Water Quality

 Water quality is a measurement of how healthy a water system is. Water systems include ponds, lakes, river systems and oceans. In determining the water quality of a system several factors should be tested to ensure good water quality. They include temperature, pH or acidity, turbidity, dissolved oxygen, the amount of disease causing organisms, nitrate level, and the presence of organisms that tolerate good water quality. Changes in these factors may affect the water quality of a water system.

Temperature

 Temperature is an important indicator of water quality. Temperature is the amount of kinetic energy a substance has. Temperature affects the amount of dissolved oxygen in the water, the rate of photosynthesis by aquatic plants, and the sensitivity of organisms to wastes, parasites and disease. Thermal pollution, the discharge of heated water from industrial operations, can cause temperature changes that can make aquatic organisms susceptible to disease.

pH

 pH is the measurement of how acidic or basic the water is. The pH scale ranges from 0(very acidic) to 14(very basic), with 7 being neutral. The pH of water is usually between 6.5 to 8.2, though pure water is neutral meaning it has a pH of 7. Most aquatic organisms are adapted to a specific pH level and may die if the pH of the water changes slightly. pH can be caused by industrial waste, agricultural runoff, or drainage from improperly run mining operations or acid rain (acidic precipitation).

Turbidity

 Turbidity is the measure of the clarity of the water. Turbid water is caused by suspended matter such as clay, silt, organic and in organic matter, or microscopic organisms. Turbidity should not be confused with the color of water. Water can be darkly colored and not be turbid. Turbid water is the result of soil erosion, urban runoff, algal blooms, and bottom sediment disturbances caused by boat traffic and bottom feeding fish. As a result turbid water temperatures increase more quickly decreasing the dissolved oxygen levels in the water. Fish and other aquatic organisms are more likely to catch diseases and die.

Dissolved Oxygen

 Dissolved Oxygen (DO) is important to the health of aquatic ecosystems. All aquatic animals need oxygen to survive. Natural waters with a high dissolved oxygen level are most likely health and stable environments. They are capable of supporting different types of aquatic animals. Low amounts of Dissolved Oxygen will cause fish to become more likely to catch a disease or die. Dissolved Oxygen is an important measurement of water quality.

 Temperature affects the amount of dissolved oxygen in the water. Cold water can hold more dissolved oxygen than warm water. However, high amounts of algae, rotting vegetation, and bacteria can decrease the dissolved oxygen.

Disease causing organisms

 A large amount of bacteria and other disease causing organisms can affect the quality of water. The presence of these organisms is detected by conducting a *coliform count*, which measures the amount of E. coli bacteria in the water. E. coli is found in human and animal wastes. The coliform test is an indicator that the water may contain other disease causing organisms and sewage.

Nitrates and Phosphates

 Nitrates are chemical compounds that contain nitrogen. As decomposition of plant and animal material occurs, dissolved oxygen levels decrease and nitrate levels increase. In addition, bacteria break down large protein molecules into ammonia which combines with oxygen to form nitrates and nitrites. Of these, nitrate is usually the most important to consider when determining water quality. Normally only small amounts are found naturally, but an increase in nitrate levels can come from many man-made sources such as septic systems, fertilizer runoff and improperly treated wastewater. As nitrates increase, they act as a plant nutrient and cause an increase in plant growth. As the plant material dies and decomposes, dissolved oxygen levels decrease.

An increase in nitrates may be followed by an increase in phosphates. As phosphates increase and the growth of aquatic plants is encouraged, algal blooms can occur. With the increase in algae growth and decomposition, the dissolved oxygen levels will decrease.

Sources of phosphates include septic tanks, runoff from feedlots, and runoff from agriculture and waste water treatment plants. In addition, detergents with phosphates were a prime source before manufacturers developed phosphate-free alternatives.

Sources

“Water Monitoring Day Booklet”, Lamonte Company. Chestertown MD. 2004. pp. 7,9,11, 14

“Water What If’s” . http://www.ncsu.edu/sciencejunction/depot/experiments/water/ . Internet. April 15, 2008. School Network.

Water Quality Factors- Notes

Directions. Read and annotate the article “Water Quality Factors” and complete the following Cause/ Effect relationship as it relates to the article.

1. What is water quality? Water quality is a measurement of how healthy a water system is.
2. Complete the following table. For each Factor, define it, identify the cause for changes in each factor and the effect it has on the water source.

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| --- | --- | --- |
| Water quality Factor (Definition) | What causes this factor change? What may cause it to increase and/ or decrease? | What effect does it have on the environment? What effect does an increase or decrease have on the water? |
| Temperatureis the amount of kinetic energy a substance has | Thermal pollution | the amount of dissolved oxygen in the water, the rate of photosynthesis by aquatic plants, and the sensitivity of organisms to wastes, parasites and disease |
| pHthe measurement of how acidic or basic the water is | pH can be caused by industrial waste, agricultural runoff, or drainage from improperly run mining operations or acid rain (acidic precipitation).  | Most aquatic organisms are adapted to a specific pH level and may die if the pH of the water changes slightly |
| Turbiditythe measure of the clarity of the water | Turbid water is the result of soil erosion, urban runoff, algal blooms, and bottom sediment disturbances caused by boat traffic and bottom feeding fish. | turbid water temperatures increase more quickly decreasing the dissolved oxygen levels in the water. Fish and other aquatic organisms are more likely to catch diseases and die. |
| Nitrateschemical compounds that contain nitrogen | increase in nitrate levels can come from many man-made sources such as septic systems, fertilizer runoff and improperly treated wastewater. | they act as a plant nutrient and cause an increase in plant growth. As the plant material dies and decomposes, dissolved oxygen levels decrease.  |
| Dissolved OxygenAmount of oxygen in the water | high amounts of algae, rotting vegetation, and bacteria can decrease the dissolved oxygen. | Low amounts of Dissolved Oxygen will cause fish to become more likely to catch a disease or die |

1. Which factor is the most important to measure and why?