

CREATING A CULTURE OF PREPAREDNESS

SURVIVAL BASICS: SANITATION AND WASTE MANAGEMENT

Twin-bucket System is the Way to Go When Disaster Strikes

Lauren Kraemer, Glenda Hyde and Lynette Black

The Cascadia Subduction Zone earthquake will cause heavy damage to our water and sewer systems, rendering them unusable for weeks, months or — for some communities — years. So, what will we do when our toilets, sinks and plumbing systems don't work? Does your household have the materials needed to create a safe and functioning hand-washing station and toilet for your family? You likely have some of the materials on hand at home already. We'll guide

Explore the online sessions!

Discover what an earthquake and tsunami are like in OSU Extension's free online training, Preparing for the Cascadia Subduction Zone Event. Videos, virtual reality simulations, interactive maps, a Cascadia checklist and other resources will help you prepare for natural disasters.

FREE at beav.es/Cascadia

you through the process of creating your "off-grid" water and sewer system before a disaster or emergency so that you can more easily transition to that system once disaster strikes.

According to scientists, there is a 37% chance that an earthquake with a magnitude of 7.1 or higher will hit the Oregon Coast in the next 50 years. The earthquake is expected to occur along the Cascadia Subduction Zone, a 600-mile fault off the Pacific Coast that runs from Vancouver, British Columbia, to Northern California. There have been 41 earthquakes along the fault in the last 10,000 years. The last one, in 1700, had a magnitude of 9.0. Oregon emergency services officials say that residents could be without services for two weeks or longer after an earthquake on the fault.

Many emergency management and disaster planning agencies in the Pacific Northwest have acknowledged



Photo: Regional Disaster Preparedness Organization

The components of the twin-bucket system are easy to acquire.

the need for toilets after seeing the challenges of waste management after earthquakes in New Zealand and Japan. Despite the higher level of preparedness in those communities, residents still struggled initially with proper and safe waste management. Without the ability to safely and effectively dispose of human waste, we can experience secondary disasters when cholera, salmonella and other fecal-oral transmitted diseases spread. If human waste is not managed properly, flies, pests and rodents can spread germs or spores of feces to our food and the open water sources on which

Lauren Kraemer, Extension Family and Community Health Faculty, Hood River and Wasco counties, and associate professor of practice; Glenda Hyde, Extension Family and Community Health Faculty, Crook, Deschutes, Jefferson and Wheeler counties, and associate professor of practice; and Lynette Black, 4-H and Extension Specialist, Wasco County; all of the College of Public Health and Human Sciences, Oregon State University.

we may rely. Despite these issues, toilets and waste management supplies don't always make it on the list of emergency supplies. One of the reasons some families and communities have "toilet blindness" is because prior disasters like snowstorms, fires or epidemics don't damage sanitation systems and infrastructure.

Two agencies are working to address toilet blindness in our emergency and disaster planning. Public Hygiene Lets Us Stay Human, or PHLUSH, is a volunteer and advocacy group based in Portland, Oregon. The Regional Disaster Preparedness Organization of the Portland metropolitan region, with funding from the U.S. Department of Homeland Security Urban Areas Security Initiative grant program, is another agency. The Regional Disaster Preparedness Organization has developed excellent materials, including an Emergency Toilet Guidebook and printable labels for a twin-bucket toilet system in multiple languages. Additionally, its website, <https://rdpo.net/emergency-toilet>, guides households on how to use a twin-bucket system, build a latrine and continue to use a home's septic system if it hasn't been damaged. We'll briefly outline the twin-bucket system here. We encourage you to print out a copy of the Emergency Toilet Guidebook for your disaster kit to review further.

The twin-bucket system was adapted by the Regional Disaster Preparedness Organization from the New Zealand twin no-mix emergency toilet, which is nicknamed a "long-drop." Residents and agencies prefer the twin-bucket system for disaster planning because it is safe, easy to manage and inexpensive. You can often get used 5-gallon buckets for free or purchase the supplies for less than \$20. As a bonus, the buckets can serve as storage for other emergency supplies.

The "no-mix" principle of the twin-bucket system reduces both volume and pathogen load. Pathogens are anything that can produce disease, including viruses, bacteria, parasites, protozoa and fungi. "No-mix" means urine is separated from feces. Pee has volume and odor but is generally sterile. Poo has pathogens, but when you add wood shavings, sawdust, shredded paper, bark chips or peat moss, it composts down to a small volume. Wood pellets take less space in storage and can regain their original texture with a small amount of moisture — from the poo or by a light misting of water before they are spread over the poo. By keeping pee and poo separate, waste is easier to store and dispose of.

If your home has not been heavily damaged during the earthquake and is still habitable, you may be able to set up your toilet and hand-washing systems in your existing bathroom. This adds to the feelings of normalcy as well as maintains privacy. If your home is not safe to occupy, the toilet and hand-washing stations will need to be set up outdoors or in a separate, safe structure. Every property is different, but as you site your stations, consider ease of access, privacy and pest contamination.



Photo: Lauren Kraemer

If a home is safe to live in after a disaster, you can place a twin-bucket toilet system in a bathroom.

In the aftermath of a disaster, people often feel vulnerable and scared. If your faucets, flush toilet and sewer system aren't working, people in your household will appreciate the comfort, hygiene and safety that come with this simple twin-bucket toilet and hand-washing system.

Toilet system

How to set up a twin-bucket toilet system

- Get two 5-gallon buckets. Home improvement stores or bakeries are great places to find inexpensive buckets or even free, used buckets.
- Mark the buckets "pee" and "poo" (or #1 and #2, or urine and feces). Check out the ready-made labels at <https://rdpo.net/emergency-toilet>. Many city and county emergency management departments are printing the labels on adhesive vinyl stickers so they are waterproof and easy to affix to the buckets.
- The pee bucket can remain unlined. The poo bucket should be lined with a heavy-duty 13-gallon black plastic garbage bag. Heavy-duty bags are often called "contractor" bags and have a thickness of 3–5 mil. (Note: Mil will be referred to on the packaging of the bags.)
- Purchase or make a seat. Most camping/outdoor sections of stores carry the seat/lid combos. A pool noodle cut in half and then sliced down the long side can be attached to the top of the bucket for



Source: The Noun Project
Heavy-duty plastic garbage bags have a thickness of at least 3 mil.

some padding in absence of a seat. The seat can be moved from one bucket to the other.

- Purchase toilet paper (RV toilet paper breaks down the best), plastic garbage bags, disposable gloves and the carbon material (wood shavings, sawdust, shredded paper, bark chips or peat moss). Store those items inside the buckets. Keep these stored and ready until you need to use them.

How to use a twin-bucket toilet system

- Set up the buckets in a private space. This could be an existing bathroom if space allows or elsewhere indoors or outdoors with a privacy screen or curtain.
- Try not to pee in the poo bucket. This is really important because the pee is the component that produces the strong smell in toilets that mix.
- After using the pee bucket, place toilet paper in either the poo bag or a separate plastic bag rather than dropping it in the pee bucket. This ensures that you can easily dump out the pee later on. Remove the seat and cover with a lid that closes well.
- After using the poo bucket, sprinkle about a half cup of carbon material (wood shavings, sawdust, shredded paper, bark chips or peat moss) so that it completely covers the surface of the poo. This will eliminate odors and ensure flies do not make themselves at home. Flies can carry germs and spores of feces to human food and open water sources. If you collect toilet paper separately in a plastic bag, it is easier to be sure the poo is completely covered.
- Put the toilet seat back down, ensuring it's not airtight. Give your poo some air and it will dry out and reduce in volume.

Disposal of waste from a twin-bucket system

- When the pee bucket is roughly one-quarter full or before it becomes too heavy to safely carry, add some water to the contents if possible to dilute the urine and simply pour on the lawn or ground. Try to change locations each time so the chemicals in the urine don't damage the ground.
- Fill poo bucket no more than half-full of waste. When ready to empty, put on disposable gloves, double-bag the waste, tightly seal or close, and store separately from other garbage and far away from your food and water. A dedicated and separate garbage can or roll cart is a good option for storing waste. Secure waste from pets, flies and rats. Reline the bucket with the heavy-duty bags for continued use. If you live in a more rural area, consider digging a latrine or hole and burying the poo. Do not bury waste within 100 feet of a



Photo: Lauren Kraemer

A hand-washing station can be set up in an existing bathroom.

water source or where the contaminants can leach downhill into a water source.

- You will likely have to store the waste until the public sanitary system is fixed. Do not put human waste into the normal garbage. It has to be specially treated and should not go in a landfill with other household waste.

Hand-washing system

Being able to thoroughly and regularly wash your hands will ensure that you stay healthy and well following a disaster.

All that is needed for a hand-washing station is a jug of clean water (potable) with an on/off spigot, soap, towels and a catch bucket for the used water. If possible, set up two hand-washing stations — one near the area where food is prepared and the other next to the emergency toilet to encourage people to wash their hands after using the bathroom.

Place a water jug with a spigot at an existing sink in the home and allow it to drain into a catch basin set in the sink. You can also place a bucket underneath the sink and disconnect the plumbing to allow the sink to drain into the bucket. If the sink will be set up outside the home, set the water jug on a table or counter and set a bucket below to catch the used water.

Additionally, you can tie a water jug with a handle (or clean, sanitized milk jug) to a tree branch. Place soap and towels near the hand-washing station so they are easily accessible. Put some bar soap in the toe of a tube sock or nylon stocking and tie it to the handle.

Water collected in the bucket or basin can be used to dilute urine before dumping outside. Do not attempt to treat the water from the catch basin to reuse for other purposes. Regularly sanitize the spigot handle to avoid

cross-contamination. If possible, use disposable paper towels to turn the spigot off when you're done rinsing hands.

A note about hand sanitizer: The [CDC](#) recommends washing your hands with soap and water whenever possible because hand-washing reduces the amounts of all types of germs and chemicals on our hands. If soap and water are not available, using a hand sanitizer with at least 60% alcohol can help you avoid getting sick and spreading germs. However, hand sanitizer is only effective when your hands are free of dirt, grime, grease and debris. Hand sanitizer is not effective against all types of germs, and many people do not use enough sanitizer to adequately "kill" some microbes. Finally, hand sanitizer does not remove chemicals like heavy metals, pesticides or other toxins that may be present in our soil, air and water following a disaster.

Special considerations

Special considerations for household members who use diapers

If any of your household members use disposable diapers, consider having an extra supply on hand as a part of your disaster preparedness kit. Don't forget to rotate them into use and replace them with the next size as your infant grows. If your little one is potty-training and prefers using a small child-sized toilet, they may continue to do so and you can add their pee and poo to the buckets used by the other household members. Soiled infant and adult diapers should be bagged in heavy-duty 3–5 mil black plastic bags and disposed of along with bagged poo when garbage service becomes available.

Special considerations for household members with mobility or balance challenges

For older adults with mobility or balance challenges, consider placing the buckets in a location where sturdy chairs, railing or other materials can assist with getting on and off the toilet. Elevating the toilet buckets with scrap wood or bricks may also help with accessibility.

Special considerations for household members who use menstrual products

- If any of your household members use menstrual products including tampons, pads or cups, consider having an extra supply on hand as a part of your disaster preparedness kit. Because of their high absorbency, pads and tampons are also useful in the first-aid kit for dressing wounds.
- Soiled sanitary napkins and other menstrual products should be bagged in heavy-duty 3–5 mil black plastic bags and disposed of along with bagged poo when garbage service becomes available.

Good hygiene is in your hands

The [Centers for Disease Control](#) recommends hand-washing during these key times when you are likely to get and spread germs:

- Before, during and after preparing food.
- Before and after eating food.
- Before and after caring for someone who is sick with vomiting or diarrhea.
- Before and after treating a cut or wound.
- After using the toilet.
- After changing diapers or cleaning up a child or adult who has used the toilet. See CDC guidance on diapering, <https://www.cdc.gov/healthywater/hygiene/diapering/index.html>.
- After blowing your nose, coughing or sneezing.
- After touching an animal, animal feed or animal waste.
- After handling pet food or pet treats.
- After touching garbage.

- Dispose in the same manner as toilet paper.
- Menstrual cups: As menstrual cups have become more popular, different options have become more accessible. They are washable and reusable and typically do not need to be changed as frequently as pads or tampons. This makes it easier to keep your space cleaner and reduces exposure to bodily fluids. It's a good idea to get comfortable with a menstrual cup before an emergency. You might find you want to use it all the time. Or, you might find that you don't like it and you'll want to prepare alternatives. The fit matters, so here's a quick quiz to find the best menstrual cup for you: <https://putacupinit.com/quiz/>.

What to do ...

... Immediately following the Cascadia Subduction Zone earthquake or other disaster if you are in a hard-hit area

- As a proactive measure, turn off the water supply to your home to avoid contamination from broken pipes along the supply infrastructure and to prevent leaks. You can turn it back on once it is determined the pipes are not broken. Your city water district or local county health department may recommend boiling water for a period of time following the disaster if there has been a loss of pressure or other contaminants introduced into the water.

- Avoid using toilets even if your home sewer lines are not damaged. Your home's pipes might be OK but pipes in the street may be broken. Local authorities may be able to tell you if using your toilet is safe through emergency radio or community message boards. If you have a septic system, it may be safe to continue using as long as you do not see signs of leaking or backing up into the home.
- Set up your twin-bucket toilet system and hand-washing system.
- Check with local officials for recommendations to properly dispose of human waste. Local radio stations may share this information.

... To prepare ahead of time

- Learn where water shut-off valves are in your home and at the connection point to the water supply.
- If your water comes from a household well with an electric well pump, consider having a generator to ensure you can continue to access water without electricity. Many well pumps run on 220-volt power (instead of the usual 110-volt power supplied by regular home generators).
- Anchor your water heater to the wall with straps to ensure it doesn't fall over during an earthquake and learn how to drain the water inside. The 60–80 gallons of water inside a water heater can be used for drinking and sanitation if not contaminated. Filtering the water with a carbon filter (like a Brita filter) is a good idea because metals like lead and copper can sometimes leach out of hot-water tanks.
- Prepare and store enough water for your household (humans and pets) for at least two weeks, assuming a minimum of 1 gallon per person per day. Note that 1 gallon is the minimum and won't go far when you consider your needs for hydration, sanitation, cooking, dish or clothes washing, and any other needs. To calculate the *minimum* number of gallons of water needed for drinking and hygiene for two weeks,

multiply the number of humans and pets by 14. See *Survival Basics: Water*, EM 9285, <https://catalog.extension.oregonstate.edu/em9285>, for more information about water needs during a disaster.

- Have a way to purify water either by filtration, chemicals or boiling if you need to use surface water following a disaster.
- Assemble materials needed for the twin-bucket toilet system and hand-washing system.

For the twin-bucket toilet system:

- ◆ Two 5-gallon buckets with lids; label buckets “Pee” and “Poo.”
- ◆ Carbon material (wood shavings, sawdust, bark chips, shredded paper).
- ◆ Toilet paper.
- ◆ Toilet seat or a pool noodle split down the middle for comfort.
- ◆ Several boxes of 3–5 mil black plastic garbage/contractor bags.
- ◆ Closable bags to hold used toilet paper.
- ◆ Screen, curtains or tarp for privacy if system will not be placed in existing bathroom.
- ◆ Latex or nitrile gloves to wear when bagging poop.

For the hand-washing system:

- ◆ Full water jug with on/off spigot or preassembled foot pump set-up.
- ◆ Soap.
- ◆ Towels. (If using cloth towels, replace them daily.)
- ◆ Catch bucket or basin to put in existing sink, below the sink or below the spigot.

Many outdoor retailers and online stores sell ready-made waste management and hand-washing systems. You may also purchase or make a pressurized or pump shower, many of which are solar powered, to provide warm water.

Resources

CDC Guide to Handwashing. Centers for Disease Control. <https://www.cdc.gov/handwashing/when-how-handwashing.html>

CDC Show Me the Science — When & How to Use Hand Sanitizer in Community Settings. Centers for Disease Control. <https://www.cdc.gov/handwashing/show-me-the-science-hand-sanitizer.html>

Disaster Sanitation Planning Guide. PHLUSH (Public Hygiene Lets Us Stay Human). https://docs.google.com/document/d/14NRgCmHR7Y9EG236Z4j_IQ9HOYswGyrnWv-M1ugz7s/edit

Disaster Sanitation Resource List. PHLUSH (Public Hygiene Lets Us Stay Human). <https://docs.google.com/document/d/1WaEy7O3fHM4MS-SLaXcp0KH0H2FLwLkF8ZR7vvVAwFk/edit>

Domestic Well Water Safety. United States Environmental Protection Agency. <https://www.epa.gov/privatewells/protect-your-homes-water#floodwellanchor>

Emergency Toilet Guidebook. Regional Disaster Preparedness Organization. <https://rdpo.net/emergency-toilet> or https://docs.google.com/document/d/1Pt4W2ul_nfBeES0-a138SFGN9_5-rCDcV45lbfvligA/edit

Emergency toilet website. Regional Disaster Preparedness Organization. <https://rdpo.net/emergency-toilet>

Emergency toilet twin-bucket system labels. Regional Disaster Preparedness Organization. <https://rdpo.net/emergency-toilet> or <https://drive.google.com/file/d/1NXByvyIEUjzCET1qkDwEM5pwlnswr3kw/view>

How to Build a Latrine. Regional Disaster Preparedness Organization. https://drive.google.com/file/d/1XuW_A7Tqo6jMpwIRo2PXBfji0F4UmfeW/view

How to Check Your Septic System. Regional Disaster Preparedness Organization. <https://drive.google.com/file/d/1Up-1FHWwgx66DqmCkDbFmQ9n27n2wWDc/view>

Survival Basics: Water, EM 9285, Oregon State University Extension. <https://catalog.extension.oregonstate.edu/em9285>

Acknowledgments: Special thanks to our reviewers: Ian Stromquist, REHS-emergency response coordinator; Carrie Burkholder, compliance officer for Oregon State University Agricultural Experiment Stations; Rick Griffiths, New Mexico State University Extension Service; Kate Hart; Emily Whittier.

This publication will be made available in an accessible alternative format upon request. Please contact puborders@oregonstate.edu or 1-800-561-6719.

© 2021 Oregon State University. Extension work is a cooperative program of Oregon State University, the U.S. Department of Agriculture, and Oregon counties. Oregon State University Extension Service offers educational programs, activities, and materials without discrimination on the basis of race, color, national origin, religion, sex, gender identity (including gender expression), sexual orientation, disability, age, marital status, familial/parental status, income derived from a public assistance program, political beliefs, genetic information, veteran's status, reprisal or retaliation for prior civil rights activity. (Not all prohibited bases apply to all programs.)

Published October 2021