

Pond Filtration: Guide to Choosing and Setting up a Filter System

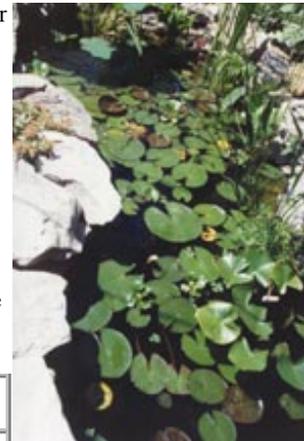
Drs. Foster & Smith Educational Staff

Ponds add a touch of serenity and elegance to almost any setting. But in order to maintain their beauty, proper filtration is essential. While nature will eventually help maintain water quality by establishing its own filtration methods, you will most likely need to give your pond a little help in order to achieve the results that you want.

Filters are not essential for very large ponds, but they are a good idea for anyone who wants clear water. Water gardens can thrive without filters, as can shallow ornamental or reflective ponds with only a few fish. For other ponds, filtration is needed to eliminate particulate and biological wastes from the water.

Types of filtration

To better understand why filtration is a good idea, you need to understand how it works. There are different types of filters and filtration, and each has its benefits for certain types of ponds.



Mechanical or physical filtration refers to the removal of particles of debris by means of passing the pond water through various filtration media. This type of filtration is useful for keeping your pond water clear and clean.

Filtration Quick Guide				
Filtration type	Helps eliminate:			
	Algae	Debris	Discoloration	Toxins
Mechanical		✓		
Chemical	✓		✓	✓
Biological	✓			✓

Mechanical filters either strain or skim debris such as leaves, stirred up muck, and free-floating algae from the pond. This helps to prevent clogs in other pond equipment as well as reduce the amount of decaying materials from settling on the bottom. Mechanical filters do this by straining water through various media of varying densities and thicknesses (typically sponges or pads). A specialized mechanical filter called a "skimmer" is designed to grab leaves off the surface of the water, whereas other mechanical filters generally strain out suspended particles. Because of the nature of mechanical filtration, you will need to clean the filter regularly (at least once a week).

Chemical filtration is not as commonly used in ponds as in aquariums, but some pond filter systems do use it. Chemical filtration helps to remove organic and inorganic pollutants with specialized media like carbon and resins, usually in a loose, bagged, or pad form. Organic and inorganic pollutants will adhere to the carbon or resin, removing them from the pond. Carbon is often used to remove medications or treatments from the water after the designated time of treatment is over. If your pond has high levels of ammonia from too many fish or a brown tinge from dissolved organic compounds, adding the right chemical media to your filter or waterfall can help resolve the problem. Owners of ponds that are at risk of chemical contamination should also consider using a system with some form of chemical filtration.

Biological filtration is a very important part of all filtration systems. In a pond with more than one or two fish, or one with decaying leaves or other plant material, harmful levels of ammonia begin to build up. Biological filtration is the process that removes this excess ammonia by using nature's nitrogen cycle to detoxify organic waste products. Once the ammonia level in the water begins to rise, a colony of bacteria that feeds on ammonia will begin to grow in the filter's biomedium (lava rock, plastic pin balls, foam, etc.). These bacteria will break down the ammonia into nitrites. Nitrites are also dangerous for your fish, but once the nitrite level begins to rise, another colony of bacteria will develop; this colony feeds on the nitrite and produces nitrate, which is not as harmful to your fish and will be utilized by your plants. This process, known as the nitrogen cycle, is necessary to ensure that your pond water is biologically safe for your fish. In smaller unlined ponds, you may not need to worry about biological filtration, since the exposure of the water to the soil allows the bacteria in the soil to act as the filter. For lined ponds, however, you will need to purchase a filter with special areas designed for these bacteria to grow in a protected environment and a way to force water through the bacterial colony. Keeping your pond free from ammonia is essential for fish health, and bio-filters also help eliminate the waste products that lead to excessive algae growth.

You also have a couple options for starting the biological filters. Nature will do it on its own, but it will take from 4 to 6 weeks, sometimes longer, during which period you should make no changes at all in your pond environment. This cycling needs to occur in any new aquarium or pond. There are some commercially available products that will help speed this process, but they are not a substitute for giving your pond enough time to cycle. Adding fish to a pond that has not cycled can cause lethal amounts of ammonia and nitrite to develop.

Equipment you will need

It is a good idea to plan your filtration system before you dig your pond. Doing so gives you the flexibility to decide how you want to feed your water through the system. There are multiple factors to consider when setting up filtration units. For optimal long-term results, invest in the filtration system that best fits your particular budget, your comfort level, and your own unique pond set-up. At the very least, most pond keepers want clear, algae-free water as the end result.

Filters

There are multiple types of filters available. You will want to choose one that provides the proper types of filtration for your pond, and whether the filter will be installed inside or outside the pond.

Combination Filters: Many filters combine multiple types of filtration for efficiency. For example, a multi-filter may include sponge media and an empty chamber. The sponge media is both a mechanical and biological filter, as beneficial bacteria grow on the sponge used to strain out debris. The empty chamber is available for you to add "tea bags" of chemical media to target certain specific problems with your water conditions.

External or Submersible Filters: Various factors including ease of installation, plumbing and electrical requirements, maintenance, and pond size should be considered in determining your choice of an external or submersible filter.

Water pumps

Size, Pressure, and Volume: Water pumps are arguably the most important piece of equipment for a good filtration system. There are many available on the market, but you must be certain to choose a pump that is right for your pond. In order to pass water through the filters effectively, the water pump needs to circulate all of the pond water through the filter in a period of 60 to 90 minutes. This means, for example, that a 1000-gallon pond needs to have a pump rated somewhere between 11 and 17 gallons per minute (GPM) ($1000/60=17$; $1000/90=11$).

If you do not currently know the number of gallons in your pond you can calculate it using the following formula. If measuring in inches, multiply L x W x D, and then divide the total by 231 to get total gallons. If measuring in feet, multiply L x W x D, and then multiply the total by 7.48 to get total gallons. For example, a pond that is 6 feet long, 4 feet wide and 2 feet deep would be $6 \times 4 \times 2 \times 7.48 = 359$ gallons.

You should also become familiar with pump pressure and pump volume. Pressure is how quickly the water is circulated, and volume is how much water is circulated. Many new pond owners purchase swimming-pool pumps, which are usually high-pressure, low-volume pumps. These often prove to be a poor choice, as they use far more electricity than necessary. A better choice for ponds is a low-pressure, high-volume pump.

One final word about buying a pump: it is worth investing in a high-quality pump from the beginning. Some cheaper pumps will use more electricity to pump the same amount of water, may break down more often, and will cost more in the long run than a high quality, energy efficient pump.

Water flow design is important for the aesthetic value of your pond. Some pond owners use submersible pumps and filters, while others install piping to carry the water to and from a separate pump house. If you are designing a new pond, you have the most flexibility in this area, as you can do all your digging at once if you decide to pipe the water to a pump house.

Piping: Submersibles are fine for smaller ponds, but larger ponds require larger pumps. If you decide on a pump house, you will need to purchase adequate piping to circulate the water through the filters. You should not use pipes with an inside diameter any narrower than 2 inches. Remember that water in the pipes is not in your pond; about 6 feet of 2 inch pipe will hold 1 gallon of water. If you decide to put your pump house 100 feet from your pond, you will have about 35 gallons of water in the pipes.

Alternatives to Pumps: Another option is to use a running stream or waterfall to



External or Submersible (Internal) Filtration: Factors to Consider

Submersible filters are:

- Installed directly in the pond
- Intended for smaller ponds (typically less than 2,000 gallons)
- Easier to plumb
- More difficult to wire for electricity
- More difficult to access for maintenance
- Easier to disguise

External filters are:

- Installed outside of the pond
- Intended for larger ponds (typically up to 21,000 gallons)
- More difficult to plumb
- Easier to wire for electricity (and less likely to cause shorts)
- Easier to access for maintenance
- Harder to disguise (and often requires housing to protect from the elements)

circulate the water. These features add to the expense, but they also add a distinct splendor and elegance to any pond.

Cost

The cost of filtration equipment may seem rather high at first, but we cannot say this enough: quality is worth paying for. You will save money over time if you set up a good filtration system from the beginning. Mechanical filters tend to be less expensive than biological filters, and while you may be tempted to just use one or the other, both types of filters are required for any pond with more than one or two fish.

Remember that a good filtration system provides many functions including improving water quality, controlling ammonia and nitrite levels, and providing water movement and adding oxygen to the water. The filtration system is probably the most important piece of mechanical equipment in your pond, so invest in a system that is easy to maintain and of the best quality.

