Audubon International

Fact Sheet

Understanding and Evaluating Water Quality

Although water is one of our most precious natural resources, it is often taken for granted. Water flows through our homes and buildings, our factories and agricultural fields, our landscapes, our bodies. Water is used for everything from hygiene to growing food to cooling machines.

"Water is the driving force in nature." — Leonardo da Vinci

Threats to Water Quality

Unfortunately, there are many threats to good water quality -- some obvious, and some quite difficult to detect. The fact that we don't often think about our water sources, let alone actively care for them, is certainly a contributing problem.

Concern about water pollution is often limited to what is called **point source pollution**-- that is, **direct discharges into waterways** from pipes, including municipal and industrial sewage treatment plants, power plants, and stormwater discharges. But most of these point sources are discharged legally through permits issued under the Clean Water Act and the National Pollution Discharge Elimination System. The purpose of these permits is to limit the quantities and types of pollutants permitted to be contained in wastewater.

While some permit holders violate their permits, this does not represent the major cause of water quality degradation. Indeed, according to the EPA, the major source of pollution impacting water bodies happens as a result of our normal day-to-day activities and is known as **non-point source pollution.**

Non-point source pollution generally comes from contaminated runoff from roads, construction sites, agriculture, and livestock feedlots, the inflow of polluted groundwater, and faulty home septic systems. Stormwater runoff can contain chemicals such as gasoline, pesticides, fertilizers, heavy metals, oils and animal waste. In addition, toxic pollutants in the air can also condense and enter waterways in rain and snow.

Effects of Pollution

The influx of sediments, nutrients, and toxics can cause a variety of problems. Increased sediments can be devastating for aquatic organisms because it interferes with feeding, breeding, and breathing. Suspended sediments also block sunlight, which is the basic energy source for photosynthesis -- the primary source of food in any ecosystem.

The Basics: Water flows downhill and brings stuff with it.

Nutrient pollution from both non-point and point sources such as sewage, livestock waste, and fertilizers can cause an explosive growth of algae and rooted aquatic plants. When an overabundance of aquatic plants die off and decompose, they use up oxygen, leaving little for fish and aquatic insects to respire. Pollution sensitive organisms can disappear from waters contaminated by organic wastes, leaving only pollution tolerant organisms like fly larvae and aquatic worms to survive.

Finally, substances such as oil, gasoline and diesel fuel are pervasive sources of toxic pollution in urban watersheds. Toxics can impair or kill aquatic life and make consumption of water and fish unsafe.

Inviting an outside group to help you with water quality monitoring will not only allow you to gather useful information, but also provide an opportunity for the property to be used as a living classroom.

Conducting a Visual Survey of Water Quality

Identifying and reducing non-point source pollution is an enormous task because it involves so many activities and so many people. The good news is that everyone can participate in water quality protection. A visual survey of water quality requires little or no equipment and takes a minimal amount of time. It simply involves surveying the conditions of a stream, river, lake, or wetland, looking at the water and surrounding land, and noting what you see. Despite its simplicity, it is an important aspect of environmental monitoring.

By collecting information on a regular basis, you can develop a baseline of normal conditions and record changes over time. Any unusual conditions can be detected sooner and promptly followed-up with further testing. Thus, costly and damaging pollution problems can be avoided or minimized.

The simple chart on the following page can be carried with you in the field or posted in a central location to provide essential information about water quality conditions that you see.

Sources of Non-point Source Pollution

Stormwater runoff- As water from storms washes over highways, parking lots, lawns, agricultural fields, industrial sites, logged areas, and construction sites, it picks up contaminants and carries them into water bodies.

Polluted rain, snow, or toxic fallout- Contaminants collect in the air and fall out in precipitation. Acid rain is common example of this type of pollution.

Inflowing groundwater- Pesticides, nitrates, and a variety of chemicals can leach into groundwater. Waste storage or disposal sites, sludge disposal sites and failing septic tanks are common culprits of groundwater contamination.

Land alterations- Construction debris, logging, removal of vegetation, and increased paved surfaces contribute to erosion, soil loss, and less filtration for pollutants entering waterways.

Abandoned mines- Drainage from former mines can be highly contaminated.

Marine sources- Ocean dumping, dredge spoils, boat hull paints and marine sanitation devices have a direct impact on water quality.

If the water is...	It could be...	You should...
Green or blue-green	Nutrients released into the water causing an algae bloom	Check for possible fertilizer or manure run-off, sewage discharge or septic failure. Conduct tests for nitrogen and phosphorous.
Orange-red	Acid drainage or the presence of synthetic dyes	Check for industrial waste or for landfill seepage draining into the water.
Grey/Black	Sewage or livestock waste	Check for sewage discharge or animal populations.
Light brown (muddy or cloudy)	Sediment deposition caused by erosion	Look for disturbed ground left open to rainfall (*e.g.,* construction*).*
Yellow-brown to dark brown	Acids released from decaying plants. Also common in streams draining from a marsh or swamp	If it's not fall, search upstream for some foreign item in the water
If you can smell...	**It could be...**	**You should...**
Rotten egg odor	A natural occurrence in swampy or marshy land or sewage pollution	Look for sewage or septic inputs.
Musky odor	Untreated sewage, livestock waste, algae or other conditions	Check your watershed for sewage/septic input and animal populations
Chlorine	Over-chlorination of sewage input water or swimming pool discharge	Look for sewage input or a recently drained swimming pool.
Fishy Odor	Excess algal growth or presence of dead fish	Search for dead fish or look for cause of excess algae. Conduct tests for nitrogen and phosphorous.
If you notice...	**It could be...**	**You should...**
Fish kill	Naturally occurring, (accompanies annual spawning) or toxic/nutrient inputs	Check upstream for discharges or seepage; check fish lifecycle in your area. Check dissolved oxygen levels in the water. Depressed dissolved oxygen levels are the primary cause for fish kills.
Increase or decrease in wildlife sightings	Many reasons: habitat changes, water quality changes, natural population increases during breeding season or decreases after migration	Have any changes, such as construction or development, occurred since you last monitored? Note the time of year. Can this be correlated with breeding or migration?
If the water is...	**It could be...**	**You should...**
Increase or decrease in water flow	Weather-related or possible obstruction or discharge into stream	Note weather conditions such as temperature and recent rainfall. Check upstream for blockage and/or discharge source.
If surface or bottom has...	**It could be...**	**You should...**
Yellow coating (bottom)	Sulfur or natural color	Check for industrial waste.
Multi-color reflection (surface)	Oil or a natural algae	Check for a petroleum smell. If so, look for road runoff or canisters of oil.
White cottony masses	"Sewage fungus"	Check for sewage or septic inputs.
White or cream-colored foam	A natural occurrence (cream-colored) or detergent or industrial waste	If higher than 3 inches and white, check for industrial or residential discharge.