Lake George Algae

In September 2004, a letter was written to the River Falls Journal expressing concern over the algae problems in Lake George. Included in that letter was a feeling that the dams should be removed because of this problem. We have posted here our responses to some common algae and dam removal questions.

Q: What Causes Algae?

A: The development of an algae bloom depends upon local conditions and site-specific characteristics. But they generally occur where there are high levels of nutrients, principally phosphorus, together with warm, sunny and calm conditions.

The main source of nutrients in Lake George is sediment, which has accumulated behind the dams since they were constructed over 100 years ago. This sediment resulted from poor upland soil conservation practices that were generally followed prior to 1960. It has been estimated that in the 1950's, sediment was accumulating in Lake George at a rate of 2,500 cubic yards per year. In the 1990's the estimated rate of sediment accumulation had dropped to 500 cubic yards per year.

The Kinnickinnic Priority Watershed Project indicated that the current sources of sediment in the Kinnickinnic River at River Falls are:

All Uplands..... 83%
Streambank Erosion..... 3%
Erosion of Dry Runs..... 6%
Urban Runoff..... 5%
Construction Sites..... 3%

Sediment Loads to Kinnickinnic River at River Falls (Tons/year)

	Kinnickinnic Sub-Watersheds					
Source	Upper	Middle	South Fork	River Falls	Total	Percent
All Uplands	7674	3868	1528	849	**13919**	83%
Streambank	20	370	130	40	**560**	3%
Dry Runs	176	584	153	51	**964**	6%
Urban Runoff	111	0	368	317	**796**	5%
Construction Sites	40	80	60	320	**500**	3%
Total	**8021**	**4902**	**2239**	**1577**	**16739**	
	Source: *Kinnickinnic River Priority Watershed Project*, April, 1999					

Q: How much of the algae problem is caused by the two dams on the river?

A: The algae is caused by nutrient rich soil that is accumulated behind the dams. Without the dams in place, this nutrient rich soil would have been transported further downstream.

Q: What kinds of changes have been observed over the years as far as the amount of algae goes?

A: The delivery of nutrient rich soil to the Kinnickinnic River has been significantly decreased over the

past 30-years and continues to get better. This directly leads to less production of algae in both the rivers and the lakes because they are receiving less nutrient rich sediment. However, significant nutrient rich sediment deposits remain and lakes are very slow to recover after excessive phosphorus inputs have been eliminated.

Q: Is there a possibility of removing the dams to help remove the algae? Why or why not?

A: Removing the dams would result in the reduction of algae present on the lake because the lake would no longer be there. If the dams were no longer there to trap the nutrient rich sediments that are being transported in the river, the algae problem would simply move downstream, therefore it would be critical to implement new measures that prevent nutrient rich sediments from entering the river.

Q: What kinds of options are there for removing the algae? Is it harmful?

A: Typically, the first steps taken target the control of the external sources of phosphorus and can include: encouraging the use of phosphorus free fertilizers; improving agricultural practices, reducing urban run-off; and restoring vegetation buffers around waterways.

Lakes are very slow to recover after excessive phosphorus inputs have been eliminated. Furthermore, it's extremely difficult to achieve recovery of lake conditions without additional in-lake management. This is due to the fact that lake sediments become phosphorus rich and can deliver excessive amounts of phosphorus to the overlying water. When dissolved oxygen levels decrease in the bottom waters of the lake (anaerobic conditions), large amounts of phosphorus trapped in the bottom sediments are released into the overlying water. This process is often called internal nutrient loading or recycling.

Alum is used primarily to control this internal recycling of phosphorus from the sediments of the lake bottom that result in algae. On contact with water, alum forms a fluffy aluminum hydroxide precipitate called floc. Aluminum hydroxide (the principle ingredient in common antacids such as Maalox) binds with phosphorus to form an aluminum phosphate compound. This compound is insoluble in water under most conditions so the phosphorus in it can no longer be used as food by algae organisms. As the floc slowly settles, some phosphorus is removed from the water. The floc also tends to collect suspended particles in the water and carry them down to the bottom, leaving the lake noticeably clearer. On the bottom of the lake the floc forms a layer that acts as a phosphorus barrier by combining with phosphorus as it is released from the sediments.

Q: How long have the dams been around for? What is their purpose?

A: The power plant started here in 1900, that's when the first hydro was put in. The upper dam produces 250-kilowatts/hr maximum and the lower dam produces 125-kw/hr maximum. The amount produced is based on the flow in the river. The dams are operated in "run of the river" fashion. This means that they **do not** store additional water behind the dams during times of low energy use in order to generate more energy at peak times. Instead, the hydro plants use whatever natural flow exists in the river to produce energy.

There was a smaller rock and crib dam built in 1865, which is located between the upper dam and the Winter Street Bridge. It is currently under water, but still there. This dam provided electricity to

convert gas streetlights on Main Street into electric streetlights to prevent fires, which is how the utility was first started.

Q: How long of a process would removing the dams be?

A: The process would involve a significant number of entities and agencies. The process would probably take between 3 and 6 years.

Q: As far as the city is concerned, how much of a problem is the algae and how much of a prerogative for the city is the issue?

A: The City is concerned with anything that results in adverse water quality impacts to the Kinnickinnic River. Arguments could be made that the algae in the lakes results in minor adverse water quality impacts on the Kinnickinnic River. However, if dam removal is to be considered, measures must be taken to offset the sediment removal function that the dams currently provide so that nutrient rich sediments are not unnecessarily introduced into the lower Kinnickinnic River.

Such measures are currently being evaluated by the City through a grant from the Wisconsin Department of Natural Resources. The scope of this work is to conduct a detailed feasibility study focused on reconfiguring Lake George to act as a storm water quality facility for runoff and also to determine if a concept can be developed that would be viable whether or not the dam remains in place long-term. The study is also considering alternative treatment options that will identify the alternative treatment system that could be implemented in this watershed without reconfiguring Lake George.