

## BASIC BARRIERS TO GOOD WATER QUALITY

By Carolyn Weise, Ecological Laboratories, Inc

**STOCKING DENSITY-** Too many fish will always cause a decline in water quality. This is the most frequently experienced problem with koi and water garden ponds created by hobbyists. Yes, it's nice to see one of each type and color swimming happily in my pond, but there is a cost (generally, to the fish). The water becomes "cloudy" and then, if lucky, it will turn green with Planktonic algae. In nature, you cannot look down into the water and see ten or more fish swimming by. You'd be lucky to spot even one, in nature. That is the "balance of nature". But in our ponds, we want "more" than nature affords us, so we add super-efficiency filtration, triple-sized waterfalls, bottom drains and all the bells and whistles, so we can stuff more fish into a small body of water. Gee, that's the biggest pond I can fit into my yard. We even dig them deeper than the law would allow (if they knew) in order to have more water volume. And then, we feel we can add MORE FISH. If you want to have good water quality, you need to stock sensibly. Here is a really simple formula that will work in practically any environment, provided you have adequate filtration and circulation: 10 gallons per fish inch of Koi, and 8 ½ gallons per fish inch of goldfish and others. Please keep in mind, Koi can grow to 36" or better at maturity. If you love your fish, give them room to grow.

**FEEDING-** Each Koi needs about one pellet per day. More food will not make the fish grow bigger or live a healthier life. Fish can become obese, too, and will die from fatty liver, enlarged heart, and other overweight conditions. Living in a small pond will naturally limit their exercise. Feeding last year's food can mimic many diseases but may only be nutritional deficiencies. The nutrients in food, after opening, start to break down. By the following year, the most important vitamins and minerals may no longer be available to the fish. (I wouldn't eat food from my refrigerator if it's been there a month, so why would I feed my Koi food that has sat on the shelf for 6-8 months?) The ability of a Koi to grow is in its genetics and the quality of water in which it lives. The food provides nutrients for good development of bones, fins, scales and immune system. The growth factor was up to its parents. In general, a fish is healthier and livelier when fed less. This is one case where "less is more". Water temperature will dictate how much and how often to feed your fish. Since none of us (not even the radiologists) can predict weather accurately, it's best to expect the worst and feed just for today. When the water temps are below 50F, there is no feeding (not even on brief sunny, warm days in winter). Once the water temps rise to 55F, it's time to start slowly with wheat germ cold weather food (I feed mine Legacy Cold Weather), once a day, only as much as they will consumer in 2-5 minutes. Anything left over is scooped out and discarded. When water temps are between 65-75F, this is the ideal feeding temperature for Koi and they can be feed very small amounts up to 3-6 times a day of a higher protein food (although there is nothing nutritionally unsound about feeding wheat germ food all season in some areas). At 85F, cut back on feeding, feed only 1-2 times a day and go back to the wheat germ because the fish need to conserve energy.

These are temperate zone fish, not tropicals. Watch the water. If the water begins to cloud, feed them once a day or every other day. But, if you live in a warm area or have a shallow pond, and the water temps go into the 90's, stop feeding. No feeding above 90F. Any uneaten food (and the excess fish waste) will add to organic loading and oxygen demand to the water. The key is this- fish have no stomach to fill. They have one long gut and any food simply passes through. If the food has enough time as it is passing through for nutrients to be absorbed, the fish will be nourished. If it is overfed, the food might be simply forced through the fish, limiting the actual benefit to the fish and simply deteriorating water quality.

FILTRATION- I should say "under-filtration" is another problem. Or it could be poor maintenance of the filter system. Many people are told to leave the "bacteria" in the bottom of the filter... Huh? Bacteria are microscopic, so you cannot see them. Whatever you CAN see, is dirt. Remove it. Your bacteria will work better if they are not covered with dirt. With Koi, a bottom drain is imperative to prevent the fish from sitting in their own feces. If the filter is not able to pull ALL the dirt from the water, then it is under-filtered. The filter is a system, not just a pump, skimmer and waterfall. It needs to be serviced regularly (cleaned) or it will not be adequate. If you do not have clean and clear water, one of these things, the amount of fish, the feeding schedule, or the filter are the problem. They are all up to the pond owner to manage and maintain.

FACTS? If the water is still not clean enough for the fish start with cutting out some feedings. Still not clean? Next step would be to cull some fish. Ponds with male and female Koi are going to have babies. Babies are a guarantee of overstocking. Upgrading the filter or building a larger pond, without fixing the problem, is only a band-aid on a broken bone. It will not go away. The secret is learning the best way to manage your pond... and doing it... even the things you may not want to do.