**Microorganisms in water**

Water microbiology is concerned with the [microorganisms](http://science.jrank.org/pages/4305/Microorganisms.html) that live in [water](http://science.jrank.org/pages/7301/Water.html), or can be transported from one [habitat](http://science.jrank.org/pages/3184/Habitat.html) to another by water.

The important characterizes of soil microorganisms are:

1. Water can support the growth of many types of microorganisms. For example, the chemical activities of certain strains of yeasts provide us with bread. As well, the growth of some [bacteria](http://science.jrank.org/pages/714/Bacteria.html) in contaminated water can help digest and degrade the poisons from the water.
2. The presence of other [disease](http://science.jrank.org/pages/2114/Disease.html) causing microbes in water is unhealthy and even life threatening and can be fatal. For example, bacteria that live in the intestinal tracts of humans and other warm blooded animals, such as [*Escherichia coli*](http://science.jrank.org/pages/2571/Escherichia-coli.html), *Salmonella*, *Shigella*, and *Vibrio*, can contaminate water if feces enters the water.
3. Another group of microbes of concern in water microbiology are **protozoa**. The two protozoa of the most concern are *Giardia* and *Cryptosporidium*. They live normally in the intestinal tract of animals such as beaver and deer.

*Giardia* and *Cryptosporidium* form dormant and hardy forms called cysts during their life cycles. The cyst forms are resistant to [chlorine](http://science.jrank.org/pages/1440/Chlorine.html), which is the most common form of drinking water disinfection, and can pass through the filters used in many [water](http://science.jrank.org/pages/7313/Water-Treatment.html) plants. If ingested in drinking water they can cause acute diarrhea in humans, and can be life threatening to those people with impaired immune systems.

1. Another microorganism found in **saltwater** are a type of algae known as **dinoflagellates**. The rapid growth and multiplication of dinoflagellates can turn the water red. This type of algae depletes the water of nutrients and oxygen, which can cause many [**fish**](http://science.jrank.org/pages/2724/Fish.html) to die. As well, humans can become ill by eating contaminated fish.
2. Many microorganisms are found naturally in **fresh and saltwater.** These include bacteria, cyanobacteria, protozoa, algae, and tiny animals such as rotifers. These can be important in the food chain that forms the basis of life in the water. For example, the microbes called cyanobacteria can convert the [energy](http://science.jrank.org/pages/2491/Energy.html) of the [sun](http://science.jrank.org/pages/6606/Sun.html) into the energy it needs to live. The plentiful numbers of these organisms in turn are used as food for other life. The algae that thrive in water is also an important food source for other forms of life.

**Microorganisms in air**

Of all environments, air is the simplest one. The relative quantities of various gases in air, by volume percentage are nitrogen 78%, oxygen 21 %, argon 0.9%, carbon dioxide 0.03%, hydrogen 0.01 % and other gases in trace amounts. In addition to various gases, dust and condensed vapor may also be found in air.

Various layers can be recognized in the atmosphere up to a height of about 1000km. The layer nearest to the earth is called as troposphere. In temperate regions, troposphere extends up to about 11 km whereas in tropics up to about 16km. This troposphere is characterized by a heavy load of microorganisms. The atmosphere as a habitat is characterized by high light intensities, extreme temperature variations, low amount of organic matter and a scarcity of available water making it an unsuitable environment for microorganisms and generally unsuitable habitat for their growth. Nevertheless, large numbers of microbes are found in the lower regions of the atmosphere.

**Sources of Microorganisms in Air** - In addition to gases, dust particles and water vapor, air also contains microorganisms. There are vegetative cells and spores of bacteria, fungi and algae, viruses and protozoan cysts. Air is mainly it transport or dispersal medium for microorganisms. They occur in relatively small numbers in air when compared with soil or water. Although a number of microorganisms are present in air, it doesn't have an indigenous flora because air is not a natural environment for microorganisms as it doesn't contain enough moisture and nutrients to support their growth and reproduction.

The most common sources of air microorganisms are:

1. **Soil:** Soil microorganisms when disturbed by the wind blow, liberated into the air and remain suspended there for a long period of time. Man-made actions like digging or plaguing the soil may also release soil borne microbes into the air.
2. **Water:** Similarly microorganisms found in water may also be released into the air in the form of water droplets or aerosols. Splashing of water by wind action or tidal action may also produce droplets or aerosols.
3. Air currents may bring the microorganisms from plant or animal surfaces into air. These organisms may be either commensals or plant or animal pathogens. Studies show that plant pathogenic microorganisms are spread over very long distances through air. For example, spores of *Puccinia graminis* travel over a thousand kilometers. However, the transmission of animal diseases is not usually important in outside air.
4. The main source of airborne microorganisms is human beings. Their surface flora may be disseminated into the air. Similarly, the commensals as well as pathogenic flora of the upper respiratory tract and the mouth are constantly discharged into the air by activities like coughing, sneezing, talking and laughing.