and kinds of algae and other microorganisms present in the water. Finally, bacterial samples are obtained and analyzed during each water quality survey.

Two types of samples are collected for chemical analysis. A grab sample is an instantaneous sample collected to indicate water quality conditions at a particular time. Composite samples are collected over a period of time at specific intervals. This method gives a better indication of the overall water quality situation during the sampling period.

Oxygen Relationships

The dissolved oxygen (D.O.) in water refers to the uncombined oxygen held in solution and thereby made available to aquatic organisms for respiration. Sources of dissolved oxygen include atmospheric aeration and the direct addition of oxygen as the by-product of chemical reduction reactions and algal photosynthesis. Whereas respiratory processes of aquatic organisms consume oxygen throughout the day and night, photosynthetic release of oxygen is restricted to the daylight hours. As a result, productive waters exhibit a characteristic diurnal variation in dissolved oxygen concentration. The solubility of oxygen in water is primarily a function of water temperature and the atmospheric partial pressure of oxygen. Saturation levels at standard pressure (760 mm Hg) range from 14.6 mg/l O_2 at 0°C to 6.6 mg/l O_2 at 40°C.

Organic matter is introduced to a river or stream either as the result of natural phenomena, such as the deposition of leaves and plant materials in autumn, or by the discharge of pollutants resulting from human related activities. Regardless of its origin, organic matter is gradually decomposed by bacteria which utilize the available dissolved oxygen in the water. Therefore, the ability of a stream segment to assimilate these organic materials, that is, its waste assimilative capacity, is dependent upon the amount of dissolved oxygen present in the water. In many instances, the assimilation of large amounts of organic wastes severely depletes the oxygen concentration in the water body rendering it unsuitable for the existence of aquatic organisms such as invertebrates and fish.

The biochemical oxygen demand (BOD) is a measure of the amount of oxygen required by bacteria to decompose a given amount of organic matter. This decomposition process occurs in two distinct steps each governed by a specific kind of bacteria. During the first step, or carbonaceous stage, carbon compounds are stabilized with a concurrent release of carbon dioxide. The second stage, nitrification, begins approximately seven days later and is the process by which nitrogenous substances are broken down to ammonia and ultimately to nitrate. The total combined oxygen demands of both stages is the ultimate BOD which may be exerted over a period of thirty days or more. Through recurrent use, the five day BOD (BOD_5) has been accepted as the standard test used in water quality analysis. While the BOD_5 of untreated sewage normally ranges from 150 to 300 mg/1, the BOD_5 of an unpolluted water rarely exceeds 2 mg/1.