

WATER PURIFICATION IN THE BACKCOUNTRY

The necessity of water treatment

It is sometimes difficult for people to realize that the cool, clear water they see in a mountain stream isn't safe to drink. These days experienced outdoor lovers and travelers know that drinking untreated water can cause serious illness. It's no longer a question of *should you treat the water*, but rather, *how do you treat the water?*

There are a number of micro-organisms that can cause illness in backcountry travelers. One of the most well known is *Giardia Lamblia* or giardia. But giardia, although notorious, is not the only thing that could be living in your backcountry water. In fact, there are three categories of creatures that can make you sick if you ingest them: protozoan (parasites), bacteria, and viruses.

The two most common protozoans are giardia and cryptosporidium. The symptoms of giardiasis and cryptosporidiosis are almost identical. These diseases are characterized by diarrhea that usually lasts one week or more and may be accompanied by one or more of the following: abdominal cramps, bloating, flatulence, fatigue, and weight loss. In addition, people with cryptosporidiosis also have a low-grade fever. If you have these symptoms within one or two weeks after drinking untreated water, you should inform your doctor. Giardiasis can be treated with prescription drugs that relieve symptoms in one to three days. There is no cure for cryptosporidiosis; this disease usually runs its course in seven to ten days. For healthy adults, giardiasis and cryptosporidiosis are not life-threatening illnesses. However people who were immuno-compromised have died from both of these diseases.

There are many different kinds of bacteria. Those that live in the water and cause intestinal diseases include: *E. coli*, *shigella*, *campylobacter*, *vibrio cholerae*, and *salmonella*. Size-wise, viruses are the tiniest of health hazards. Viruses include: hepatitis A and B, Norwalk virus, rotavirus, echovirus, and poliovirus.

Methods of water treatment

The safest water to drink is water from tested public systems. Always begin a trip with as much water from home that you can reasonable carry. When it becomes necessary to purify water on a trip, choose your water from the best possible source. If at all possible use moving water such as: springs, streams, or rivers.

If the water your need to purify is muddy, allow it to stand awhile in a cook pot until the silt has settled to the bottom. Then dip the clear water off the top before you treat it.

There are three methods of treating water to make it safe to drink: boiling, filtration, or chemical treatment.

Boiling ~ The surest method of making water safe is to bring it to a full boil for at least one minute (at high elevations, add 3-4 more minutes). No waterborne microorganism can survive a rolling boil. Drawbacks to boiling include: a flat taste, no removal of debris from the water, and a long waiting time until it is cool enough to drink. Boiling also requires fuel. For long trips, extra fuel supplies may not be feasible.

Filtration ~ Filter systems have come a long way in the past few years. In fact, filters have become the system of choice for many backpackers because of their ease of use, low weight, and effectiveness in removing both micro-organisms and other particles. Filters have "pores" which allow particles of certain sizes to pass through. A good filter will physically screen out all organisms over 0.2 microns (eliminating protozoan & bacteria). No filters have pore sizes small enough to filter out viruses, but some filters, known as water purifiers, come with chemically coated elements that kill viruses and bacteria. Filter elements have to be cleaned periodically and eventually replaced. Cleaning filters can be a nuisance and the initial cost of the filter as well as the replacement cartridges are the main drawbacks to using filters.

Chemical treatments ~ Iodine and chlorine are the two most commonly used chemicals for water purification. Iodine treatment in tablet, crystalline, or concentrated liquid form is light, simple to use, and is *effective against bacteria and viruses. Depending on water temperature, iodine treatments often require lengthy contact times before you can safely drink. Iodine imparts a slight odor and taste to the water. Use of ascorbic acid "neutralizing" tablets (after the required time for sterilization) noticeably helps the taste of the water. Some people should avoid iodine entirely for health reasons, particularly people with thyroid conditions and pregnant or nursing women. Chlorination is another chemical method of purifying water, but is considered unstable and impractical for backcountry use. *Both iodine and chlorine are ineffective against cryptosporidium.