edge of the pool, then the water will clear. This could take one week or ten, depending on water chemistry, plant density and the seasonal elements, but it will happen eventually and the water will then stay clear unless the balance is upset. For those who can't wait for the pond to clear, use algacides to help

remove algae, alternatively install an external or internal biological filter."

A final note is on the fish being eaten by cats and birds. Cave says that in an outside pond, fish can be very vulnerable to predators – but a minimum depth and some surface cover are all that is required to keep them safe. Bird/cat netting is available which stretches over the pond at surface level that can be used in more difficult situations. It is fastened around the edges of the pond with stakes or tent pegs, and is almost invisible to the eye when stretched taut. ☺



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