

Inexpensive Fish Pond

The real cost of a fish pond is the total amount spent over its lifetime.

By Stephen M. Meyer

Q. I am designing a koi pond as inexpensively as possible. I intend to make this an earth-bottom pond so I can grow plants directly in the soil. First I will excavate the area and put down a 6-inch layer of sand. Next I will lay down an 8-mil layer of plastic to keep water in. On top of this plastic liner I will put a tarp to protect the liner from damage. Then another layer of plastic will be put in to stop the plant roots from growing into the weave of the tarp.

Now, from there I want to put down a 12-inch layer of soil to grow plants. I am also planning to install a pump and a biological filter. I want to keep my koi outdoors all winter, so I assume I will need to keep the water circulating throughout the winter.

I have three questions. First, is the liner design reasonable? Second, how deep would you recommend making it for keeping koi? Third, is it safe to keep the koi in the pond throughout the winter? The temperature gets down to -20 to -30 degrees Fahrenheit during the cold spells.

A. I applaud the thought and planning you have put into your project. It is clear that you are trying to design a pond with many common failure points in mind — such as rooting pond plants puncturing the liner. I am afraid, however, that there is a flaw in the design: The 8-mil plastic is the weak link and will not last more than a single season in your area. The frost line in your part of Wisconsin probably extends down at least 6 feet below ground surface. Exposed to that kind of cold for several months the plastic will become brittle, crack and disintegrate during the first winter. Come spring, there would be no liner under your pond and that means that the water will drain out.

You must think about your pond as a long-term capital project. You want it to last at least a decade, and almost certainly longer. The "cheapest" design, then, is one that will last at least that long, require minimal repair and maintenance, and present the least risk of loss of water. In other words, the cheapest design is the one that offers the least cost over the lifetime of the pond. To me this implies that you should purchase a very high-quality pond liner — a 50-mil (or better) fish-grade EPDM liner, for example — that will stand up to the rigors of your area. I cannot emphasize enough that it makes no sense to put koi into a pond that fails and the fish die. The pond will no longer seem inexpensive.

The layered structure of your pond floor is probably more elaborate than you need. The sand is a great idea to prevent frost heaves from thrusting stones through the liner. The tarp, however, is really unnecessary if you switch to a better liner and if you just deepen the earth bed. Even the most aggressive aquatic rooting plants, such as cattails, will not put down roots much deeper than 2 or 3 feet. So, if you make the earth layer 4 feet you should have no problem at all, and the liner will probably outlast you.

But when it comes to depth, the earthen pond floor is the least of your concerns. To have a prayer of overwintering koi or goldfish in your pond you need a water depth of at least 15 feet.

There is no need to put deep earth in areas where the water depth is greater than a few feet because plant growth is very limited in that kind of deep water. You should design the pond contour accordingly. In areas where you want to plant waterlilies, cattails or other emergent and floating-leafed plants, you should design for water depths of 1 to 2 feet. These areas should have 4-foot soil depths. Therefore, the roughout should be between 5 and 6 feet. In deeper pond areas the soil depth can taper down to about a foot at the deepest section.

The design should use very gradual slopes from shallow planting areas to deep areas — at least 3 feet of run for every foot of depth — to keep the soil from avalanching to the deep areas. When you consider that much of the pond should be at least 15 feet deep, this means that the pond is going to have to be fairly large.

I frankly doubt that koi will survive outdoors in winter many years under those harsh climate conditions anyway. The water will just get too cold for koi (which are really coolwater fish) and anoxic (oxygen-deprived).

Trying to keep the pump running in -20 degree weather, with the hope that circulating water will maintain a survivable level of dissolved oxygen, is not a very promising approach. It will almost certainly freeze up after several days of below zero temperatures. Unless you intend to build a pond about an acre in size, I would plan to move the fish indoors to



overwinter.