

MODERN SURVIVAL
Field-book Series

Book 4
Water Purification

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About this booklet

The Modern Survival field-book series has been designed to accompany the on-site course available through the Campcraft Outdoors Field School (campcraftoutdoors.com) and the online Modern Survival course through the Old World Alliance (oldworldalliance.com).

Alone, we believe this booklet series will transmit a great deal of insight regarding modern survival skills and how they will make your outdoor adventures safer, more meaningful and instill and greater confidence in your ability to endure when the worst conditions are against you.

Water in the Bible

Water is used throughout the scriptures as a symbol for the Holy Spirit. For example in John 4:13-14 Jesus is speaking to the woman at the well.

Jesus answered and said unto her, *Whosoever drinketh of this water shall thirst again: But whosoever drinketh of the water that I shall give him shall never thirst; but the water that I shall give him shall be in him a well of water springing up into everlasting life.*

Water is also used a symbol for the Word of God in the scriptures for obedience to the word of God brings cleansing. *“How can a man cleanse his way? By taking heed according to your word.”* Psalm 119:9

Obedience to the word brings cleansing to our soul while the Holy Spirit brings refreshing to our spirit as we are obedient. In Romans 6 we learn that by being immersed or baptized in water upon our confession of Christ as Savior breaks the power of sin in our lives.

Collecting spiritual water is likened to remaining obedient to the will and teachings of God as

found in the Bible and as with water collection in the natural, contaminants can creep in our water supply if we stray from his clearly laid path. In James 4:17 we're told that those that know the truth, but don't do it, are in sin. Knowing the way to Christ, but doing your own thing instead is a contaminant in your water supply which if left unchecked will lead to sickness and eventually death...

We can take lessons from the natural process of collecting water and apply these principles to our spiritual lives for understanding how to effectively gather, clean and purify drinking water is a skill that everyone must understand. The days of simply drinking from the local creek are pretty much gone due to all the chemicals and waste being pumped or dumped into our ground water systems today just as taking the word of every "man of God" can lead us into error.

In the end-times the Bible tells us that all the waters will become bitter and as blood (Rev. 16:3-7), praise God for the provision that comes from He who is the living water!

Dangers in Drinking Water

Cholera – Cholera is the friendliest bacteria found in water as it typically only leads to diarrhea. It is treated by continually replacing the lost fluids by drinking clean water.

Continuing to drink cholera infected water however can lead to increased infection which will include leg cramps, vomiting, dehydration and shock which would require fluids to be replaced intravenously. Without proper treatment at an advanced stage, death can occur.

Hepatitis A – Hep A is obviously not friendly as it's a disease of the liver caused by viral infection. Symptoms include loss of appetite, nausea, vomiting, fever, dark urine, tiredness, and abdominal pains and jaundice (yellowing of the skin and eyes). While the disease is not life-threatening it can take months to overcome its effects with medication. Typically once overcome your body will create antibodies that will aid in the prevention of a recurrence of the disease.

Giardiasis – Giardia is a single celled parasite that lives in the intestines that is ingested by drinking water contaminated by sewage. This

organism can survive outside the body for a long time and is one of the most common waterborne diseases. Symptoms include greasy stools that tend to float, diarrhea, cramps and nausea. Advanced symptoms can lead to weight loss and dehydration while others have no symptoms at all. The problem is typically alleviated by flushing the parasite from the body over a period of several weeks with clean fluids and medication if required.

Chemical Pollutants – The big issue with chemical pollution is that it won't boil out of your water. Most of the chemicals are heat resistant and must be filtered out through charcoal or another type of filter system. If you find water in the middle of a tobacco, soybean or corn field, you can bet that the water has been contaminated by some sort of chemical. Check for flora around the area and look at their condition, do they look healthy? Are they thriving in the area? Is there fish or frogs in the water? Frogs in the water are a good sign of a proper ecosystem but this again is no guarantee of a chemical free environment. When in doubt, filter and boil it out.

Natural Sources of Water

Seasonal creeks and run offs – These areas are typically only active during and shortly after a rain and should be treated like chemically polluted water as anything sitting atop the ground surface will be flushed into the stream thereby polluting the available water. These water sources should be filtered and boiled or chemically treated.

Rainwater – Your best source of clean water comes from heaven above, collecting it is simply a matter of taking advantage of the weather and utilizing whatever containers you have available. If you are in a heavily industrialized area however you can get some chemical taste and possible infection. You can also collect rain water in the way of dew by tying cloth around your ankles and trekking through some tall grass. The cloth will quickly become filled with water which can be wrung out into a bowl or container to be filtered of turbidity (solids in water).

Rivers and Streams – Like Creeks and run offs rivers and streams should be filtered whenever possible and boiled. Millions of people still rely

on water from rivers and streams around the world for the daily water; drinking straight from the source however is not advised because bacteria and viruses can more easily reproduce in slow moving water and when the water is up these sources fill with run-off from the surrounding areas and serve as nature's toilet system flushing waste out of the area.

Plant Water - Here in the Eastern Woodlands and also in many jungles water can be harvested from vines by cutting a section approx. 3 feet long at an angle on both ends; water will drip from of the cut surface of the vine and provide some needed hydration. If the water you find in cloudy or bitter coming from a vine, it should be avoided as it's the wrong species. You can also tap trees such as the maple or birch which provides sap which can be drank as it is or boiled down to a sweet liquid much like syrup. In the desert Aloe and Agave plants survive extended period of drought and store liquids in their leaves which can be harvested for liquid.

Coconuts also provide a wonderful source of fluids which aids in the replacement of electrolytes. Lastly, you can plastic tie bags over leafy boughs on live trees and allow the sun to

heat and condense the air in the bag which will create water after several hours.

The 5 Hydration Factors

Maintaining proper body hydration is always important in day to day life and more so in the wilderness. Cold weather especially tricks the mind into thinking it is hydrated due to the damp and cold conditions present. Drinking at regular intervals throughout the day is the best way to remain hydrated. Examine your urine each time it's evacuated as it will aid you in determining your hydration levels.

5 Urine Colors

1. Clear: Well hydrated
2. Faint Yellow: Good hydration
3. Straw Yellow: Hydrated
4. Yellow: Dehydrated
5. Dark Yellow/Brown: Extremely Dehydrated* Dark Yellow/ Nearly Brown urine is typical for most morning evacuations and a sign for you to rehydrate your body each day.

The 5 Factors Affecting Hydration

1. Heat – In extreme heat we sweat and lose water more quickly.
2. Cold- In cold/wet weather, our mind focuses on maintaining core temperature more so than hydration, so drink more often.
3. Tea/ Coffee- Are diuretics that trigger a urinary response regardless of how well or poorly hydrated we are. Thus, more frequent hydration will be required.
4. Soda – Provides carbs by way of sugar and not hydration. There is a lot of salt and sugar in soda and they should not be considered at all for maintaining hydration.
5. Medications- may affect your body by making you urinate more or less frequently and even in odd colors. Talk to your doctor to discuss potential issues.

The best source of hydrating your body is always WATER coupled with minerals, salts and sugars. You could eat regular snacks such as trail mix with water intake or elect to include

electrolyte aids.

The 5 Water Purification Methods

Boiling (Water from an unknown source)

Boiling remains the best method of killing off the pathogens within water. In the process of heating water above 131°F pasteurization takes place destroying cysts and by 149°F, the majority of pathogens are destroyed. Water boils at 212°F at sea level and drops by 1°F for every 500ft above sea level. So, at an elevation of 5000ft. water will begin to boil at about 203°F. So, by bringing water to a rolling boil, you can rest assured that all pathogens within the water will be destroyed. Boiling is a visual indicator that a sufficient temperature has been reached for the destruction of water-borne pathogens.

I liken boiling water to receiving an impartation of the Fire of God; this is a radical call to holiness. It's a simple and the most direct way to eliminate toxins in your life, seek out the holiness of God by the power of the Holy Spirit. Johnathan Wesley said it best "The spirit of God has set me ablaze and the people come to watch me burn". Let that be the example we leave to those around us- let us boil over with the Spirit

of God!

Filtering (Water from a known source)

Filtering by means of a modern filter such as a Sawyer, LifeStraw or Berkey are excellent for removing turbidity and chemical agents from your water source but have only marginal success at removing bacteria and pathogens. This is why filtering is best when you know where the water comes from and/or you suspect no or minimal bacterial contamination.

While mile farm run off or suburban chemicals won't adversely affect you in a short term survival situation (days), over weeks of ingestion adverse reactions would be expected. When you know you have some chemically affected water you can also make a primitive filter from charcoal, grasses and sand. Filtering through these sediments within a container removes many of the chemicals that could adversely affect your body over time. If you rely on a modern, commercial filter take time to read the instructions so you will know how to properly use it and under what conditions it will work most effectively.

Spiritually speaking, we must filter out what we

hear from others. Not everyone that speaks with claimed authority, such as a well known pastor or teacher will give us accurate information. We must understand, all men are fallible and despite the best of intentions, they can and often do lead us astray. But by filtering their message through the Word of God, we can get to the truth of a matter and decide whether or not to receive the water which they have offered us.

Distillation (Salt Water)

If all you can find is salt water, you will have to desalinate it (remove the salt). The salt in saltwater overworks the renal glands quickly which leads to kidney failure, shock and a host of other issues. Distill the water hanging a can full of water over a fire and placing a clean cloth over the lid to collect all the steam. From time to time wring out the steam into a potable water container to drink once it cools. The salt that remains behind in the can should be utilized to season game meats as you harvest them.

Alternatively, should you have access to some plumbing pipe or tubing, a still can be created from any metal container. Bring water to a boil and allow the steam to collect in the pipe and cool as it drops over into another container.

Desalination is the spiritual sense is the times when you feel like you are stuck in a rut, waiting on God to move. The process adds pressure until you come to a decision, you'll continue to stew or you'll shed the impurities holding you back and burst forth by the power of the Spirit. These ruts can go on for as long as you allow them to, God is always waiting on us, it's never the other way around; all we have to do is shed the dead weight (sin, disobedience, unforgiveness) that will allow us to get back on the narrow path to eternity with Him.

Solar Pasteurization

Is the process of bringing water to a temperature of at least 145°F. By maintaining that temperature for 30 minutes (Low Temp, Long Time), pathogens are destroyed. By using keep water in a bottle and allowing the rays of the sun to refract through it, heating occurs. This heat and UV radiation, if maintained over a long period of time is enough to often neutralize pathogens present within water. Place water in full sun, when possible use heath reflectors such as foil, aluminum or black surfaces to aid in heating the water. Allow to collect the sun as long as possible, small bubbles around the top of the water are a good sign as this denotes water

has been heated to a pasteurizing temperature.

Spiritually speaking, the longer we remain in the light, the less darkness we'll perceive in our lives. Jesus said in John 12:46 *I have come as a light to shine in this dark world, so that all who put their trust in me will no longer remain in the dark.* We should seek to spiritually pasteurize ourselves through regular fellowship with like-minded people in the light of Christ.

Chemicals (Bleach, Iodine)

If you use bleach or purification tablets of any type, read the instructions. They often make the water taste like bleach or iodine, but it's very safe to drink. When using these agents shake the water well to make sure the chemical tablet reaches all the water in your container and if you have an enclosed container, be sure to flip it over so that cap is hit by the chemically cleaned water to kill off any hidden bacteria lurking in the cap.

Liquid Clorox Bleach

One gallon of Clorox Bleach can purify about 3,800 gallons of drinking water. When the infrastructure collapses and the water stops flowing, bleach is going to be a valuable bartering item and a true lifesaver. As history

has shown, the biggest demand in a long term disaster is for drinkable water. During most big natural disasters you'll find relief crews hand out free Clorox Bleach packets with simple instructions. Although bleach will kill the bacteria in water it will not filter out the particles. To use bleach follow these steps and be sure to store these directions with your emergency bottle of bleach:

1. Filter water to remove large particles
2. Pour the clear water into a clean, uncontaminated container
3. Add Regular bleach containing 4% to 6% sodium hypochlorite (8 drops per gallon of water)
4. Mix and shake well
5. Wait 30 min
6. Water should have a slight bleach odor and if it doesn't, repeat dose

Keep an eyedropper handy in your survival kit or attached by a string to your bottle of Clorox Bleach. Never pour purified water into a contaminated container. Sanitize water jugs, containers and dishes with a little Clorox Bleach. Keep in mind that you should only use regular Clorox Bleach and not Fresh Scent or

Lemon Fresh, bleach is bad enough as it is so try not to make it worse. Bleach will eventually lose its strength and the expiration date should be followed so try to replace your bleach bottle about every three months.

To clean dishes, utensils and containers follow these steps:

- 1.Mix 1 tablespoon of bleach with about one gallon of water.
- 2.Wash and rinse items.
- 3.Let each item soak in the bleach/water solution for about 2 minutes.
- 4.Drain and air dry.

Iodine

You can either get iodine in a liquid form or a solid tablet form and both can be used to purify water. To use liquid iodine:

- 1.Add 2-3 drops of iodine to each liter of clear water (8-10 for cloudy water).
- 2.Mix and shake well.
- 3.Let the water stand for 30 minutes.

Iodine in tablet form is usually easier to find and can be found at most drug stores and sporting goods stores. The names will vary but they're

most commonly known as Halazone tablets. Each manufacture will make them differently so follow the directions on the package. Generally the recommended dose is one tablet per liter of water and two tablets if the water is cloudy.

A purification tablet in the spiritual sense is a Rhema word from God. It's the written word made active and in the now; information that brings immediate clarity to a situation you may be struggling with. These "tablets" may come from the Spirit speaking to your mind or from a brother or sister in Christ that feels "led" to share something with you.

Urban Water Sources

Procuring water in an urban environment, especially in modern cities with a lot of foot traffic will require a *sillcock key*. A sillcock is an outdoor water spigot, hose bibb, faucet or valve that is attached to the exterior of a residential, commercial or industrial building. Residential sillcocks most commonly have a handle or lever to control the flow of water. But commercial and industrial sillcock valves typically require a key to operate them, primarily as a deterrent of vandalism.



Not having a handle readily available prevents would-be vandals from turning the water on and leaving it running, possibly flooding the area. Sure, you might be able to open some sillcock valves with pliers or a multi-tool, but most are engineered to protect against them. Water gained will be the same that comes from the tap.

Water heaters are another great resource to consider when procuring water in an urban survival scenario. Should the grid be down, many water heaters will be full of water. After time, that water can sour and begin to smell, but with filtering it is still safe to drink.

Water pipes for the most part will also still be full of water, although not pressurized. If you can gain access to a multilevel home or at least get to the lowest level of a home, you can drain the water in the pipes by using gravity to your advantage. Cut the line and catch the water that drains out in a container. Open a faucet at a higher level to release any residual pressure that may have built up.

Canned Goods all have water in them that can be drained. Fruits, vegetables and canned meats are all options. If tuna flavored water isn't your

thing, filter it through charcoal to remove some of that flavor. You can get meat and pathogen free water.

Pools, Fountains and Decorative Ponds can contain a variety of chemicals, including algaecide and chlorine. Even a properly maintained pool can contain other contaminants such as algae, fecal bacteria and insects. To be safe, filter and if possible boil water from these resources to eliminate chemicals and pathogens from the water.

Boiling at Altitude Table

Based on standard sea-level atmospheric pressure (courtesy, NOAA):

Altitude, ft (m)	Boiling point of water, °F (°C)
0 (0 m)	212°F (100°C)
500 (150 m)	211.1°F (99.5°C)
1,000 (305 m)	210.2°F (99°C)
2,000 (610 m)	208.4°F (98°C)
5,000 (1524 m)	203°F (95°C)
6,000 (1829 m)	201.1°F (94°C)
8,000 (2438 m)	197.4°F (91.9°C)
10,000 (3048 m)	193.6°F (89.8°C)
12,000 (3658 m)	189.8°F (87.6°C)
14,000 (4267 m)	185.9°F (85.5°C)
15,000 (4572 m)	184.1°F (84.5°C)

How to make Boiled Water Taste Better

Many things can be dissolved in water, including air. When the water is boiled, the dissolved air leaves the water and the result is a flat taste.

After boiling water, aerate the water by pouring it back and forth a few times between two containers. This adds air to the water and it will taste better. You could also shake it violently in a closed container, open the cap to introduce more air, then shake again.

Should the taste be off, introducing some charcoal chunks to the water or filtering the water through powdered charcoal will greatly improve the taste.



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