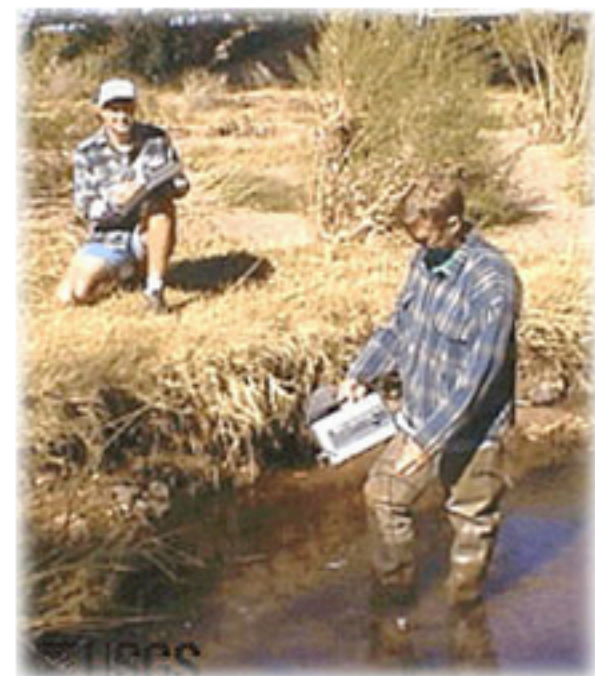


Water properties: Dissolved oxygen

The U.S. Geological Survey (USGS) has been measuring water for decades. Millions of measurements and analyses have been made. Some measurements, such as [temperature](#), [pH](#), and [specific conductance](#) are taken almost every time water is sampled and investigated, no matter where in the U.S. the water is being studied. Another common measurement often taken is dissolved oxygen (DO), which is a measure of how much oxygen is dissolved in the water - DO can tell us a lot about water quality.

Dissolved oxygen



You can't tell by looking at water that there is oxygen in it (unless you remember that chemical makeup of a water molecule is hydrogen and oxygen). But, if you look at a closed bottle of a soft drink, you don't see the carbon dioxide dissolved in that - until you shake it up and open the top. The oxygen dissolved in lakes, rivers, and oceans is crucial for the organisms and creatures living in it. As the amount of dissolved oxygen drops below normal levels in water bodies, the water quality is harmed and creatures begin to die off. Indeed, a water body can "die", a process called [eutrophication](#).

Although water molecules contain an oxygen atom, this oxygen is not what is needed by aquatic organisms living in natural waters. A small amount of oxygen, up to about ten molecules of oxygen per million of water, is actually dissolved in water. Oxygen enters a stream mainly from the atmosphere and, in areas where ground-water discharge into streams is a large portion of streamflow, from groundwater discharge. This dissolved oxygen is breathed by fish and zooplankton and is needed by them to survive.

Dissolved oxygen and water quality

Rapidly moving water, such as in a mountain stream or large river, tends to contain a lot of dissolved oxygen, whereas stagnant water contains less. Bacteria in water can consume oxygen as organic matter decays. Thus, excess organic material in lakes and rivers can cause eutrophic conditions, which is an oxygen-deficient situation that can cause a water body "to die." Aquatic life can have a hard time in stagnant water that has a lot of rotting, organic material in it, especially in summer (the concentration of dissolved oxygen is inversely related to water temperature), when dissolved-oxygen levels are at a seasonal low. Water near the surface of the lake- the epilimnion- is too warm for them, while water near the bottom-the hypolimnion- has too little oxygen. Conditions may become especially serious during a period of hot, calm weather, resulting in the loss of many fish. You may have heard about summertime fish kills in local lakes that likely result from this problem. ((Source: [A Citizen's Guide to Understanding and Monitoring Lakes and Streams](#))



Eutrophic conditions, Hartbees River, South Africa
Credit: National Eutrophication Monitoring Programme