WATER CRISIS GUIDE

Table of contents

Are we running out of fresh water?

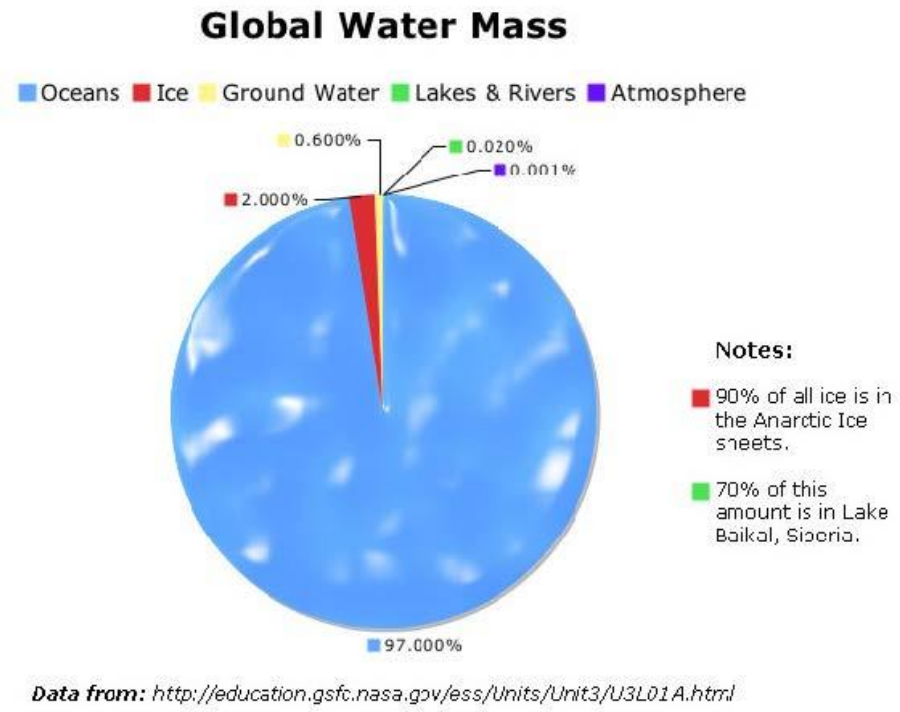
Remember your fifth-grade science class about the water cycle?

We never really use up or lose water

It's always recaptured somewhere, in some form. And yet, having enough fresh, clean water is the single greatest crisis facing our civilization. If water doesn't really disappear, why is there a crisis? You may have heard the term "peak oil," but have you heard of "peak water?" It may well turn out to be even more serious than peak oil.

Few people are fully aware of the threats that water problems pose to the population at large. Most of us take water for granted. We assume there will be enough. (There isn't.) We assume it will be clean. (It isn't.) All across the United States and around the world, more and more people are coming to the stark realization that fresh, clean water is a finite resource.

Of the entire water mass on our planet, only .62% of it is fresh water … and most of it is in a very deep lake in Siberia.



Data from: *http://education.gsfc.nasa.gov/ess/Units/Unit3/U3L01A.html*

Here are some facts that will help you realize the gravity of the situation:

- We use water at a staggering rate. According to the National Academy of Sciences, the average U.S. household used 200 gallons per day in 1999. Now, 13 years later, we're using about 350 gallons per household per day. For the 112 million U.S. households, that adds up to 39,200,000,000 gallon per day – a 57 percent increase in just a decade. In the next decade, we'll need even more.

- The U.S. Environmental Protection Agency made a worrisome announcement in 2009. “In the last five years, nearly every region of the country has experienced water shortages,” they reported. “At least 36 states are anticipating local, regional, or statewide water shortages by 2015, even under non-drought conditions.

- In the western United States, we’re gulping so much water that the Colorado River no longer flows to the sea. More water rights are parceled out to U.S. cities and farms than the river can actually supply.

  Only about 10 percent of all the water that flows into the Colorado makes it as far as Mexico. After traversing 1,440 miles, carving out the Grand Canyon, and providing water for farms and cities in seven states, just thirty miles south of the border the mighty Colorado River has dwindled to a canal only three feet wide. Choked with sewage, fertilizer, pesticides and salts leached from farmland, it ends in a knotwork of muddy rivulets at the base of the Sierra de Juarez Mountains.

- The Rio Grande, too, is so tapped out that it lapses to a mere trickle and then vanishes into its old, sandy bed just 300 feet away from the Gulf of Mexico.

Are we running out of fresh water? **Yes**.

Water in a survival situation

Water is one of your most urgent needs in a survival situation. You can't live long without it, especially in hot areas where you lose water rapidly through perspiration. Even in cold areas, you need a minimum of 2 liters of water each day to maintain efficiency.

More than three-fourths of your body is composed of fluids. Your body loses fluid as a result of heat, cold, stress, and exertion. To function effectively, you must replace the fluid your body loses. So, one of your first goals is to obtain an adequate supply of water.

Sourcing Water

Almost any environment has water present to some degree. Here are some possible sources of water in various environments:

Environment	Source of Water	Means of Obtaining and/or Making Potable	Remarks
Frigid areas	Snow and ice	Melt and purify.	**Do not eat** without melting! Eating snow and ice can reduce body temperature and will lead to more dehydration. Snow and ice are no purer than the water from which they come. Sea ice that is gray in color or opaque is salty. Do not use it without desalting it. Sea ice that is crystalline with a bluish cast has little salt in it.
At sea	Sea	Use desalter kit.	**Do not** drink seawater without desalting.
	Rain	Catch rain in tarps or in other water-holding material or containers.	If tarp or water-holding material has become encrusted with salt, wash it in the sea before using (very little salt will remain on it).
	Sea ice		See remarks above for frigid areas.

Environment	Source of Water	Means of Obtaining and/or Making Potable	Remarks
Beach	Ground	Dig hole deep enough to allow water to seep in; obtain rocks, build fire, and heat rocks; drop hot rocks in water; hold cloth over hole to absorb steam; wring water from cloth.	Alternate method if a container or bark pot is available: Fill container or pot with seawater; build fire and boil water to produce steam; hold cloth over container to absorb steam; wring water from cloth.
Desert	Ground • in valleys and low areas • at foot of concave banks of dry river beads • at foot of cliffs or rock outcrops • at first depression behind first sand dune of dry desert lakes • wherever you find damp surface sand • wherever you find green vegetation	Dig holes deep enough to allow water to seep in.	In a sand dune belt, any available water will be found beneath the original valley floor at the edge of dunes.
	Cacti	Cut off the top of a barrel cactus and mash or squeeze the pulp. **CAUTION: Do not eat pulp. Place pulp in mouth, suck out juice, and discard pulp.**	Without a machete, cutting into a cactus is difficult and takes time since you must get past the long, strong spines and cut through the tough rind.

Environment	Source of Water	Means of Obtaining and/or Making Potable	Remarks
Desert (continued)	Depressions or holes in rocks		Periodic rainfall may collect in pools, seep into fissures, or collect in holes in rocks.
	Fissures in rock	Insert flexible tubing and siphon water. If fissure is large enough, you can lower a container into it.	
	Porous rock	Insert flexible tubing and siphon water.	
	Condensation on metal	Use cloth to absorb water, then wring water from cloth.	Extreme temperature variations between night and day may cause condensation on metal surfaces. Following are signs to watch for in the desert to help you find water: • All trails lead to water. You should follow in the direction in which the trails converge. Signs of camps, campfire ashes, animal droppings, and trampled terrain may mark trails. • Flocks of birds will circle over water holes. Some birds fly to water holes at dawn and sunset. Their flight at these times is generally fast and close to the ground. Bird tracks or chirping sounds in the evening or early morning sometimes indicate that water is nearby.

Additional sources

- Wherever you find banana or plantain trees, you can get water. Cut down the tree, leaving about a 30-centimeter stump, and scoop out the center of the stump so that the hollow is bowl-shaped. Water from the roots will immediately start to fill the hollow. The first three fillings of water will be bitter, but succeeding fillings will be palatable.

- Some tropical vines can give you water. Cut a notch in the vine as high as you can reach, then cut the vine off close to the ground. Catch the dropping liquid in a container or in your mouth.

- The milk from green (unripe) coconuts is a good thirst quencher. However, the milk from mature coconuts contains an oil that acts as a laxative. Drink in moderation only.

- In the American tropics you may find large trees whose branches support air plants. These air plants may hold a considerable amount of rainwater in their overlapping, thickly growing leaves. Strain the water through a cloth to remove insects and debris.

- You can get water from plants with moist pulpy centers. Cut off a section of the plant and squeeze or smash the pulp so that the moisture runs out. Catch the liquid in a container.

- Plant roots may provide water. Dig or pry the roots out of the ground, cut them into short pieces, and smash the pulp so that the moisture runs out. Catch the liquid in a container.

- Fleshy leaves, stems, or stalks, such as bamboo, contain water. Cut or notch the stalks at the base of a joint to drain out the liquid.

The following trees can also provide water:

- ✓ Palms. Palms, such as the buri, coconut, sugar, rattan, and nips, contain liquid. Bruise a lower frond and pull it down so the tree will "bleed" at the injury.
- ✓ Traveler's tree. Found in Madagascar, this tree has a cuplike sheath at the base of its leaves in which water collects.
- ✓ Umbrella tree. The leaf bases and roots of this tree of western tropical Africa can provide water.
- ✓ Baobab tree. This tree of the sandy plains of northern Australia and Africa collects water in its bottlelike trunk during the wet season. Frequently, you can find clear, fresh water in these trees after weeks of dry weather.

Caution: Do not keep the sap from plants longer than 24 hours. It begins fermenting, becoming dangerous as a water source.

Your only chance – Water Purification

You do not want to wait until you are thirsty to begin gathering water, as the urge to drink directly from the contaminated source can become unbearable. Due to the negative effects of drinking water contaminated with Giardia and other bacteria/viruses, this is a bad idea.

Becoming sick from drinking bad water, will further dehydrate you, worsening your situation.

Having some knowledge of the type of contaminants we could deal with is important. When choosing a ceramic filter it is a good idea to get information on the filter's micron rating:

Some contaminants and their size in microns:

Giardia lamblia - 8 to 12 microns
Cryptosporidium parvum - 4 to 6 microns
Bacteria (salmonella, E.coli) - 0.2 to 4 microns
Viruses - 0.004 to 0.1 microns

Water Purification Methods

Most water purification techniques are fairly simple. Below are the most common methods of purifying water.

Boiling

Boiling is the simplest method of killing bacteria/viruses. The concept is that the organism is destroyed by pushing the bacterium/virus past its heat range. 100°C (212°F) will effectively kill most organisms, not just bacteria.

Assuming you can get a fire going, and have a metal container. After filtering as many of the particulates as possible, fill your container with water, place over the fire, bring to a rapid boil, then allow to cool (drinking hot water can induce vomiting). Boiling will kill the harmful bacteria in the water, as they cannot withstand the temperature.

Advantage is that you are not adding any chemicals to your water, which takes out the guess work as far as dosage. The disadvantage, if it can even be called that, is that you have to have a source of heat (fire, stove, etc.) in order to bring the water to the boiling point.

Water purification through chemical treatment

Common chemicals used:

- Iodine

  -tablets

  -crystals

  -tincture of iodine
- Sodium Chlorite / Chlorine Dioxide
- Potassium Permanganate

Some parasites may not be killed using this method.

Purification capability can be reduced by several factors:

- ✓ Temperature of the water
- ✓ Clarity of water
- ✓ Tablet expiration date

Treating with iodine crystals

Iodine solutions kill bacteria by upsetting the ion balance within the cell, replacing chemicals that the bacteria needs to survive with

iodide ions. Iodine can also be poisonous to humans, and can be especially harmful to young children, and pregnant women.

You should be careful not to use too much iodine when purifying your water, and if at all possible avoid using it as a primary purification method for extended periods of time. If you find yourself in a survival situation, for an extended period of time, you should consider setting up a still, or boiling the water if possible.

Simply fill the provided container with water. Shake the container. Allow the filled container to stand for about an hour. This allows time for the water to become saturated with iodine. Add the iodine to your water container, adding the indicated amount of capfuls (it's about 1 capful to 1 quart). Shake the water container to ensure a proper mixture. Allow the container to sit 20-30 minutes. Afterwards the water is ready to drink.

Iodine tastes just like it smells, fortunately, this is a pretty weak solution, so the taste is not overpowering; it is only slightly worse than city water. The advantages of iodine crystals, is that, one container can treat somewhere in the neighborhood of 10,000 gallons. As well as the fact that, it prepares the water relatively fast. The disadvantage is, as mentioned above, that it is harmful in the long term.

Note: Using this method on water from a running stream, proved to have no ill effects on my digestive system.

Treating with iodine tablets

Sodium Chlorite / Chlorine Dioxide tablets

These tablets essentially use chlorination as their method of purification. Sodium chlorite generate chlorine dioxide giving it the ability to treat water. Chlorination, as most know, is a common method of disinfecting water, and is commonly used by municipalities world-wide for this purpose.

Chlorine destroys bacteria by destroying the cell walls of the bacterium/virus, killing the organism. Fortunately, when we drink chlorinated water, our digestive system quickly neutralizes the

chlorine. So chlorine concentrations along the gastrointestinal tract are, in all likelihood, too low to cause damage.

Add one of these tablets to a quart of water. Allow it to sit for approximately 4 hours. Personally, I feel that shaking the container once or twice helps dissolve the tablet more quickly, and improve distribution of the tablet.

Water treated in this manner has a slight bleach/chlorine taste, which is less potent than your average city water. The advantage of these pills is their simplicity; add the tab, and let sit. The disadvantage is that you will be waiting for a while before you can drink it.

Note: Using this method on water from a running stream, proved to have no ill effects on my digestive system.

Potassium Permanganate

Condy's Crystals or KMNO4 can be purchased at hardware stores. They are sold as a water softener. Can be purchased in both powder and pill form (permitabs). This chemical compound has many uses from fire starting to water purification. Just a few crystals can treat a

quart of water (approximately 0.01% solution - 1 gram per liter, meaning 3 - 4 crystals).

Micro-filtration/
Water
Filters

Micro-filters remove contaminants from the water using a ceramic filter. By passing the fluid through the microporous membrane with pore sizes smaller than the contaminant we effectively remove pathogens.

Survival Filter Straws

There are several manufacturers of survival straws or emergency water filter systems. Examples include **Aquamira** and **Lifestraw**

Information from Aquamira: "One unit will filter up to 20 gallons (75L) of water. Tests indicate that the Frontier Filter will remove 99.9% of Cryptosporidium and Giardia. The Frontier Emergency Water Filter System is also easy to operate, just attach and expand the straw, submerge the filter end into the water source, and drink through the straw."

Additional chemical methods

Other chemicals can be used in case of an emergency such as:

Iodine tincture - Around eight drops per liter or about thirty per gallon.

EPA suggestions: You can use tincture of iodine to disinfect filtered and settled water.

Common household iodine from the medicine chest or first aid kit may be used to disinfect water. Add five drops of 2 percent U.S. or your country's approved Pharmacopeia tincture of iodine to each quart or liter of clear water. For cloudy water add ten drops and let the solution stand for at least 30 minutes.

Bleach - Two drops of bleach per quart 1/8 teaspoon (or eight drops) of regular, unscented, liquid household bleach for each gallon of water.

Hydrogen peroxide - (untested). During research we found recommended thirty-five to fifty percent concentration being used.

How to make a water filter from scratch

The first thing to consider when collecting water is to think about how soon you will need to drink. If you have time, collect standing water in a container and let it sit for a few hours. This will allow anything that floats to rise to the surface, and you can skim off any debris.

If you have two containers, try this method for filtering water:

Step 1

Take the first container and fill it with water. Then, put your shirt or some sort of porous layer over the other container. Put your pebbles on top of the cloth and filter your water by pouring it over the stones and into the container.

Step 2

Next, remove the pebbles and put sand, a finer material, on top of the cloth. Filter your water again.

Step 3

Finally, the most effective way to filter is to crush up charcoal, put it on your cloth and let the water run through it. Charcoal filters remove sediment, many contaminants, and improve taste.

Charcoal is used in store bought home and backcountry water filters. You can make your own charcoal by making a campfire, covering it with dirt and ash, and allow it to cool completely. Once it has cooled, crush it into small pieces. Pour the water through the charcoal several times.

Step 4

If at all possible, build a contraption that will combine all three filtering steps, letting the water flow from one material to another. This will make the water gradually clearer as you filter it again and again.

If you don't have a manmade container, some natural materials are great alternatives. Bamboo is a prime example. It is hollow in the center and water can flow through it easily. There are many other plants with hollow centers. Use these to your advantage.

A hollow log can be a great option. Place the materials (pebbles, sand, cloth and charcoal) in layers through the various parts of the bamboo or log. Remember to think about what materials you are carrying and check out your surroundings in any survival situation.

This should provide you with a basic insight on how to create a survival water filter. Realize that it is still possible to get sick, even if you follow the guidelines in this article. Always contact a physician after you drink questionable water. The side effects of pathogens and microorganisms will take at least a week to start affecting you. If you are in a survival situation, keep hydrated and worry about those side effects later.

Water Storage – 5 Common Mistakes You Should Avoid

One of the first things that people think of when preparing for a disaster situation is storing water. Water is extremely crucial if you want to survive. A person can survive three weeks without food but only three days without water. Although water storage is forefront in many a prepper's mind, there are five common mistakes that many make.

1. The amount you store

The recommended amount to store water is one gallon a day per person. But when you factor in cooking, hygiene needs, sanitation and increased activity levels, the amount should be closer to two gallons a day per person. If you have pets, remember to store water for them too.

2. Where you store it

Heat and sunlight can shorten the shelf life of water. If you store your water in a garage or a shed – don't.

Keep your water in a cool dark place, like a basement or even under your bed.

3. How long you store it

Water can go bad. Algae and bacteria can grow in water, even if it is treated. Rotate or replenish your water every six months to one year. If you use a commercial water preserver, then it is five years.

4. What you store it in

Don't store your water in used milk or juice jugs. The proteins and fruit sugars embedded in the plastic is a perfect breeding ground for bacteria. A better "free" container would be a 2 liter soda bottle. Just be sure to sanitize it first.

5. The condition of the water

If you get your water from a well, don't just put the water in a storage container and think that you're done. Add two drops of non-scented bleach per gallon of water. This will kill any bacteria that might be harboring in the water.

With these common mistakes avoided, you will be sure to have a good water supply at a time where you need it most.

How to dig a Well

Following are the proper steps for building a well.

Things You'll Need

Well Supplies

- 3 8ft Lengths of 8 inch PVC Pipe (Qty. may vary)
- 3 8ft Lengths of 6 inch PVC Pipe (Qty. may vary)
- 3 8ft Lengths of 4 inch PVC Pipe (Qty. may vary)
- 3 8 inch Slip-Slip PVC Coupling
- 3 4 inch Slip-Slip PVC Coupling
- 3 6 inch Slip-Slip PVC Coupling
- 1 8 inch PVC End Cap
- 1 6 inch foot valve

- 1 4 inch foot valve

Tools and Equipment Required

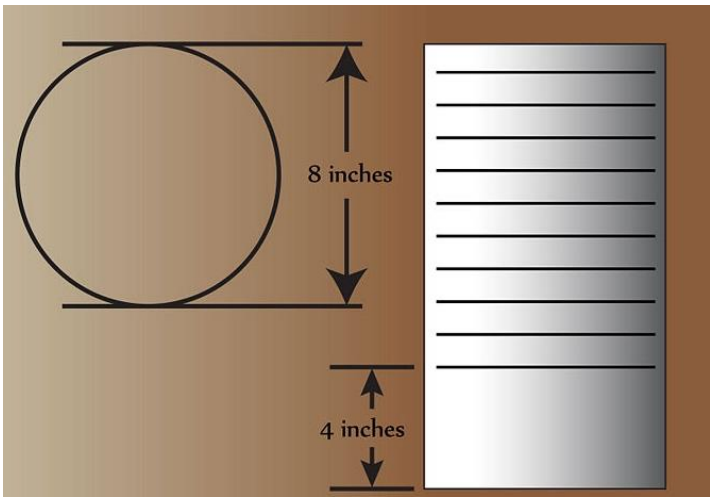
- 1 Adjustable Post Hole Digger/Auger with 8 inch Auger head
- Drill rod extensions for Post Hole digger (QTY will vary on length of individual attachments)
- Spanner/Catcher
- Can of PVC Pipe Glue Primer
- Can of PVC Pipe Glue
- Hacksaw
- Permanent Marker
- 8 ft. tripod with pulley
- 8 inch Water Bailer

Step 1 - Prepare the Well Screen

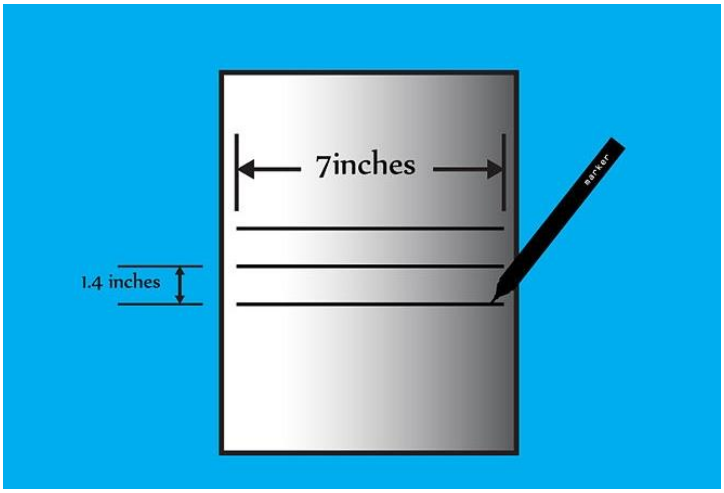
The well screen is the main structural component of the well. This component is the widest pipe used in the construction of the well, and it is called a screen because it has a series of circumferential slits cut along the length of the pipe (resembling a screen).

This screen allows water to enter the pipe (allowing the well screen to also act as a reservoir), while keeping out mud and other debris.

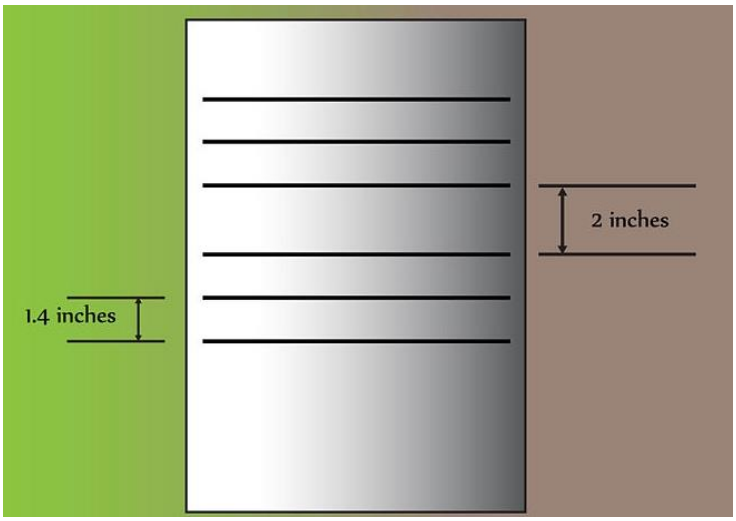
Mark the well screen pattern. The well screen will start 4 inches from the bottom of the 8 inch PVC pipe.



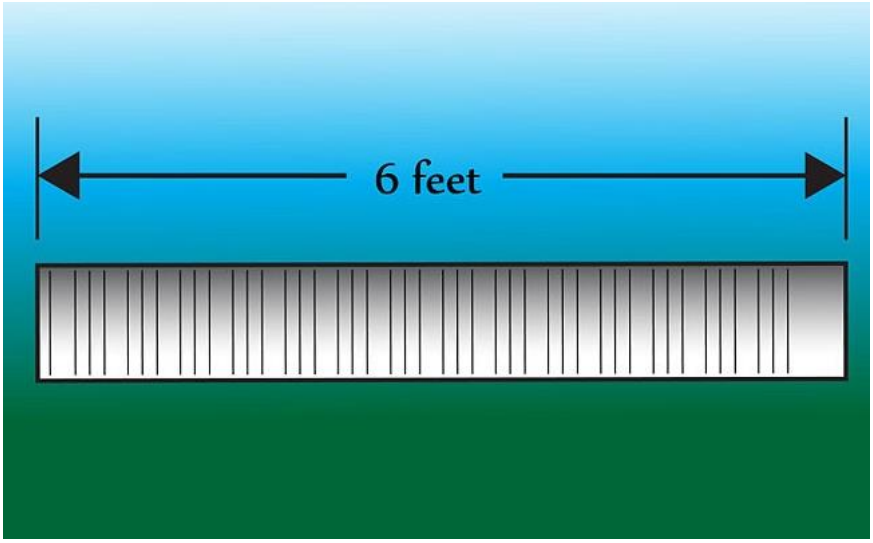
Using the permanent marker, mark three slits circumferentially around the 8 inch pipe. The slits should be approximately 7 inches long and should be equally spaced apart. The gap between each slit should be approximately 1.4 inches.



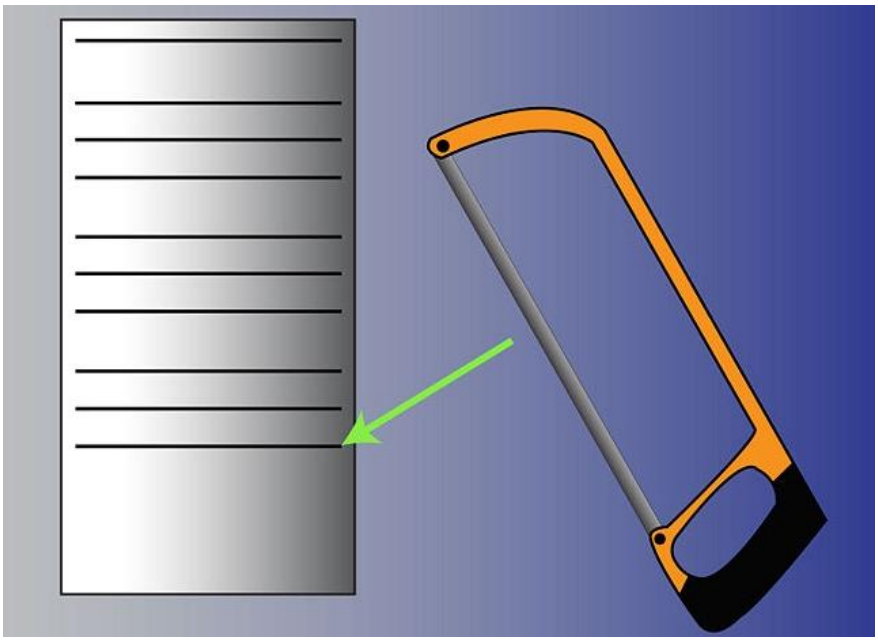
Repeat this step two inches above the first set of slits.



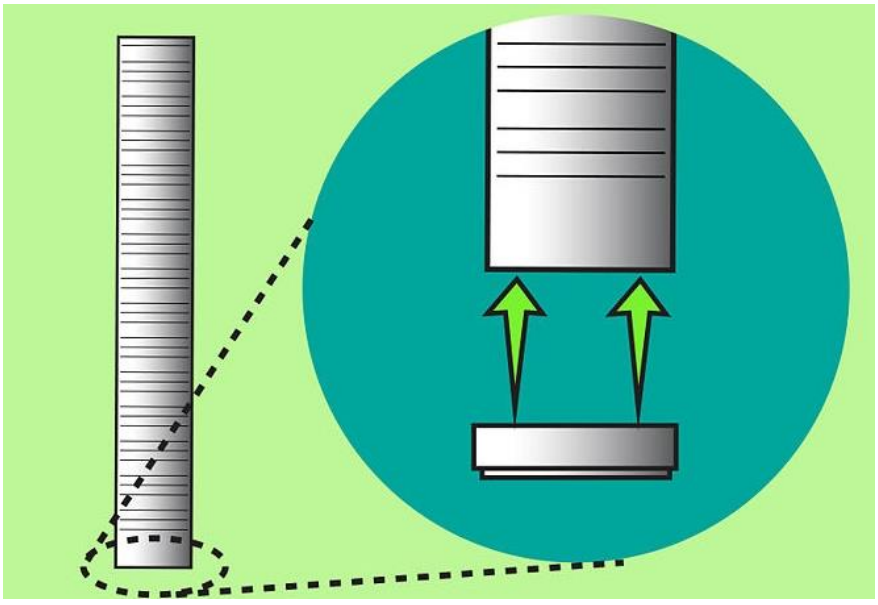
Repeat until the well screen is at least 6 feet in length.



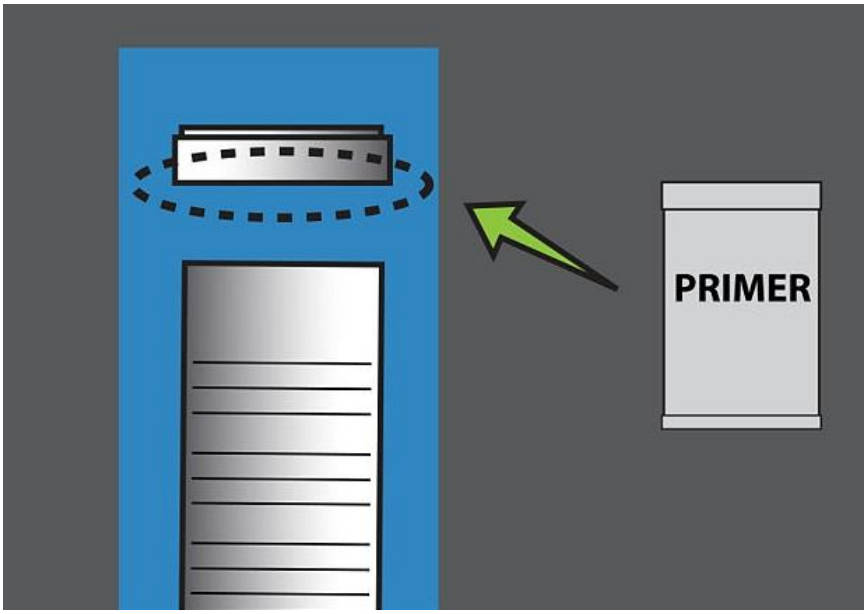
Use the hack saw to cut the well screen.



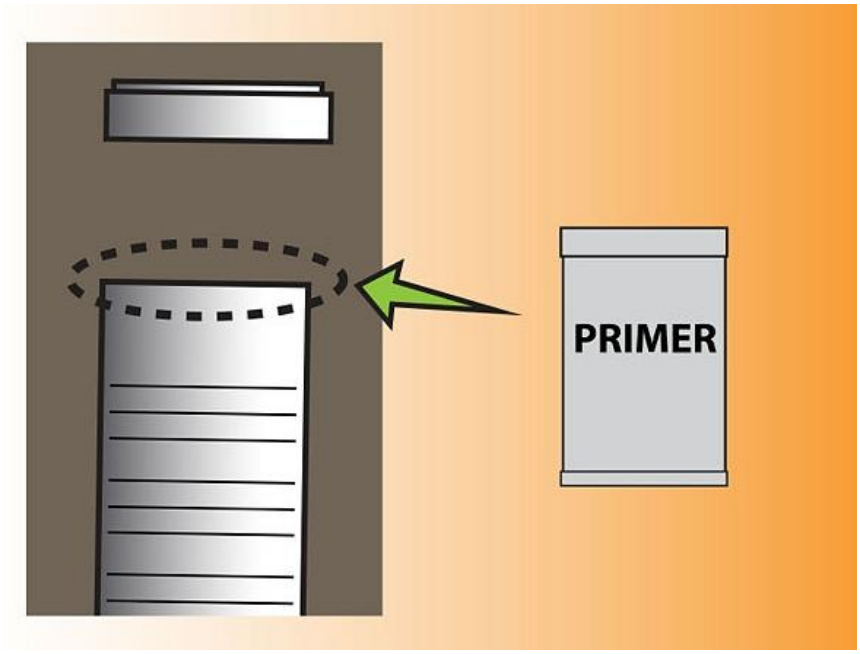
Cap the well screen



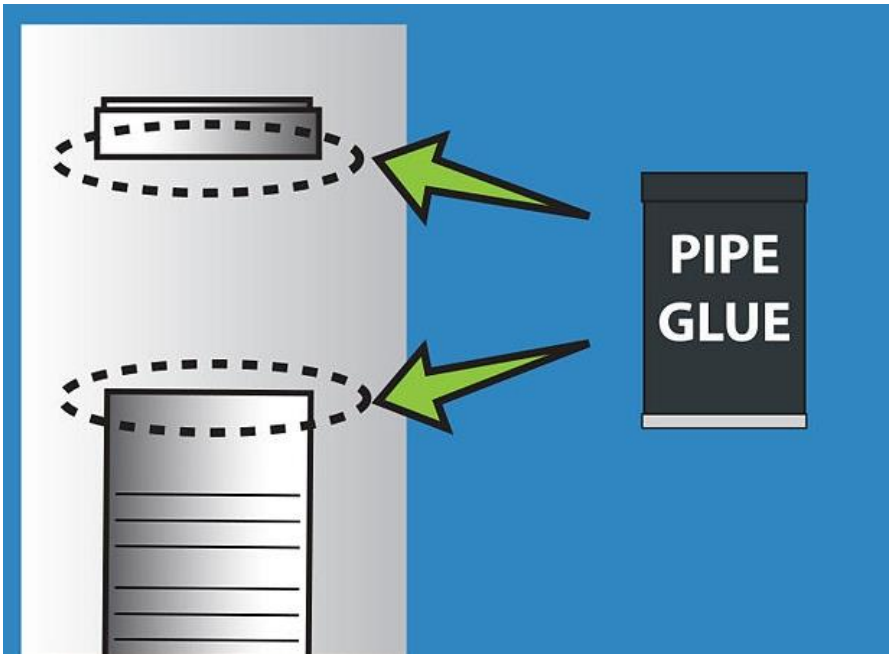
Apply a coat of primer to the mating portion of the end cap.



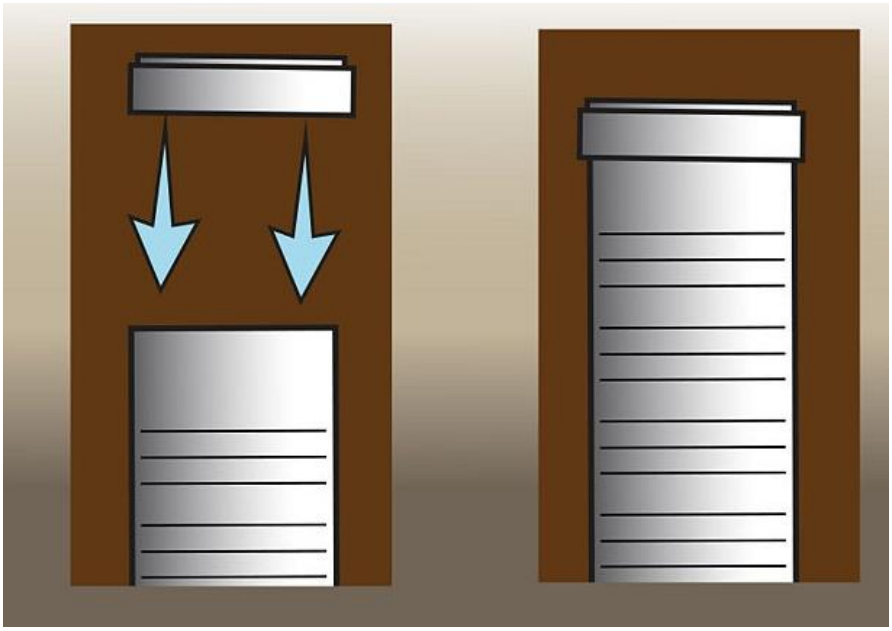
Apply a coat of primer to the mating portion of the well screen.



Apply a coat of pipe glue to the primed locations.

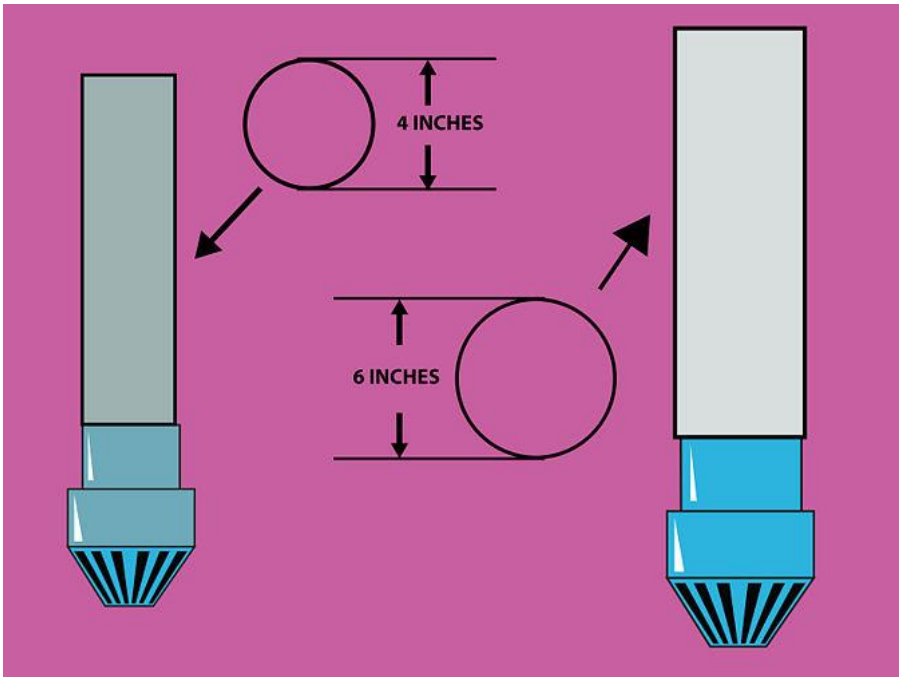


Install the end cap quickly and allow to dry (Installation will vary depending on end cap used).



Step 2 - Glue the foot valves

The foot valve is the mechanism that allows water to be drawn in but does not allow water to escape back out.

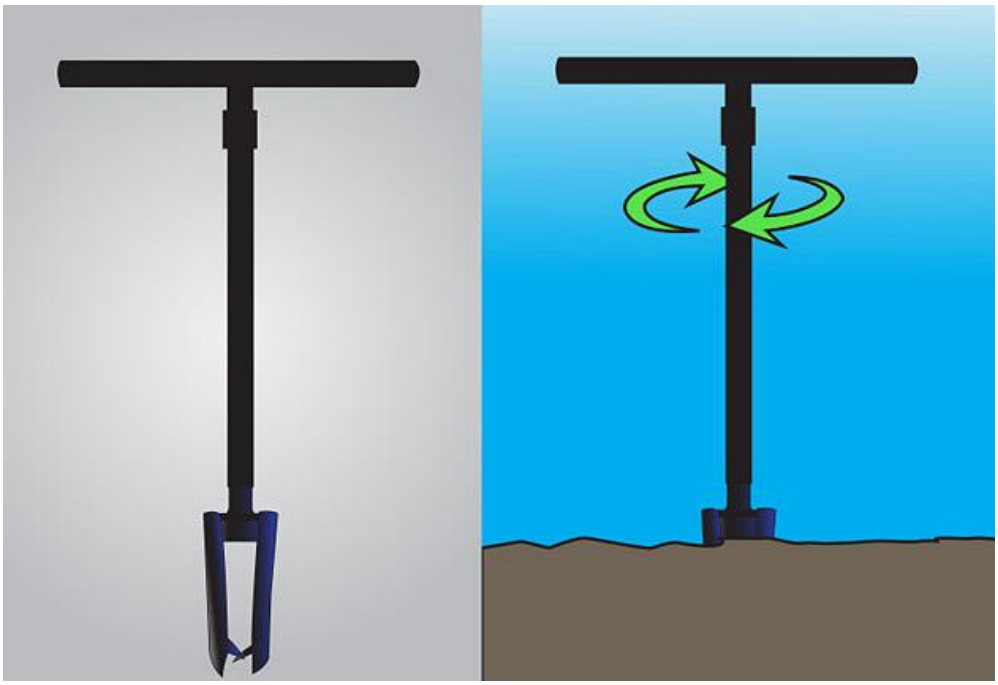


There are two foot valves used in this well. The first one is at the bottom of the six inch PVC pipe and the second one is at the bottom of the 4 inch PVC.

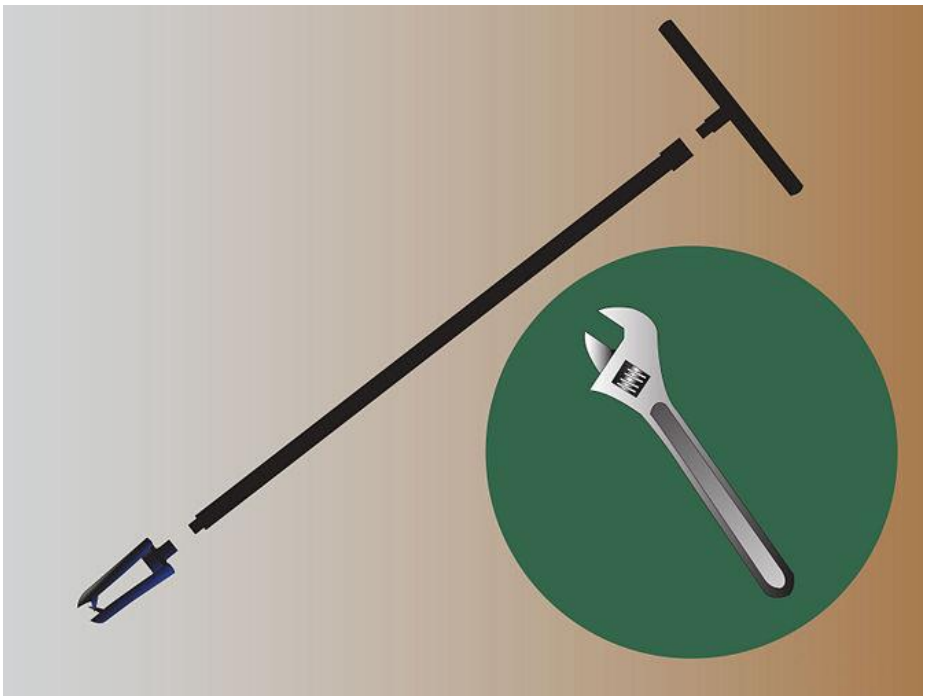
These mechanisms will allow the water to be drawn into the 6 inch pipe on the upstroke of the well, and it will push water through the 4 inch pipe on the down stroke. The down stroke will be the stroke in which the water is pushed out of the well.

Step 3 - Bore the well

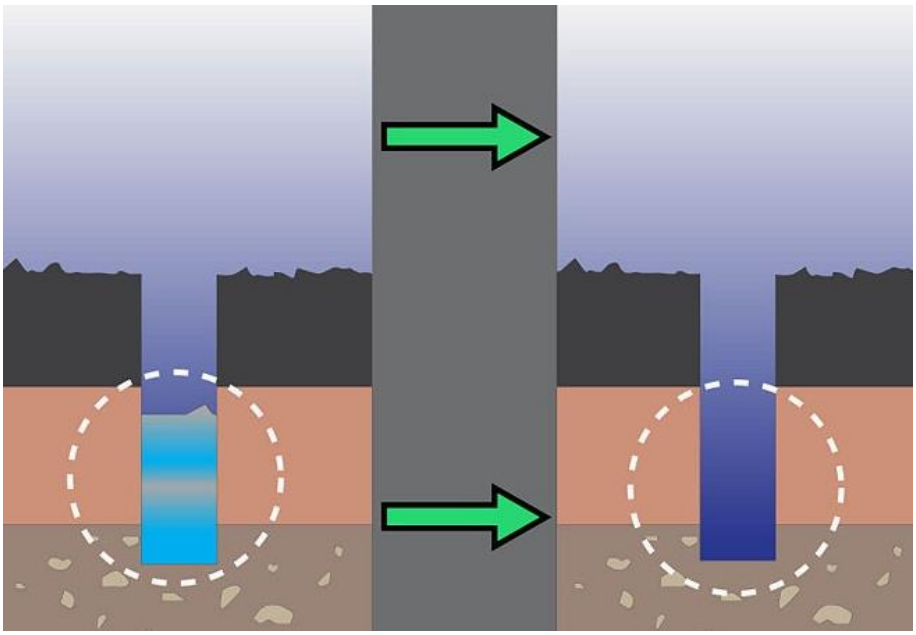
Use the hand auger to bore the well. Turn the auger in a clockwise direction into the ground. Remove the auger from the ground and empty it when full.



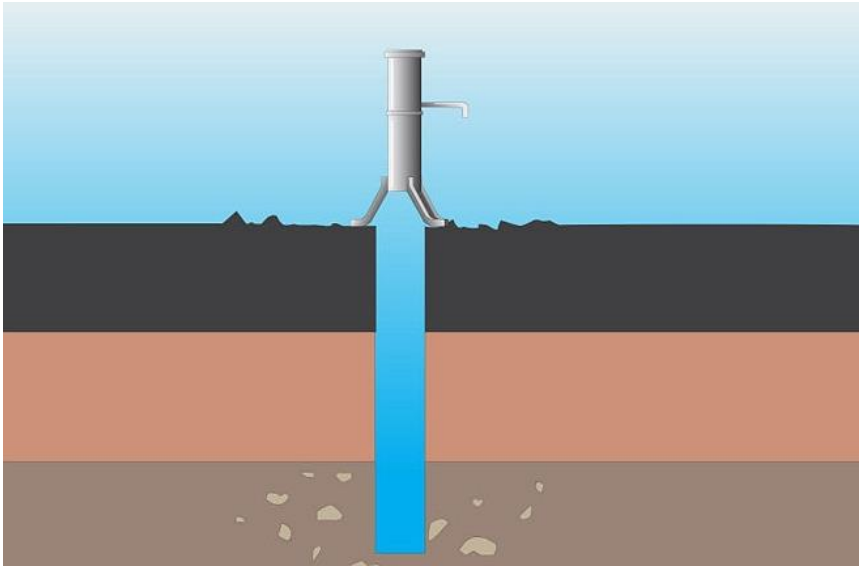
Continue to bore into the ground using the hand auger. When the bore is too deep for the auger attach a drill rod to the auger in order to make the auger longer. (Installing/ removing the auger from the bore becomes challenging when the auger with the drill rods becomes long. To overcome this, use the spanner catch the auger while you install or remove the auger in pieces.)



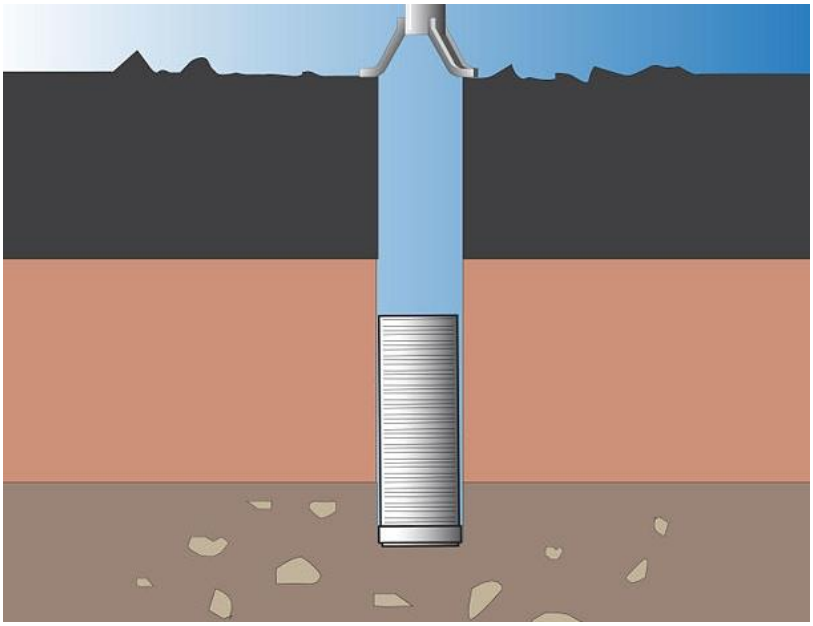
Step 4 - Bail the well



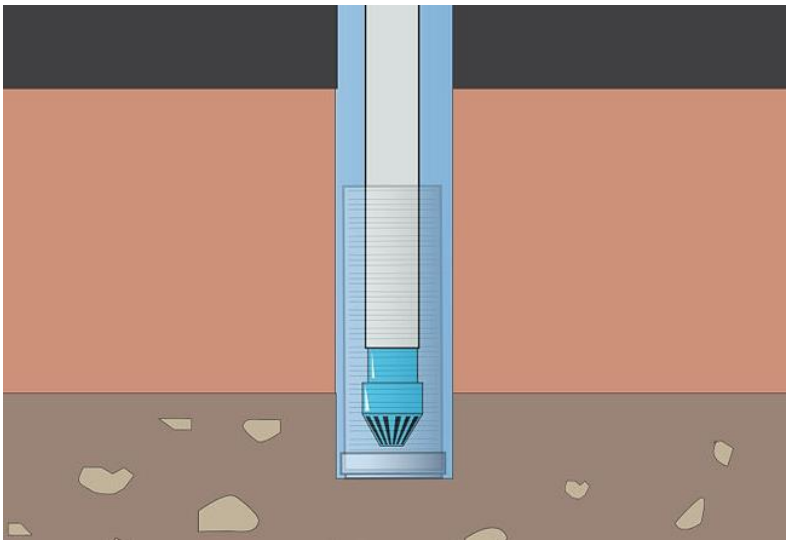
Step 5 - Set up the tripod directly over the bore



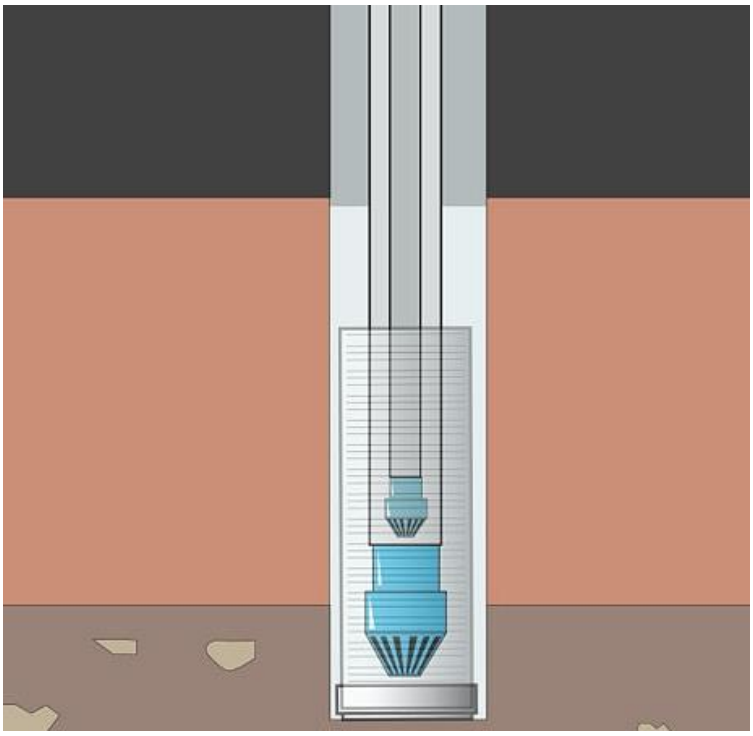
Step 6 - Install the Well Screen



Step 7 - Install the outer foot valve pipe



Step 8 - Install the inner foot valve pipe



Step 9 - Install the handle