

## Pond Construction: Selecting Good Places for Ponds

When selecting a good place for a pond, an engineer may seek advice from local people, a biologist or an economist. It may be difficult to find an ideal site but it is necessary to look at the available sites before the work on pond building begins - so that it holds water, does not collapse or cost too much and will not waste effort and money.

There are lots of things to think about before finally recommending a site. Think about getting to the pond (maybe with a vehicle): make sure this is easy. Avoid tall trees that block the sunlight or drop leaves. Avoid swampy, marshy or peat soils and try to avoid places that flood frequently. Think about how to stop poaching. Near towns, avoid neighborhood factories that give out gases, smoke, fly-ash, or organic or toxic outflows.



A *munda* typical of those seen in Orissa. This *munda* in Kumna block Nuapara is used for fish culture.

### Types of ponds

In watershed areas, ponds are often built with dykes or banks that block the course of a seasonal stream (*nallah*) or collect the surface run-off in a low-lying area. These ponds may have one, two, three or four dykes depending on the topography of the land (with a narrow entrance for water).

A *munda* is kind of pond which has four dykes.

The *kattah* in Western Orissa is a fine example of a pond with a dyke on one, two or three sides.

These ponds may hold water for a short or long time depending on the soil quality and rainfall and can play a useful role in the economy of the area, recharging nearby wells and providing a water body for domestic use, stock watering and irrigation. Embankment ponds or tanks are subject to flooding during heavy rains and have to be provided with a waste weir. When constructed for irrigation, they are also provided with a sluice gate.

*Dugout ponds* are usually dug in low-lying saucer-shaped areas that are surrounded by a dyke. These are usually dug for water storage rather than aquaculture but can be used for fish culture if a proper site is selected.



A *kattah* typical of those seen in Orissa. The *kattah* is a good place for fish production.

## How soil feels and why it is important

Not all soils are suitable for pond building.

Not all soils feel the same - they are made up of different things.

Clay is made of small parts.

Silt is bigger than clay.

Sand is bigger than silt.

Loam is a mixture of clay, silt, sand and useful nutrients.

So acid and alkaline soils are not good for fish culture or soils with lots of organic things, or lots of clay; sandstone and rocky soils should be avoided.

To grow fish a pond must hold water. Water holding and how much fish a pond can produce depend a lot on the type of soil. There are lots of different soils; some are good and some less good.

Clay soil is mainly tiny parts close together and water cannot get through. Loam is another type of soil that has a mix of all different sizes and has nutrients in it too.

A mix of these *clayey-loam soils* are the best soils for pond building as they hold water well and the nutrients help to make the water green with food.

So-called *black cotton soils* hold water in the pond better than *laterite*, *brown* and *grey* soils which let water through all of these soils are not very productive.

The soils in Western Orissa are, in general, poor at holding water and have few nutrients - but many people still grow fish well in *mundas* and *kattahs*.

Another important thing about soils is called pH, which goes from 1-14. You can measure pH with a special kit which changes color depending on what number the soil or water is on the pH scale.

Low numbers less than 5 (called *acid*) are not good for fish. High numbers, 9 or above (called *alkaline*), are also bad. pH 6.5-7.5 (neutral) soils are the best but those with a pH of 5.5-6.5 and 8.0-9.0 could also be managed through adding lime or gypsum.

If I want to construct a pond, how can I test soil quality?

One way is to take a hand full of soil, mix it with water and roll it into a ball (*laddu*). If it holds its shape and does not crumble, the soil is suitable for building a pond.

Another way is to put a handful of soil into a glass of water, stir it thoroughly and leave it for some time. When it settles, you see different layers - the finest at the top (clay), then silt, sand and the heaviest stones at the bottom.

The thickness of each layer helps you to know about the soil: if it has lots of clay, it will hold water. If it has lots of different layers and organic parts on the top, it is clay-loam, which is good. If it is mainly sand and stones it will not hold water.

So the size of the parts and pH - got it!



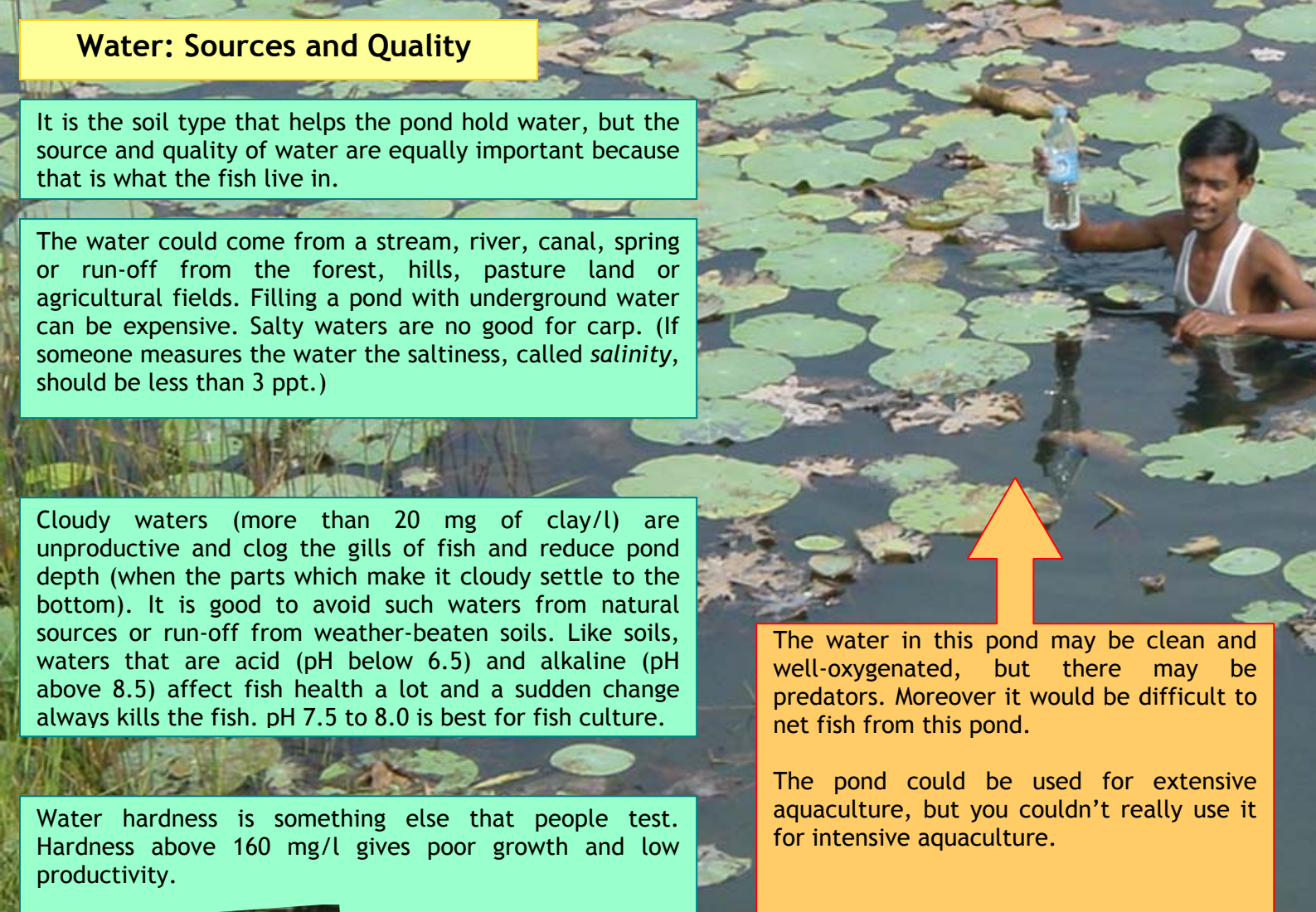
## Water: Sources and Quality

It is the soil type that helps the pond hold water, but the source and quality of water are equally important because that is what the fish live in.

The water could come from a stream, river, canal, spring or run-off from the forest, hills, pasture land or agricultural fields. Filling a pond with underground water can be expensive. Salty waters are no good for carp. (If someone measures the water the saltiness, called *salinity*, should be less than 3 ppt.)


Cloudy waters (more than 20 mg of clay/l) are unproductive and clog the gills of fish and reduce pond depth (when the parts which make it cloudy settle to the bottom). It is good to avoid such waters from natural sources or run-off from weather-beaten soils. Like soils, waters that are acid (pH below 6.5) and alkaline (pH above 8.5) affect fish health a lot and a sudden change always kills the fish. pH 7.5 to 8.0 is best for fish culture.

Water hardness is something else that people test. Hardness above 160 mg/l gives poor growth and low productivity.



The water in this pond may be clean and well-oxygenated, but there may be predators. Moreover it would be difficult to net fish from this pond.

The pond could be used for extensive aquaculture, but you couldn't really use it for intensive aquaculture.



How do I know if the water quality of my pond is good?

Well, first you have to get someone to test it. Give them a sample in a clean drinking water bottle, washed out in the water you want to test and filled to the top. When you see the results, remember this:

- Water pH 7.5 to 8.0 is best for fish culture.
- Water pH of 6.0-6.5 and 8.5-9.0 could also be managed through adding lime or gypsum (if I can afford that).
- More than 20 mg of clay/l is not good.
- *Salinity* (saltiness) should be less than 3 ppt
- Hardness above 160 mg/l is bad.

## What to Look for and What to Avoid

**Look for** clayey-loam soils.

**Look for** a good source of water from a stream, river, canal, spring or run-off from the forest, hills, pasture land or agricultural fields.

**Look for** neutral soils, neither acidic nor alkaline.

**Avoid** swampy, marshy and peaty soils.

**Avoid** laterite, black cotton, brown or grey soils.

**Avoid** highly acidic soils.

**Avoid** highly alkaline soils.

**Avoid** highly organic, highly clayey, sandstone and rocky soils.

**Avoid** saline, acid, alkaline, cloudy and hard waters.



## Useful Contacts

### Other Better-Practice Guidelines

There are many more Better-Practice Guidelines in this series.

You can get more copies of this and other Better-Practice Guidelines from your local One-stop Aqua Shop, STREAM India Communications Hub, from the STREAM Regional Office or from the STREAM Website.

[www.streaminitiative.org](http://www.streaminitiative.org)

We would like your feedback about these Better-Practice Guidelines. You can let us know by phoning, emailing or writing to the Communications Hub Manager at your STREAM Country Office.

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