

Water

*“You never miss the water
till the well runs dry.”*

Roland Howard

Water, water everywhere and not a drop to drink

Water is your second survival priority. Water makes up 75% of the human body and needs to be constantly replenished. Once you have fulfilled your needs for shelter, all your efforts should be concentrated on finding, gathering and treating water.

In a survival situation, an emergency or natural disaster, you must consider all water contaminated. In fact, as we discovered while conducting research for this book, our municipal water treatment plants are having serious problems of their own.

You don't want to drink that

Water almost always contains the bacteria, *Giardia* and *Cryptosporidium*. Because humans are remarkably adaptive creatures, in small quantities, these do us no harm, unless you have a compromised immune system. However, if the water entering your municipal treatment plant has been heavily contaminated by human or animal waste, additional numbers of these "critters" slip in unnoticed.

Standard sand filtration and chlorine disinfectant will not systematically remove these contaminants. *Giardia* is becoming more resistant to chlorine disinfectant and *Cryptosporidium* is already entirely resistant to disinfectant. In fact neither of these bacteria can even be isolated in the water. The only way a public supplier knows there is a problem with the drinking water is after the fact!

Amazingly, the authorities only know about an outbreak of these bacteria after people have already contracted *Giardiasis* and *Cryptosporidiosis*. The symptoms include diarrhea, stomach cramps and low grade fever. It is only when infected people seek treatment at a health facility that the infections can be identified by performing tests on fecal samples.

Procedures for identifying the public in the event of an outbreak state that if the lab tests reveal that the infected people drank from a municipal plant that facility is notified and the plant must issue a boil water directive. But by then it can be too late.

When outbreaks occurred recently in Sydney, Australia over 3 million residents were affected. In 1993, an outbreak in Milwaukee, Wisconsin left over one hundred residents dead.

Believe it • A drinking water emergency situation already exists.

Be on the safe side

You must consider all water provided by your municipal water plants to be suspect. In fact, in 1995, the Center for Disease Control and EPA issued a directive that announced that anyone with a severely compromised immune system should consider boiling all their drinking water. The directive, which includes AIDS patients, the elderly and many cancer patients, and could affect 10% of the U.S. population or about 26 million people, was sent to all Public Environmental Health offices.

In San Diego, that directive was forwarded to the individual water treatment plants for their information *but there was no mandate that it be distributed to their customers*. To date, this information has not been made readily available.

Although self-help groups, including the AIDS community are well advised and aware, hospital cancer centers are still unaware of the EPA's directive. And, if they weren't notified in 1995, it seems highly likely that they will be advised now.

If you thought your government, at the federal and local levels cared about your health, maybe you will reconsider the trust you place in them.

Bottled water is suspect too!

The quality of all water you drink today, including bottled water, needs to be carefully evaluated. The FDA (Federal Drug Administration), not the EPA (Environmental Protection Agency), regulates bottled water. The standards are not equal across the board and in some cases are non-existent. Do your homework before you drink.

There is no need to wait for a terrorist attack or other emergency situation. Where water is concerned we are already living in a survival situation.

Storing water in case of an emergency

Being prepared for an emergency situation means always having some stored clean water on hand. One gallon per day per person is a minimum. Clean new water storage containers for camping, ranging in size from one to six gallons are

Survival tip



You need one gallon of water per day per person.



convenient and easy to move. These can be found in the camping/outdoor section of most stores.

To store larger quantities of water, the 55 gallon plastic barrels originally used to transport soft drink syrup are excellent. Be careful though, barrels of this kind are also used for storing hazardous chemicals. Make sure you know what was originally stored in these containers before you clean them and store your water.

For convenience and ease of movement, we recommend using recycled Gatorade bottles. They are number one food grade and what you don't use for water are also great for storage of food. You can also use your empty soda bottles, though not as strong, they are quite serviceable. (Don't use milk jugs as they are too flimsy and break.)

Clean thoroughly

Using anti-microbial soap, clean the containers and then air-dry them. Fill with clean water and store the bottles out of direct sunlight. Store your clean water with no additives and then treat it before you use it. (Refer to *water treatment* section.)

Storing enough water for a few days is simple. However, to store enough water for a family of four for one year you would need 5,110 gallons. Remember that water takes up considerable space and is extremely heavy.

Where do I find drinkable water?

Rainwater

Rainwater is perfectly drinkable water as it falls from the sky. Gather it in clean containers *before* it touches any other surface. After it touches the ground or dirty surface, it must be considered contaminated and you will need to go through the treatment process.

The morning dew

The morning dew is the simplest method to get perfectly drinkable water but you have to be cautious where you gather it. The safest method is to gather dew from your lawn using a rag, a sponge or some other absorbent material and wring it into a clean container. Tie rags to your ankles and swish them in the grass. On a heavily dew-filled morning you can collect about ten gallons of water an hour. This water is perfectly safe, and is drinkable the way it is, However, if there is any question of contamination from any source, e.g. animal excreta, or chemical residues from petrol or pesticides then you should go through the treatment process.

A plastic bag

Place a plastic bag (with no holes) around the branch of a non-poisonous plant and tie it securely to the branch with wire or string. The plant produces water vapour which it releases into the atmosphere. This moisture will condense on the inside of the bag. After a while a sufficient amount of water will gather in the corner of the bag. Remove the bag or cut a small hole in the lowest corner and sip the condensed water.

Beavertail cactus

The beavertail cactus is considered to be edible water. This low, spreading cactus with short bristles grows 6 to 12 inches high and up to 6 feet wide. The gray-green, jointed stems are wide and flat resembling the tail of a beaver.

Oval in shape, the stems are 1 to 6 inches wide and 2 to 13 inches long. The stems grow in clumps with flowers from the top edge of the joints. Flowers are followed by a brownish-gray, oval fruit more than an inch long with many seeds.

Remember, if it looks parched and withered it probably is. Choose a robust plant. Singe off the spines in an open flame.

Slice off the outer skin of the plant and eat the pulp.

Fruit and vegetables

These are full of water. When you eat these you are rehydrating your body as well as nourishing it.

Where else can I find water?

Water does one thing constantly—it flows downhill! All you need to do is find out where it collects.

Clues from the landscape

Trees, such as sycamore, cottonwood and willow are usually good indicators of water as they need a great deal themselves and have extensive root structures to suck water from the ground. If you see reeds you can be pretty sure water will be under them as they thrive in swampy ground.

All animal trails lead to water. Follow them downhill by looking for animals' footprints, spoor, broken grasses or twigs. Watch where insects and birds are flying, they need water too. Follow the sounds of frogs that live in creek beds and small ponds. Look around for natural depressions and ravines that could have been created by a once great river that is now just a trickle.

In a creek bed, even if no running water is visible, damp sand or mud indicates that there is water present. Dig down and wait for the water to fill the hole. Water can often be found below the surface under large boulders even though the ground may appear dry.

Caution

In the outside environment you are better off dealing with running moving water than you are with anything that is

stagnant, that has pooled, or just doesn't look healthy. Be cautious of water from a lake. By the time the water has collected in the lake, it may have collected a host of pollutants and contaminants along the way. It is a much better idea to find the feeder stream entering the lake. A running stream is a great source of water but it must still be considered contaminated. It is important before you gather any water, to look around and determine if the plants and animals nearby are healthy.

Snow, ice, and heavily polluted areas

Though freshly fallen snow may be drinkable without treatment you should always warm and melt it before letting it enter your system. Be aware that bacteria are very commonly found in old snow and ice so always treat it before drinking. Do not collect water from caves, mines, agricultural areas, railroads, roadsides, timber farms and any other areas that may be heavily polluted with herbicides, insecticides and other chemicals.

Survival tip



Before you gather any water look around and check if the plants and animals nearby are healthy.



What about ocean water?

Drinking ocean water without treatment will dehydrate you and ultimately kill you. However, salt water can be used. If you live in an area where ocean floods are common, and can seriously threaten your water supply, keeping a desalination kit as a part of your emergency survival kit may be a sensible precaution. For the person caught unawares in an ocean front catastrophe remember that a solar still will produce

clean, drinkable water from ocean water. See the *Solar still* section below for further details.

What if there's no rain, snow or plants?

So here you are, you're outside, it's not raining or snowing, you have no morning dew, and there are no plants but you have found some water that has pooled on the ground, let's say a mud puddle. This is the water that you are going to treat to get it to the drinkable stage. The analogy that we like to use is that you are panning for gold.

First, remove the big stuff, the sticks, the leaves, and the bugs. You begin by pre-filtering the water through a coffee filter, a T-shirt, sand or a clump of dried grass. This will get rid of the big chunks. Alternatively you can let the water stand for a period of time and the large chunks will settle to the bottom of the container. From there you are going to treat the water all the way to the microscopic level because unless you remove the bacteria, protozoa and the viruses, you may become ill.

Treating water

Now that you have filtered and/or removed the debris from your water it is time to kill the microscopic organisms.

There are three ways to treat the water

- ❖ Man-made mechanical devices.
- ❖ Chemicals.
- ❖ Boiling.

Man-made mechanical devices

There are two types of mechanical hand-held devices: water filters and water purifiers. Water is introduced into either device through a pumping action, is filtered and /or purified and discharged out as drinkable water.

A water filter will remove 99% of all bacterial contamination but it will not remove viruses. In order to remove viruses, you would need to chemically treat the water or boil it.

Water purifiers contain a filter device, a charcoal medium that removes odors and tastes as well as a chemical that will kill viruses.

Survival tip



Filters last longer than purifiers. A good filter will last for about 15,000 gallons of water before you have to replace the inside cartridge. A water purifier will only treat about a 100 gallons of water before the filter cartridge needs to be replaced. All mechanical filters are fragile, and must be maintained, taken apart and cleaned. They are expensive and, obviously, in order to be of use, you must have it with you. This may not always be the case, particularly if your filter is at home and the emergency situation occurs while you are in the office.

Chemicals

Chemicals kill most of the viruses, bacteria and protozoa in contaminated water by essentially poisoning them. This is the method that large municipal water treatment facilities use because it is the most cost effective method of treating large quantities of water.

There are several chemicals available to the individual

that can be used for this purpose. These include: pool chlorine, chlorine bleach, and iodine.

Chlorine • Liquid pool chlorine is extremely caustic and must be handled with care. Prior to drinking and in order to make it taste better, water treated with chlorine can be exposed to the air and the chlorine evaporates out.

Bleach/chlorine bleach • These are also caustic chemicals that must be handled with care. These are regular household bleaches sold in the supermarket. Again, to make it taste better, before drinking, you can expose the water to the air and let the bleach dissipate.

How much bleach should you use? • The rule of thumb for treating a gallon of water is 12 drops and wait thirty minutes. This should kill off the majority of the harmful critters and it is an easy rule to remember.

Iodine • It is a periodic element. It doesn't breakdown into any smaller units. It comes in three forms: as tablets, liquid or as iodine crystals.

Iodine tablets • Convenient but expensive to use. A bottle of tablets may contain 50 tablets. It takes 3 tablets per quart and they retail for \$6–8 per bottle. Once opened and not used, they will have a shelf life of several months at which point the iodine has evaporated. We don't recommend tablets unless it is the only thing available.

Liquid iodine • Is usually sold as a liquid solution. Brand names include Provine and Betadine, which are used in the medical and veterinary professions. The least expensive way to purchase it without a prescription is to go to the feed and tack store and buy it in quarts or pints. Use 12 drops per gallon and wait 30 minutes.

Iodine crystals • Small metallic looking beads that when immersed in water, saturate the water to a solution of iodine. The strength of the solution is contingent upon the amount of water and the amount of crystals present. It is variable. Iodine crystals have the advantage of being easily transportable and because they can be diluted with water and then left to evaporate they become an almost perpetual iodine making machine.

A small bottle will generally treat about 500 gallons of water before the crystals are used up. This is a very economical method and the one we recommend. For the amount to use, follow the directions on the bottle. (See the manufacturers list in the *Resources* section at the back of this book for further details.)

Note

Chemicals are caustic and particularly dangerous if mishandled. Use your sense. Don't leave any chemicals where there is a risk of cross-contamination. Keep away from children, food preparation areas, cooking utensils and pets. Some people have an allergic reaction to iodine. Check for this before an emergency situation arises.

Boil it—it's best

After speaking to representatives from EPA, CDC and local municipalities, we decided to keep it simple. The best method of treating water is to boil it.

But for how long? Research provided interesting and varying answers which ranged from just bringing it to a boil, to boiling for 1 minute; to 3–5 minutes; to 10 minutes; to 15 minutes; to 20 minutes. The differing time ranges are based on the contamination level, the source of the water, and the elevation. We did some follow-up research with biologists from Environmental Health offices and determined that the

safest method would be to bring the water to a rolling boil and continue boiling from 10 – 15 minutes depending on your own personal level of paranoia. But, definitely no less than 10 minutes. To minimise the amount lost to evaporation keep the pot covered during the boiling process.

Ten minutes will kill the majority of micro-organisms. Note well, however, that it may take up to 20 minutes to kill the most resistant of spore-stage viruses. Fortunately, viruses constitute a small percentage of water-borne pollutants but if you have immune-compromised people dependent on this water, such as very young, very old, or very weak people you probably should opt for greater caution.

What do you boil the water in?

With a metal container the job of boiling is easy. Fill it with water and put fire under it. As mentioned above, cover it, if possible to reduce evaporation loss.

But, what if you have no metal container?

Boil water in a plastic bag?

Believe it or not you can boil water in plastic sheeting, dry cleaning bags, naugahyde, leather, a PVC raincoat or any other impervious membrane. Sounds impossible? Well it is amazing but it's certainly possible. The idea is to create a "bowl" to hold the water you want to boil.

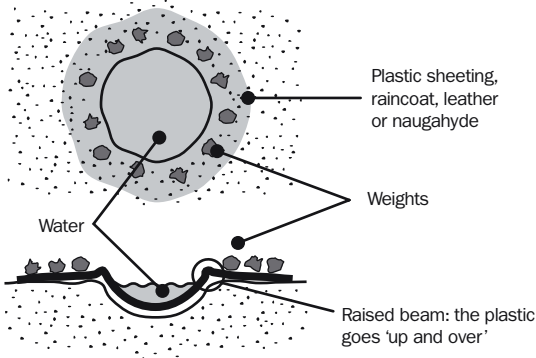
First, create a dish; second, line the dish with the impermeable membrane. The dish shape can be as simple as a hole in the ground. Conversely, you can build up a mound of sand or gravel with a depression in the middle (volcano shaped). See diagram. The cavity of a tire also works well.

To boil the water you have to bring the fire to the water. One way to do this is to heat stones, concrete or iron weights in a fire and transfer the heated material to the dish. (This

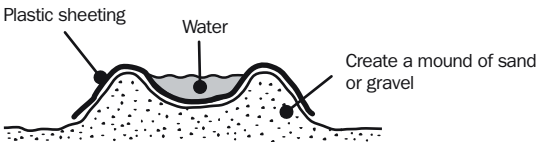
Create a bowl or dish

To boil the water: place concrete, iron weights etc., into a fire, heat up and place the hot chunks into the water.

Put small stones on plastic so that hot rock rests on small stones and not directly on a plastic sheet.



Volcano



wouldn't be a good time to burn your hand so take great care transferring the heated objects.) To prevent the heated object from burning through the plastic, place small stones to act as a barrier between the membrane and the hot object.

Depending upon the quantity of water in the bowl (a tea-cup to many gallons) adjust the number and size of stones to accomplish the task. *To boil five gallons of water it takes approximately six to eight softball size stones.* Once it is boiling, a single stone will keep it boiling from ten to fifteen minutes.

Let the water cool before you drink it, making sure that it is kept in a clean container and kept covered.

Remember the golden rule

There is a *rule* that goes with collecting stones to use to boil water: NEVER USE DAMP STONES. Do not gather your stones from a river bottom or a damp area. These stones can contain moisture that when heated will produce steam, expanding the rock often explosively and with lethal force. Also, Obsidian and Quartz stones are *not* recommended.

Solar still

A solar still is a man-made device that creates and treats water simultaneously. Its scientific principle is straightforward and involves using a sheet of transparent plastic and the sun to cause water to evaporate and re-condense as liquid. Water that has gone through this condensation/distilling cycle is pure H₂O.

Hole-in-the-ground version

Use a 6'×6' piece of transparent plastic. Dig a hole that is about knee deep on an adult and as big around. Place a catch basin to collect the water in the dead centre of the hole. Place the plastic over the hole and push the center down into the hole creating an inward cone that points directly over the catch basin (tin can, cup, glass jar, etc.). Seal the edges of the plastic against the ground with stones or any objects to hand. A big trash bag can also be used.

How it works

The rays of the sun shine through the plastic sheeting. This heats the earth underneath causing any water present in the earth to evaporate as a gas. This gas, or water vapour, rises up and hits the plastic sheeting where it cools, re-condenses and reforms as water droplets. Gravity forces these droplets

to flow downhill to the point of the inverted cone where they slide off and land in the catch basin.

In order for a solar still to function there must be water present. This water can be in the soil originally or else it can be added to the solar still. A river bottom in full sunlight with damp sand makes an ideal location. With these parameters present a solar still will produce up to a gallon of drinkable water per day.

If the soil is dry, for instance, in a desert, with no water in the hole, a solar still will produce no water at all. If it is a dry

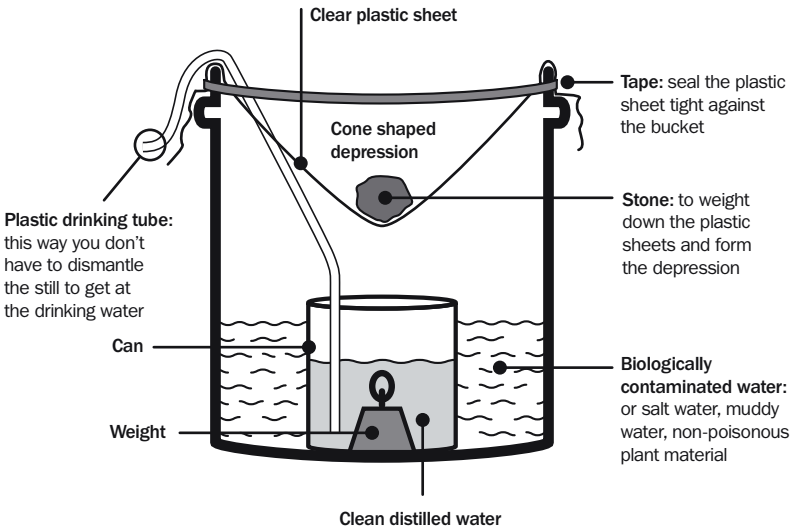
Solar still

The five gallon bucket version

- Do put in salt or sea water.
- Do put in mud or damp sand.
- Do put in plant material.

Caution: use only non-poisonous plants; don't use chemically contaminated water i.e. no oil, gasoline, pesticides etc.

Once you've constructed your solar still, remember to place it in direct sunlight.



Survival tip 

A solar still works well at the beach. In fact, your still will make about twenty gallons of water a day. Perfect for the castaway who remembered to pack a sheet of plastic.

location, you can pour bacterially contaminated water such as pond water or even urine, directly into the dirt, install the solar still and it will produce clean drinking water. You have in effect “seeded” the hole.

You can also seed it with green plant material. Caution must be used that only non-poisonous plants are used as the plants are heated they give up their moisture, which condenses on the plastic and comes back down as water.

It is possible to make a solar still with a bucket.

If you have a limited supply of water there are several things to be aware of...

- ❖ Don't eat because it takes water to digest food.
- ❖ Don't smoke because it dehydrates your lung lining.
- ❖ Don't drink alcohol of any kind because they are carbohydrates and your body has to digest them, again the body needs water for the digestion process. The same is true for soda, coffee, tea or any other caffeine drinks. These will act as divertics causing you to lose fluids rather than replace them.
- ❖ If you must travel do so only in the cool hours of the evening and the morning.
- ❖ Wear light colored clothing, avoiding sun on your skin.
- ❖ Move slowly so you don't lose moisture through perspiration or respiration.
- ❖ Don't do any physical labor.

- ❖ Stay out of the sun and the wind.
- ❖ Don't drink your urine. It will dehydrate you even more.
(You can, however, use your urine in the solar still.)

Remember you are the best container!

When you do have water, store it inside you not inside a canteen. Conserve the water in your body. There have been horror stories of people who have died with full canteens as a result of trying to conserve their water supply.

Fire

*“Humans are the only creatures
who use fire as a tool.”*

Man is the only animal capable of making fire

But, before you slap yourself on the back and wallow in your superiority over the animals, bear in mind that fire has been responsible for making us creatures of comfort and addicts of convenience. We love fire. We are fully dependent on fire. We need fire.

With fire you have heat, you can purify your water and cook your food. But fire also warms the human heart and goes a long way to making you feel more secure. Think of the times you have sat around a campfire and experienced that sense of comfort. Most of all it pushes back the dark—one of our greatest fears.

And yet, fire is too often taken for granted. It is hard to believe that fire is considered by all primitive people to be a sacred skill when in our modern society it is as simple as turning on a light switch, adjusting the thermostat, cooking on a “Jenn-Air” stove top, striking a match or flipping a “Bic.”

I cannot, with words alone, express the magical transformation that occurs when you create a “coal” using the

primitive bow and drill or hand-drill method. Neither can I establish in you the appreciation of how important fire is in our daily lives. I can, however, tell you that when man-made power goes out and you are without fire for even a few days, it will become precious beyond words.

In scientific terms, fire is nothing more than friction. It is the energy of the sun. Yet by using primitive techniques to make fire in a wilderness setting it becomes an art. The tools you use must be properly carved. Time, patience and skill produce a coal that is laid gently into a bird nest of tinder. Cradling it gently like a baby, you nurture it and breath life into it. As the tinder bursts into flames, you place it correctly into the kindling designed like a tipi within the properly located fire pit. It is a moment unlike any other when you take the purely physical act of rubbing two sticks together and bring forth, once again, the energy of the sun.

Many of the students at our wilderness school relate that it is an incredibly spiritual moment being at once overwhelmed and immensely grateful for the gift. In fact, the ability to make fire using primitive skills gives you a sense of freedom. You feel invincible, for you can go anywhere and make fire!

Starting a fire

In an urban environment, when an emergency situation has caused a power outage you need to make fire any way you can. It is always prudent to be prepared by storing waterproof matches and “Bic” lighters .

Lighters • These provide thousands of lights and they even continue to work after prolonged washing in the pocket of your jeans, they are seemingly indestructible! (A tip for those who do keep a lighter in their pocket—wrap a rubber band around the lighter, it will prevent it from falling out when you sit down).

Magnesium fire blocks • Purchase them at any drug store that has a camping section. A magnesium fire block is a large chunk of magnesium with a flint like material running down one side. You scrape off the magnesium with a file or knife creating a pile about the size of a dime. Using the steel from your knife or file you create a spark by scraping it against the flintside of the magnesium fire block. Scrape the sparks onto the magnesium shavings. It instantly ignites, burning at 5,400°F. This will get damp leaves, grass, paper to ignite. Using just the flint (spark side of the fireblock) you can ignite dry material such as cotton balls, 00 steel wool, or cattail down. This way you save your magnesium for when you have to light damp material. Magnesium fire blocks can be purchased from sporting goods stores.

Batteries • An effective method for starting fire is by using batteries: Take a 9-volt transistor radio or smoke detector battery—the flat square ones—and touch both terminals to a fluffed up mass of 00 steel wool. It will ignite instantly. Another option is to short circuit any size battery by using a piece of fine wire from lamp cord or phone wire. Cut a length of that wire about 6–8 inches. Touch one end of the wire to one end of the battery; run the body of the wire through combustible material, paper, steel wool, cotton and touch the other end to the other end of the battery. This will cause the wire to heat to the melting point and ignite the combustible material. The smaller size batteries take longer to heat the wire.

Safety Note

Be sure to insulate your hands because the wire gets hot and will burn you! Stay away from large batteries like your car battery. Too much kick! These can explode as can any battery but a car battery has far too much energy and the potential for problems is too great.

Chemicals • There are various chemical ways to start fire which are available on the market. Fire is created when two separate chemicals are combined together and ignite into open flame. Be careful, they are dangerous.

Glass • Another option is a magnifying glass, or a spectacle lens, which of course must be done on a sunny day! The magnifying glass or lens will concentrate the sunlight down to a fine point creating enough heat to ignite paper, cotton, dry grass, etc.

Note

A word of caution, do not use accelerants like gasoline or kerosene if you can't get a fire going by normal means. For example, do not use gasoline to try to get wet wood burning. Don't turn an emergency situation into a dire situation.

Practice beforehand

If you need to make a fire in an emergency you should be confident of your abilities. Frustration can lead to mistakes. It is always a good idea to practice making fire by going camping or having a barbecue. Start from the smallest material and add to it, building to the larger pieces. Also remember it takes wood to burn wood. Consider all wood found on the ground as being wet. Though you must first have a way to light them, candles are an excellent way to get wet wood burning.

If you know you will need to make fires over the course of a few days, for instance if you are on the move, or if you have to let your fire die away during the day, it is a sensible precaution to dry, fine kindling out by your fire and then keep it dry in a waterproof bag or pocket. This will save you time next time you have to make a fire.

Always prepare your fire pit designed with a “tipi” or pyramid shaped mass of kindling before you attempt to start your fire. You should never make a fire inside your shelter. You are already in an emergency situation; don’t make it worse by burning your shelter down or asphyxiating yourself. Any open flame consumes oxygen and produces poisonous carbon monoxide gas. In addition there is the physical danger of lighting something on fire. When you do have an open flame of any kind whether it is a candle or a campfire, have a designated person be on “fire watch.” Their sole function is to keep tabs on the fire.

Lamps without batteries

In an emergency, when it gets dark—go to bed. Save your resources until sun up. However, if there is an injured person you may need light. If you need to have fire for light, create a lamp.

Jar lamp

- ❖ A clean jar filled with cooking oil.
- ❖ T-shirt hem or towel hem as a wick.



Directions

Punch a hole through the lid using a Phillips head screwdriver. Punch the hole from the inside to the outside of the lid. Push the wick through, screw the lid on and light the wick. Adjust wick as necessary.



Potato lamp

This is easy. Just stand a potato on its end and cut the bottom off so it stands flat. Cut the top end off and put to one side. Take a spoon and scoop out the inside creating a reservoir. Pierce a thickish hole through the top section you cut off. Fill the reservoir with any type of cooking oil. Create a wick

using the hem of a T-shirt. Soak the wick in the oil. Push the wick up through the hole in the top piece of potato so that one end sticks up above. Replace the potato “lid” back on top of the reservoir so the other end of the T-shirt hem is sitting in the reservoir. Light the piece sticking out and hey presto!

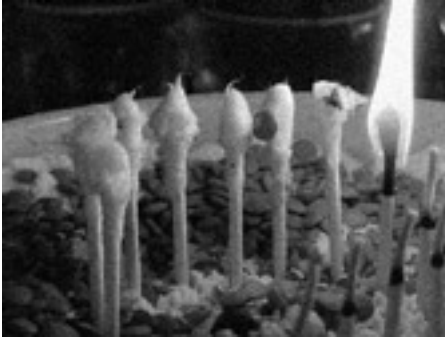
A candle • By adjusting the wick from time to time this lamp will burn for as long as there is oil in the reservoir.

Spiral chip lamp

Take a shallow pan and fill it with sand or rice or dirt, or some other non-flammable material and place chips on top. Tortilla chips work best. Start on the outer rim and spiral the chips inward, each chip standing up and barely touching the one next to it. Light the first chip. As it burns, it will light its neighbor and so on, slowly working its way, chip by chip, around the pan and around the spiral.

Cotton balls

Set cotton balls with Crisco or Vaseline mushed into them on a non-burnable surface and ignite them. They will burn for about eight minutes.



Q-Tip lamp

- ❖ Q-Tips.
- ❖ Lard.
- ❖ Bowl.
- ❖ Sand, rice, flour.

Dip the ends in lard. Stick them in an appropriate medium, i.e. rice, sand, flour in a bowl. Space each Q-Tip about one pencil width apart, more or less. Spiral them around the bowl. Light the first one and *voila!*

Don't forget that you can use multiple light sources. For example, more than one cotton ball, more than one potato lamp.

For warmth

When it is not possible to sit or sleep near the fire you may need a way of keeping yourself, a child or an injured person warm. If you are sleeping in a shelter remember you must *never* take a naked flame into it. These methods allow you to take warmth to the person who can't come to the fire.

**Safety
Note**

Remember never to collect your stones from a river bottom or an area where they are exposed to long-term dampness. The water seeps into the center of the stone over time and if placed in a fire and heated, that water turns to steam and it expands and may explode with lethal intensity.

Hot sand bags—or socks...

Heat sand in a metal frying pan over your fire. Put the hot sand into a sock or water bottle and use this as you would a heating pad or hot water bottle. Remember not to leave hot objects alongside people who are unable to move themselves, or the object, away from them as continued application of a hot object may cause burning to occur.

Hot rocks

You can heat iron weights from your bench set, concrete chunks, or dry stones in the centre of your fire. Take these heated items (use tongs) and place them on a non-burnable surface. These provide radiant heat. They give off no carbon monoxide gas and consume no oxygen. Treated with care so as not to contact any flammable surface, these can be used in an enclosed space.

Candle and blanket

This one requires extreme caution and should only be used when all other options are unavailable. Take a hot stone or a small candle. Place it inside a metal can. Set the metal can between your legs and wrap a blanket around you forming a tent-like structure. It is not recommended for children, the sick or the elderly and should not be attempted under your shelter.

Urban fire

Generators are dangerous. They are complex and unless you really know what you are doing with them you are better off using simpler forms of heat and light providers. Every year someone dies because they pulled a generator into the house, turned it on, went to sleep and never woke up. In addition, it is foolish and irresponsible to store quantities of fuel anywhere, particularly in “fire” country. If you have a fireplace with a proper chimney and adequate ventilation you should keep logs, firestarters and matches where they can be found easily in an emergency.

If you are in an apartment building with no fireplace and no obvious means of heat you should have some contingency plans. You can stay warm by building a shelter. You should have food stored and some water. Your fire needs may be minimal. However, if you decide to use a stove or light candles, remember, any naked flame is a danger, especially in such a building while the emergency services are otherwise occupied.

Never leave any flame unattended and keep a fire extinguisher or fire blanket handy. A wet blanket would serve if nothing else is available. Remember that a fire can be stopped by depriving it of oxygen so a fire blanket will suffocate a small fire in its early stages. Never throw water on a fat fire, the droplets will carry the flames across the room and start more fires. And make sure there is enough air, adequate ventilation is a *must* because carbon dioxide, a product of combustion, is a killer in an enclosed space.

It is a sensible precaution to keep a small camping gas burner, along with spare gas canisters in your apartment so that at the very least you can sterilise water, boil water for drinks or hot water bottles, and prepare basic hot food. These come in a variety of sizes from Walmart. Buy the one you can store most easily.

Although a survival situation, in a sense, seems no more

than winning a struggle against the environment with the main goal one of getting back to the comfort and convenience of civilization, it is more than that. As our umbilical cord with society is severed, we all have to learn to live again as primitive people—using our own energy to provide our needs. It is experiencing the direct reward system—energy in—energy out. You use your skill and energy to make fire, which will provide you with heat, light and ways to purify your water and cook your food. It is simple, if you make fire—you eat! Even in a modern setting, you can duplicate the sacredness of fire. All it takes is a humble attitude. But remember, fire is never a given. Be appreciative, accept the gift and be grateful.