

Effective Monitoring of Water Quality Parameters

I have been keeping goldfish and koi for 40 and 20 years respectively. I did not pay much attention to water quality parameters – I just figured that proper maintenance would ensure “good” water. I was lucky to get away with this for the first 37 years of my fish-keeping life.

About 3 years ago, a particularly virulent form of aeromonas began appearing in koi, and later, goldfish. In addition KHV for carp appeared on the scene. The combination of aeromonas and KHV had disastrous effects on the industry, and on the fish of many of my friends. I considered that I was immune to these diseases, since I quarantined fish for 2 – 3 weeks, and kept low stocking densities.

As luck (or bad preparation) would have it, I received a batch of fish (3 actually), from a new dealer, and I quarantined them for the usual 2 -3 weeks, thinking that this period of time was sufficient. Well, after I placed these fish in the pond, I noticed an outbreak of aeromonas. Being rather naïve (I never had fish with aeromonas); I thought this was no big deal. Boy was I wrong! I lost 80% of my existing stock (the balance died that winter).

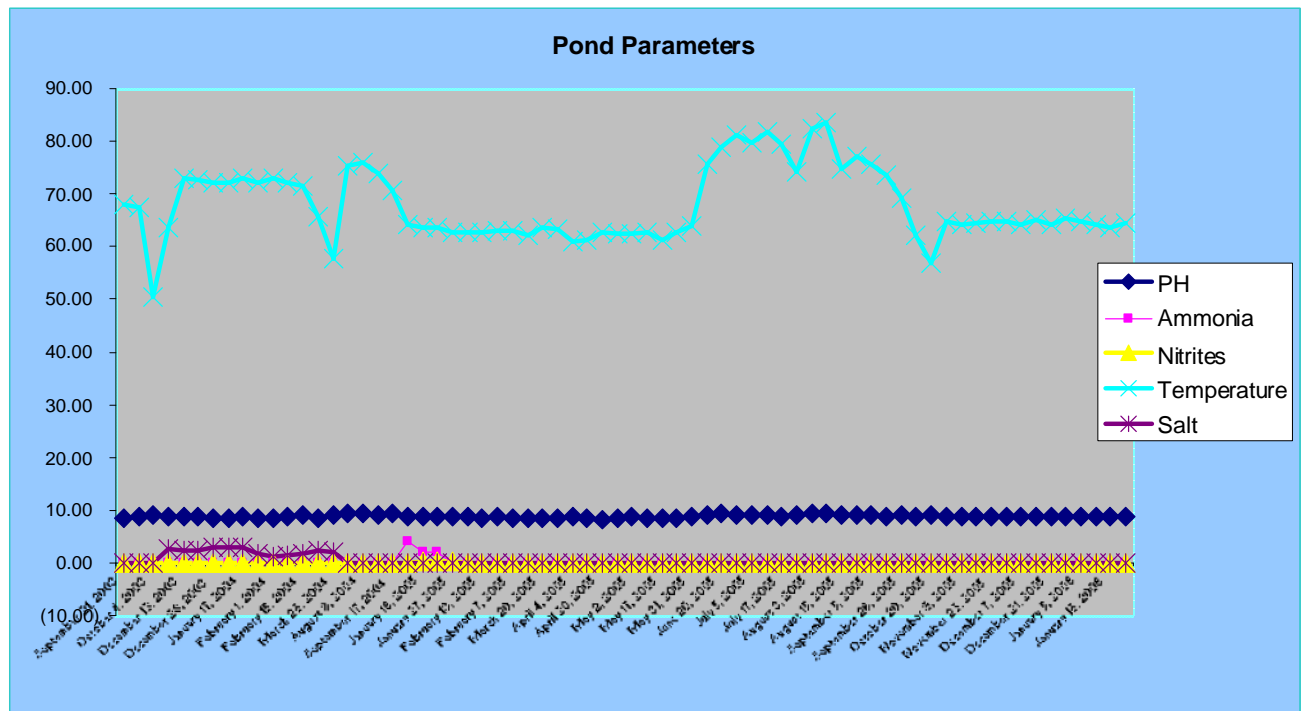
I didn't think too much of the fish loss, and proceeded to re-stock the pond in the spring. I performed my regular spring maintenance, and purchased new stock from one of my regular dealers. Within a few weeks, I noticed that the fish developed some small sores, and a few weeks later, I had a full outbreak of aeromonas (I now believe that these bacteria were left over from the previous batch of fish that died in the prior year, and that they infected my new fish). I treated the aeromonas on and off for 6 months. During that time period, I developed a great deal of appreciation for water quality parameters – certainly more than I had before the disease outbreak. I'll describe the water quality parameters in detail in the following paragraphs.

Good water can be defined as that which produces a healthy environment for your fish. Please note that this is different from an “adequate” environment for the fish – it connotes an environment where the fish will thrive. Since aquaria and ponds are a closed environment, the maintenance of “good” water is more difficult than in nature. I now believe that the cornerstone of “good” water is consistency in water quality parameters. If we keep the elements of our aquaria and ponds consistent from week to week, and month to month, then I believe this places less environmental stress on the fish, and eliminates the precursors (stress) to disease.

I currently monitor the following water parameters on a weekly basis: Ph, temperature, ammonia levels, nitrate levels, and salt levels. I then log these into a table in Excel (see the attachment), and then graph these so that I can see a visual representation of the parameters.

Date	Ph	Ammonia	Nitrite	Temperature	Salt
September 21, 2003	8.60	0.00	0.00	68.00	0.00
September 27, 2003	8.80	0.00	0.00	67.30	0.00
October 4, 2003	9.20	0.00	0.00	50.40	0.00
October 11, 2003	8.90	0.00	0.00	63.50	2.50
December 13, 2003	8.70	0.00	0.00	73.00	2.40
December 21, 2003	8.70	0.00	0.00	72.70	2.40
December 28, 2003	8.60	0.00	0.00	72.00	3.00
January 4, 2004	8.60	0.00	0.00	72.00	3.00
January 17, 2004	8.70	0.00	0.00	73.00	2.80
January 25, 2004	8.60	0.00	0.00	72.00	1.60
February 1, 2004	8.60	0.00	0.00	73.00	1.10
February 8, 2004	8.80	0.00	0.00	72.00	1.30
February 15, 2004	9.00	0.00	0.00	71.60	1.60
March 21, 2004	8.40	0.00	0.00	65.70	2.20
March 28, 2004	9.20	0.00	0.00	57.70	2.10
June 13, 2004	9.30	0.00	0.00	75.40	0.00
August 8, 2004	9.40	0.00	0.00	76.00	0.00
September 5, 2004	9.00	0.00	0.00	73.90	0.00
September 17, 2004	9.40	0.00	0.00	70.70	0.00
January 9, 2005	8.90	4.00	0.00	64.20	0.00
January 16, 2005	8.70	2.00	0.25	63.50	0.00
January 23, 2005	8.70	2.00	0.25	63.50	0.00
January 27, 2005	8.70	0.00	0.25	62.80	0.00
January 30, 2005	8.70	0.00	0.00	62.80	0.00
February 13, 2005	8.60	0.00	0.00	62.80	0.00
February 20, 2005	8.70	0.00	0.00	63.00	0.00
February 7, 2005	8.60	0.00	0.00	63.10	0.00
March 6, 2005	8.60	0.00	0.00	62.10	0.00
March 20, 2005	8.60	0.00	0.00	63.50	0.00
March 27, 2005	8.60	0.00	0.00	63.30	0.00
April 4, 2005	8.70	0.00	0.00	61.10	0.00
April 9, 2005	8.60	0.00	0.00	61.30	0.00
April 20, 2005	8.30	0.00	0.00	62.60	0.00
May 26, 2005	8.60	0.00	0.00	62.30	0.00

By including these parameters in Excel, I have a simple, easy to use charting and graphing tool which allows me to monitor water quality parameters on a weekly basis, and on a long-term basis.



A few trends can be spotted from these charts as follows:

1. Temperature levels have been fairly constant over the past 3 years. This is due, in part, to heating the pond for the first 2 years, and then transferring the fish indoors in December, 2004 (note how constant the temperature has been since December).
2. Ammonia and nitrite levels were non-existent, until the move of the fish indoors. After the nitrogen cycle completed, both ammonia and nitrite levels decreased to normal – that is zero.
3. Ph is constant from 8.3 to 8.6 over a 3-year period. This is due, in part, to the hard water which provides a natural buffering capacity for the Ph levels. (Hard water has a side effect of producing strong black coloration in fish, known as “sumi” in Japanese).
4. Salt levels have decreased from those experienced for the 1st year of charting. I originally increased salt levels to a 3 parts per thousand solution to encourage slime coat growth in the fish. I have since eliminated salt from the pond.

The charting function is helpful, because it shows changes in water quality parameters which can be measured (seen), and corrected quickly, before other problems develop. In addition, some treatments require water parameters to be carefully controlled (for instance salt level), which can only be done if measured.

Would charting have saved my fish? Probably not – but it would have alerted me to problems, and helped to establish a consistent water quality in my ponds

and aquaria. I have since increased my quarantine period to 1 – 2 months, depending on whether or not I have used the breeder before, and if the breeder also provides a quarantine period.