The Outdoor Garden Pond:

Tips, Tricks and Reminders for Ease of Care and Beauty!

Anthony Calfo

If you are considering building a pond or even if you already have some pond experience, this article will introduce you to some novel tips and tricks, dispel some myths and perhaps reinforce good notions you may already have for pleasant endeavors with aquatic gardening. Whether your preference is for flexible pond liners dressed to make a natural-looking oasis or for formal appointments in stone, concrete or tile, there are commonalities to the keeping of all outdoor ponds that we can easily summarize for success. Garden ponds can, and usually should be very simple to construct and operate. Maintenance tasks are minimal and require less time than any other expressions of keeping aquariums or aquatic features. With good planning and a strict

adherence to some simple rules you can enjoy a enjoy pond-keeping like a pro! Let me take you on a pictorial "crash course" of sound techniques to make sure your aim is spot-on:

The garden pond provides a beautiful place to enjoy nature. Right in your own backyard! Photos by Anthony Calfo

Far and away, the biggest concern and complaint about garden ponds is algae. For this reason more than any other, folks tired of fighting a losing battle with the unwanted greens ignore or shut down their ponds. This is most unfortunate since prevention or solutions to unwanted algae are inexpensive and often quickly rendered! Dreadful mistruths and half-truths abound about causes and cures for these low-lives (literally), most notoriously that excess sunlight causes algae and reducing light will cure it. Bunk. Rubbish. In plain language, sunlight does not cause nuisance algae… excess nutrients cause unwanted algae. You can find many successful ponds in full blazing sun with crystal clear water, and find many more ponds in poor or indirect light swimming in green scum. Reducing unwanted algae is entirely about nutrient control.

New hobbyists are admittedly prone to being eager and may overstock their pond (too many fishes added or added too quickly) and overfeed their new fishes. In such cases, it could not come at a worse time since a new pond may be rich in minerals or nutrients from being recently filled with tap or other source water (e.g., well water is often loaded with nutrients that fuel algae). In the early stages, filters are immature and plants are not established or may not even have been added yet. The textbook solution is prevention and patience. Add as many plants and filters (manmade and/or bog) as you can early, and proceed very slowly with fish stocking and feeding. This speaks directly to the issue of nutrient export elements (plants and filters) versus nutrient import elements (hungry fishes, turtles, frogs, etc.). Pondkeepers with an appreciation for bog and submerged aquatic plants can even get to the point very soon where no manmade filters are required whatsoever! Even large pools can remain crystal clear all year around and enjoy hearty loads with fishes that do not need fed, all for having patience in wait for strong plant populations to grow. Read on about how to find and pot those plants (and how to *still* avoid nuisance algae if you are too eager and impatient, with a small investment in technology!). The fundamental goal here is to strike a balance much like a successful ecosystem in the wild. We want seed our pools with desirable nutrient consumers and provide these organisms with just enough sustenance to thrive in a tidy aquatic microcosm. Some of the wonderful dynamics at play include: insects attracted to the water that lay eggs and provide larvae for fishes to eat, maintaining water quality so that just enough microalgae develops to sustain grazing herbivores (snails, fishes, etc.), mechanical filters catch gross particulate matter for quick export (cleaned frequently), pumps used for water circulation or biological filters, maturing rooted and floating plants absorb considerable amounts of nutrients from decaying matter (fish waste, leaf litter, etc), and small predators like frogs and catfish control the potentially explosive reproductive rates of common carp and goldfishes by eating the smaller fry.

Buying a water pump: Even if you choose to forego buying or building a large biological filter because you'll have a very heavy plant population and low fish load, you will still need to protect water pumps from clogging quickly or wearing out too soon. Few garden ponds can survive (especially with fishes) without some form of constant water movement. It’s a sometimes fatal mistake yet not uncommonly misadvised directive that shutting the pumps off at night is OK to save on electricity, or for any other reason. This is dangerous and not recommended. Since plants and algae only photosynthesize and produce oxygen during the day, natural biological processes

lead to a drop in oxygen levels at night and turning off of circulating pumps lets this drop fall even further. Frustrated pond keepers that have fish that seem healthy by day but are dead the next morning should consider oxygen deprivation (especially when it's the larger/largest fishes that die first). Even without turning off pumps, the dynamic can occur in systems that are suffering badly from "green water" (suspended unicellular algae), which due to their high density, can lethally lower oxygen levels (for these fishes) at night with respiration. Enough said… everyone gets a pump and runs it full time at least for the active pond season (above 50 F). There are many wonderful features with water pumps for your pond anyways like fountains and waterfalls.

A quality pump is an invaluable asset for your pond.

There are many choices among water pumps starting with external versus internal. Beyond any obvious constraints (construction and layout of pond, aesthetic preferences, etc.) that lead you to a specific pump size or placement, one of the most likely influences on your purchase should be efficiency. There are sometimes extraordinary differences in power consumption between brands for like-sized pumps. A good pump can be had for most ponds utilizing no more than a few dollars in electricity monthly. These tend to be the magnetic drive units, which have an impeller that "floats" on a shaft inside the pump housing. They do not suffer from resistance placed on them by valves used to reduce water flow (they actually run better/longer with at least a little resistance). And the modern evolution of this style pump has essentially overcome previous shortfalls with strength to operate the pump at great head (pressure and height, as with long runs of pipe and many joints of constriction). Only for the heaviest duty needs will a direct-drive pump likely be needed. These units sometimes are much stronger and can pump higher than magnetic drive units, but they come with a price – most notably expense to operate. Most popular direct-drive pump models in the hobby are not submersible either. Pictured here (inset) is a nice mid-range pump line: the Supreme "Mag-Drive". They are a good value in my opinion - balancing cost of purchase, efficiency and expected life.

Filters and Pre-filters: Submerged pumps used for feeding water falls, biological filters, fountains or simply just water movement and aeration in the pond can be protected with an incredibly simple, inexpensive and low maintenance DIY pre-filter. With a bucket, some coarse media (lava rock, aquarium filter "bio-balls", plastic hair curlers, etc.) and a polyester pad for pre-filtration, a good pump guard or even adequate biological filter can be constructed for mere dollars – these are DIY "**bucket filters**."




Starting with an empty bucket, place your submersible water pump at the bottom after it has been properly fitted with any flexible or rigid tubing your need. Next, fill the bucket with rinsed bulk media (lava rock is used in the illustration here… one $5 bag at the local home & garden center fills two five gallon buckets!) to serve as a gross mechanical and biological filter. Next, cut a snug fitting layer of thick spun polyester fiber pad for a prefilter to sit above the media. I prefer to use two prefilter pads on top to be rinsed alternately.

Various brands and types of filter pads can work for this purpose, but I specifically prefer the sturdy, thick types (coarse spun polyester fiber mats) marketed for pond keepers as they are efficient, easy to rinse and re-use, and a good value.


Is the specially designed filter media marketed for garden pond filters really better? Well… yes, often they are. But this DIY bucket filter is not designed for keeping heavy fish loads or as a primary biological filter. We are merely trying to construct an easy to service and inexpensive pre-filter that will keep our water pumps running smoothly. In ponds with adequate water flow, proper feeding and stocking, and reasonable maintenance (e.g., cleaning out leaf litter periodically and doing regular partial water changes), you can expect a DIY bucket filter with lava rock, "bio-balls", or the like, to need serviced once monthly (rinsing the pre-filter pad). Remove the pump twice annually for a thorough cleaning of all aspects (**Tip:** running the pump overnight in a tub of water with a few cups of vinegar to clean it out nicely).

Tip: Flexible tubing can be a bit difficult to force down onto insert fittings far enough for a good seal with pressurized pumps and plumbing. A really easy trick is to heat a cup of water (without a tea bag) and soak the tubing ends for a few minutes. This can even be used to "persuade" tubing sizes that are a bit smaller than they should be to marry some insert fitting. Hot flexible tubing slides down easily onto insert fittings and then shrinks very snug once it cools to make a very good fit. Plastic or steel hose clamps may still be necessary as with pressurized installations. Aquarium hobbyists are accustomed to using clear vinyl tubing for pump applications, but this material is a bit weak and too clear for outdoor use (algae growth inside). For pond use, spend a little more money for durable tubing with fiber braids infused (see picture above), or invest in actual flexible PVC tubing.

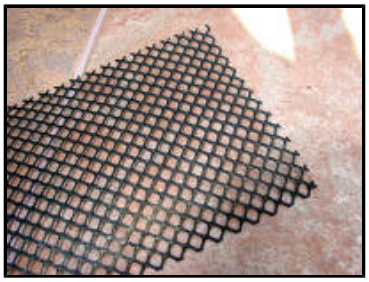

Although flexible tubing offers convenience to install and is necessary for awkward or irregular paths of water flow, hard pipe really is preferred whenever possible for its durability and utility. Outdoor pond hardware must withstand the rigors of weather, home and garden tools, foot traffic, animals and children and various other challenges. Use flexible tubing minimally as it is more prone to leaks and the accumulation of mulm and algae through opaque or clear piping walls. Hard pipe, on the other hand, can last and remain trouble-free for many decades if installed properly. If you are a "weekend warrior" and really have no practical experience with plumbing, please do seek at least a little bit of professional advice. Before committing the time and expense to hard lines, you will want to know the differences between ball and gate valves, why is it critical to use cleaner and primer before gluing any joints, and the fact that not all plastic pipe is compatible in size or weld, requiring specialized or transitional glues sometimes as with merging PVC and ABS (pictured above in black and white colored pipes with green glue).



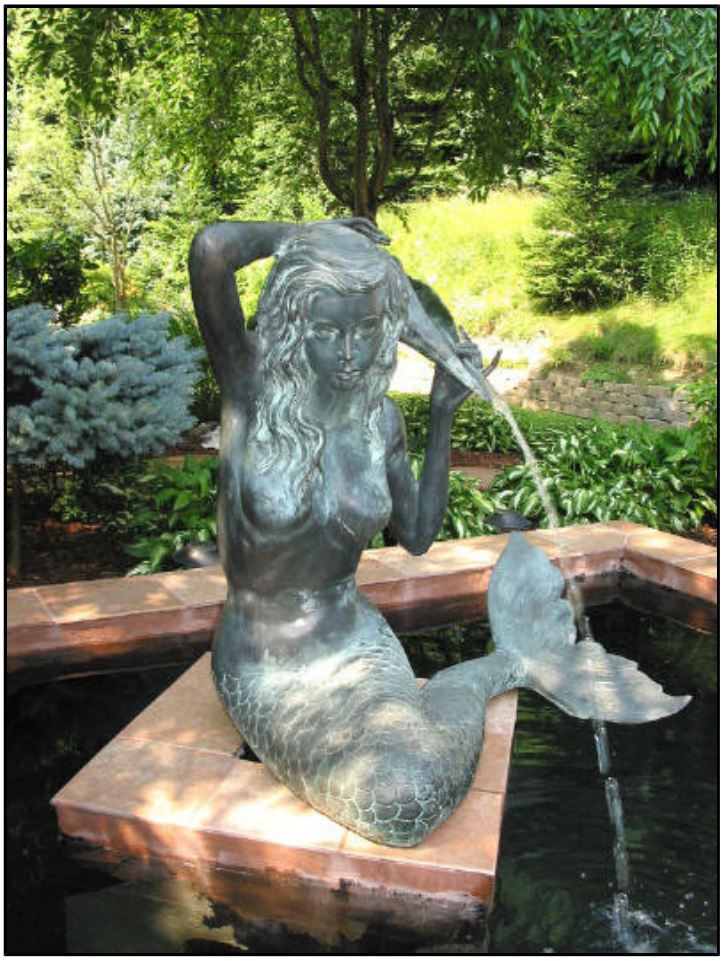
Hiding unnatural features of a pond takes just a little bit of strategy and creativity. External commercial filters (and home-made external bucket or barrel filters) are commonly submerged under ground – partially if next to the pool, or perhaps almost fully if at a higher elevation as with a hill or peak of a waterfall feature. Hard pipe plumbing can usually just be buried (left picture above – exposed pipe); soft tubing can also be buried if shielded by conduit to prevent chewing animals or future garden shovels gone astray from piercing the lines.
Weather-resistant equipment like some UV sterilizers (center picture above) may be covered in mulch or similar landscape dressings. A proper roofed hutch would be best of all but they are the hardest to hide discreetly. Some hardware made for the aquatic garden is designed to try to blend into the landscape at least a little, like this faux granite outdoor speaker (right picture above) that has been in my service for nearly a decade… getting covered in snow every winter J



With thoughtful planning in advance, you can really do a brilliant job of hiding pumps, tubing and electrical lines. In the illustrating photos above, an island was built (top left picture) to support a water feature (pump fed statuary). The island is hollow with four large water intake tubes at the bottom of the pillar (bottom picture). At the bottom of this well, I placed a simple bucket filter as described above to supply filtered water to the statue. Like any good garden pond water pump, the model used to power this statue has an extra long power cord. The electrical cord was fished through one of the water intakes (upper right picture) and then out through another pre-planned bulkhead in the side wall of the pond. Thus, no distracting lines or cords needed slung over the decorative sill of the pond.



All four water intake ports at the bottom of the fountain island screen leaf litter and large matter (like fishes!) by using some inexpensive rain gutter plastic mesh rolled up and stuffed into the pipes. You can imagine many other alternatives for this. The bucket filter can go many weeks or even months requiring little or no service. The fruit of this effort (pictured below) is the uncluttered operation of a lovely bronze water fountain. Take the time to do such thoughtful planning for the better enjoyment of your garden pond for many years to come.

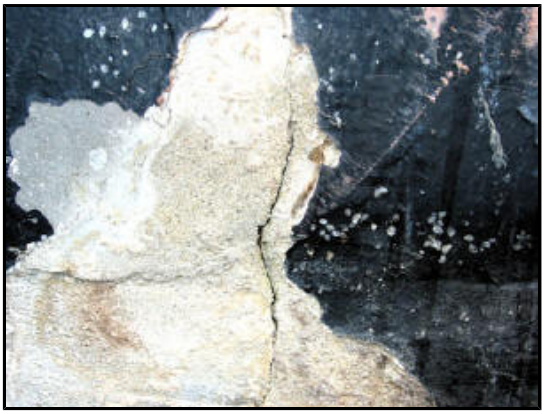


Potting pond plants is a topic of some debate, rightly so, for the great variety of species employed and their differing needs. Some plants naturally live fully submerged, some partially immersed (bog plants) and some plants sold in the hobby are not even truly aquatic at all but live wet or submerged long enough to satisfy a customer in a season. In keeping with the theme of this article, my suggested potting technique is intended to be simple, clean and easy to maintain. First the facts: most aquatic plants do not need soil or mud substrates for success as they derive their nutrition from all parts (leaves, stems, roots) unlike terrestrial plants. Most potted plants will need to be regularly repotted (every 1-3 years) for health and vigor if not to control growth. This task is commonly ignored and plants may suffer or die in the constricting pot or even just burst the vessel at the seams. If the plant was potted with any soil, you can imagine what a mess that can be. Soil from potted plants (as with run-off from poorly designed ponds, which allow rain to run off the land and carry unwanted nutrients, poisons, and other matter into the pond) is also a serious factor in water turbidity and nuisance algae growth. For most lilies and bog plants, I simply do not recommend using soil at all in the mix. For heavily flowering plant species and spurred growth in others, judicious use of fertilizing tablets are an option. Beyond concerns of pots breaking, they can often tumble over with wind and weather

(as with bog plants partially submerged), or be knocked over by gardeners working in the pond. Some large and vigorous fishes like Japanese koi or adult goldfishes may even topple potted plants as they root for food in and around the pots.

I recommend using stone and gravel wholly as a substrate to pot most pond plants. Use plastic pots with holes for at least a little bit of oxygenated water to diffuse. Large gravel or chunks of stone fill the bottom layer of the pot (see pictures above). Medium to fine pea gravel works well to fill the rest (a majority). Be sure to leave the crown of the plant exposed to light; this is the part where the leaves sprout from. It can be stressful or fatal to cover the crown in some plant species. This a tidy method for potting and repotting plants that you will come to appreciate more as the years go by.


Even if your pond is not constructed of concrete or stone, you most likely have some of these materials in and around your garden pool. Mortar may be used to build water falls or dress the edges of a lined or natural (clay) pond with natural rocks. Many decorative statues are still made of concrete or perhaps your pond is finished in tile? All of these stony products will likely benefit from an annual treatment with **sealer** to extend their lifespan to many decades.



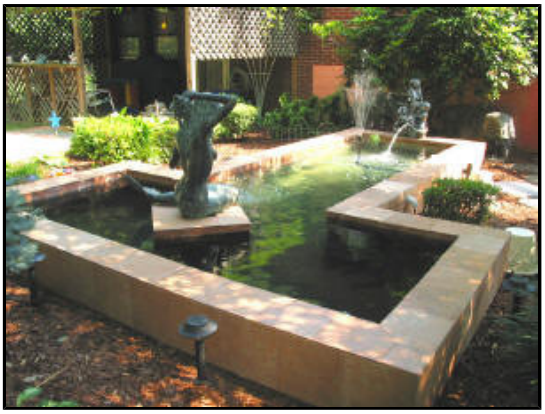

Actual cracks or repairs are quite easy to remedy nowadays with modern cement products infused with plastics and even designed to set up underwater (in minutes to seal leaks)! Some go by the name "**hydraulic cements**"; ask your swimming pool center or local home and garden store for recommendations.



U.V. Sterilizers - the green-water algae "cure". I proffer this advice with some sarcasm: a "cure" for a symptom (unicellular algae) rather than treatment of the real problem (excess nutrients). I also share it with some irony as I use the very device myself on most all of my ponds and installations, if only as a back-up. The ideal pond and the reality of how most ponds are built, inherited, or otherwise run, are often two very different things. Nutrient control can be a challenge in most systems. Rains wash nutrients into low lying ponds. Winds carry leaves and other organic debris into the pool. Aquatic birds visit and deposit considerable amounts of waste. Fishes grow and reproduce and present and ever-growing burden on the bio-load. People generally have busy lives and may not tend to pond maintenance as diligently as they should. There are many other common explanations for how nutrient levels can exceed the capacity for filters and aquatic plants to handle them, leading to unsightly problems with "greenwater". To all of these problems, there is one very simple solution: a pond-ready UV sterilizer. For likely less than $200, a properly sized "UV" can clear most any unicellular algae bloom in days. These units are typically not installed properly though! It is crucial that all water pumped into a UV be highly filtered (carbon and fine mechanical filtration) to ensure colorless water without any particles or turbidity. Indeed, excellent pre-filtration is critical. The lamp inside also needs to be changed every 6-10 months (just once annually at the start of each new pond season for those in temperate climates). Typical placement is at the end of the line in your filtration scheme: just before a fountain (pictured above center) or hidden at the top of a water fall are popular positions. Each unit will also have a recommended maximum water flow that must be obeyed. The slower the better is usually best for maximum efficacy. There are some interesting new units on the market now (pictured above right) with high intensity lamps that can handle remarkably high water flow (for large pumps/ponds… rather than imposing the need to plumb a slow bleeding line off of current installations). An additional benefit (and one for which these units are principally designed and marketed for) is disease control. UV sterilizers kill or denature unicellular algae and numerous undesirable parasites and micro-organisms.

Water changes: My friends and regular readers have to be tired of hearing me chant this mantra by now, but I'm on a mission. "The solution to pollution is dilution!" I cannot emphasize enough the importance of partial water changes for keeping aquatic life in closed systems successfully for the long term. Sparing you the science lesson as this installment draws to an end, it should be clear that there is no filter or product on the market or known to man that tracks all desirable and undesirable elements of water quality, replacing necessary ones and neutralizing or removing all harmful ones. The filtration that we employ (living and man-made) is helpful and necessary for maintaining a tolerable if not healthy water quality for aquatic organisms. But it is a losing battle that will be lost without partial water exchanges to bring "things" back on par. Topping off for evaporation is often mistakenly counted as a "water change," but it does not dilute or remove the dissolved and daily accumulating waste products that your fishes and plants are producing and living in. It merely reconstitutes them, or rather… ameliorates them. I strongly recommend a partial water change of at least 20% monthly for ponds with a moderate bio-load. Systems with a heavier burden will benefit from weekly partial exchanges instead.

Whenever possible, install an overflow on your pond too. This is surprisingly easy to do on a concrete or lined pond even after they are built. For concrete or stone ponds, a hammer drill and long masonry bit will forge the hole through which to seal a pipe in (right picture) in a matter of minutes. Pond liners are even easier to add an overflow to with a knife to cut a hole and fit a plastic bulkhead with gasket through (they even make curved wall bulkheads for such applications). Having an overflow to handle heavy rains and having an outlet to pump dirty water into during water changes is one of the most underrated aspects of pond design. It's also a priceless feature you'll be grateful you added in time.

In this overview of tips and tricks for easy and successful pond-keeping, there were many wonderful aspects of husbandry and hardware that got no mention at all. Short of writing a book about it (my dear friend Bob Fenner and I are seriously threatening to write the "Conscientious *Pond* Keeper"!), I have inevitably missed covering some very worthy topics. For these things and more, I strongly encourage you to get involved with local and regional water gardener's clubs. There are national clubs and journals to subscribe to and numerous books and magazines to get you on your way. Thoroughly explore this wonderful marriage of landscape and aquarium hobbies, and be sure to enjoy the journey. Aquatic gardeners find great pleasure and relaxation starting or ending their day by the pond and contemplating the evolution – you will too. With kind regards, Anthony Calfo.

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