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ARC

Flooding Toolkit

**PERMACULTURE SOLUTIONS FOR
REDUCING RISK FROM FLOODS,
MUDSLIDES, AND SURGES**

FLOOD

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Part 1: Introduction

This toolkit will help you understand the different types of flooding, assess your risk, and take steps to become more flood-resilient. Our goal is to help you make better decisions and bring you some peace of mind — before, during, and after a flood.

Contents of toolkit

The toolkit draws on advice and successful outcomes from FEMA, rescue agencies, builders, scientists, and our own experience. It is organized into four parts:

- **Risk assessment** -- What is your personal risk? What type of flood damage is possible in your area?
- **Surviving a Flood** -- Immediate, life-saving triage steps and fast actions you can take to stay safe and reduce damage. Start here if a potential flood is headed your way.
- **Preparation** -- simple steps to take ahead of time to reduce or prevent flood damage to your home or possessions
- **Recovery** -- What are the most important steps to minimize damage and maximize recovery? Cleanup, mold prevention, repairs and insurance.

→ In addition, we offer a **Deep Dive Guide for Flooding** -- A comprehensive, resilience-focused approach to flood preparation for individuals and communities, as well as related guides for Hurricanes and Landslides.

How to use this toolkit

Determine your risk: If you haven't completed the general  [Risk Assessment Guide](#), consider doing this first.

Then, read the section “**Understanding your risk**” for flooding below and complete the exercise to find out your vulnerability to flooding specifically, and where to focus.

Make a plan

- **Evacuate or Shelter in place?**: Determine which and create a plan.
- **Preparation**: Work out the steps you will take to protect people, pets, your belongings and home, using the preparation section.
- **Recovery**: Study the recovery steps so you know what you will need to do if your home is ever flooded.

Implement the plan

- Use the checklists from this Toolkit and the [General Toolkit](#) to complete each step of the plan so that you're ready to respond if a flood comes.
- Create a “go bag” and take other preparation steps.
- **Practice**: Drill the steps of the plan so that you and your family know how it works.
- In the event of a disaster, hold an after-action debrief, if possible, to discuss how it went and what could be improved.

→ **Create deeper resilience.** Study our [Deep Dive Guide](#) to gain an understanding of how you can create deeper resilience to flooding and help your community to do so as well.

Remember: Take one step at a time. Do the most vital items now. Add other upgrades later. Any preparation reduces stress and loss; no action is too small.

Part 2:

Mental outlook

Disasters are not something most people want to think about. Some may have past experiences that make it harder to do. This section offers some strategies for making it easier.

Decision readiness

Flooding can happen fast. A clear plan for both evacuating and sheltering in place means you won't be scrambling to figure out what to do when the pressure is on.

Peace of mind

Understanding your specific flood risk makes it easier to envision specific, practical steps you can take. Once you and those you're working with have a plan and have practiced it, you'll feel more secure knowing you can respond effectively when it matters.

Supporting each other

There are advantages to doing this process with others. Are friends, relatives or neighbors, or groups you are already part of interested in working on this together? Meeting periodically to prepare together can make the process more enjoyable. You may learn from one another, help each other find resources and discover other benefits, while minimizing potential isolation or anxiety.

Communities and groups tend to fare better after disasters. A strong community is the single biggest predictor of how well a neighborhood will do before, during and after a disaster. Any action you take to get support and prepare together is useful. Start small, and build!

Self care

See more information about successful mental and emotional recovery in the recovery section - this is important both before and during a disaster as well!



Part 3:

Understanding your risk

This section explains where and how floods occur, how to determine your personal risk, and the unique challenges present in different types of flooding. This information helps you to determine what actions will be most helpful for your situation.

Flood damage costs are rising to the tune of billions of dollars per year, driven by three main factors:

1. **Changing rain patterns** — more frequent and intense storms causing higher floods and flooding in new places
2. **New homes** built in or near floodplains
3. **Land development** that destroys wetlands, prairies, and other natural features that once absorbed millions of gallons of floodwater

Find your flood risk

This activity will help you determine the flood risk for your home or work and surrounding area.

Using maps

- **Flood risk:** Check your flood risk with [FEMA's National Flood Hazard Layer \(NFHL\) Viewer](#) - zoom in on your state and neighborhood. Are you in or near a mapped floodplain? Print your area + surrounding roads. Note, FEMA maps are conservative which means that flood risk is higher than FEMA indicates in many areas. The real estate service Redfin.com provides a flood map that includes more extreme scenarios. Enter your address into the website and click on the map to see flood risk.
- **Elevation:** Use a phone app like “Altitude” to compare your home’s elevation to nearby low points and creeks. This tells you how high flood waters would need to rise to reach you.

Note that extreme flood events have risen a few dozen feet over normal levels, depending on topography, or how the land is shaped. Hills and canyons can concentrate water, causing it to rise further in valleys than in plains.

Important! Extreme flood events have risen a few dozen feet over normal levels, depending on topography, or how the land is shaped. Hills and canyons can concentrate water, causing it to rise further in valleys than in plains.

Observing your site

Find the nearest low point and outlet

- ☐ **Stand in the street:** is your house pad lower than the curb/street (bad), level, or higher (better)? What about other structures if you have them? Are any of your structures up on blocks or elevated in some way (this may indicate past floods or risk of flooding)?
- ☐ **Is your site in a low spot** on the land (surrounded by hills)?
- ☐ **If you live in an apartment,** what is the flood level expected? Will it cover the street?
- ☐ **(After a rain)** Where does water leave your property and where does it flow? For example - it might drain from downspout to driveway to street to a storm drain, and then to a creek.
- ☐ **Trace your evacuation route** for low spots
- ☐ **Note underpasses,** dip-downs in the road, and low bridges that could flood first. Where does water sit the longest after a rainfall?
- ☐ **If you don't have a vehicle,** apply this to bus routes, walking, biking or other transport.

Locate potential chokepoints or clog points

- ☐ **Identify nearby culverts,** grates, and backyard drainage ditches (also called swales). If they clog, where will water back up?
- ☐ **Look for high points** in side yards that could prevent water in the back yard from draining to the street.

Look for ponding clues; where does water settle and stay?:

- ☐ **Water marks** on fences or buildings, algae lines on foundations, lichen lines on trees, silt on sidewalks, accumulations of organic sediment in puddles, greener areas in otherwise dry seasons.

Higher risks to keep in mind

- House pad or driveway sits below street grade; the yard slopes toward the house.
- Roads leaving the area cross a low bridge or dip that floods early.
- Storm drains frequently clog; water pools at the end of cul-de-sacs.
- Recent upstream development (more pavement) may send more runoff toward you.
- You are located just outside a mapped floodplain or in a “shaded” (moderate) zone on the flood zone map.

Assess infrastructure risks

- ☐ **Will key infrastructure** be impacted by flooding, like cell service, major freeways, utilities, local gas and grocery stores, etc?
- ☐ **Are you prepared** to shelter-in-place without access to these if so?

Using real time flood maps

These show you how fast and far the flood is rising during a flood event:

- Use the [USGS real time flood map](#) for current flood warnings in your area.
- Use the USGS National Water Dashboard which gives you a live reading of local streams to find the closest gauge and its “flood stage.”

<https://www.usgs.gov/tools/national-water-dashboard-nwd>

You’re now better oriented to your risks.

See our [Flooding Deep Dive Guide](#) for more information about more in-depth preparation.

Flooding warnings and advisories

Most local news stations will provide up-to-date warnings of potential flooding, but they may not share enough specifics, so confirm with [weather.gov](https://www.weather.gov) if there is any doubt.

Flood advisory

Definition: Heavy rain is forecast and may require additional action.

Your Action: Stay aware of changing conditions. Now is the time to ensure your go-bag or shelter in place needs are all in place, your flood barriers are prepared, your pets are gathered, and you are prepared to carry out your flood plans

Flood watch

Definition: A Flood Watch is issued when conditions are favorable for flooding. It does not mean flooding will occur, but it is possible.

Your Action: Be prepared. Take any last minute preparation steps for your home, your group and your animals. Advisory or watch is when you should evacuate if you’re at risk - if you wait for a warning, your evacuation route could be cut off. In a flash flood situation, it’s possible you won’t get a warning in time to move to higher ground. Be aware of the risks. Overestimating them saves lives.

Flood warning

Definition: Issued when the flood is already happening or is imminent. Because flooding can cover large areas, happen quickly, and make evacuation difficult, don’t wait for a warning to evacuate if you are in a floodplain or near one. You don’t want to be in a floating car or hit by a falling tree or power line.

Your Action: Take immediate action. Take any last minute steps to shelter in place. If you know you can safely leave (meaning there are no roads out that are vulnerable to flooding) and if there is a chance your location could be flooded, evacuate if you haven’t already done so.

Other warnings and watches

Areas subject to storm surge, flash flooding, tsunamis and mud flows will have watches and warnings for those events. See below for deeper explanations of these risks.

Types of flooding

Different types of flooding carry differing risks and can require different types of preparation. Understanding how they vary can help you be aware of the specific risks of each and prepare more effectively.

Heavy rainstorms

Heavy rainstorms can cause rapid flooding or can sometimes last for days, saturating the ground and creating a “slow flood” type of effect in low lying areas. Sometimes flooding can move downstream, far from the major areas of rain. Flood effects can be magnified if the ground is saturated from previous rains or snow melt. Heavy rainstorms can cause flooding in any low lying area and are the most common forms of flooding. For example, in Iowa:

IMPACT: Widespread slow flooding occurred in June of 2008, following snow melt from heavy winter snows, heavy spring rainfalls, and a late May series of severe thunderstorms that saturated the soil. Farming practices of draining water rapidly off of fields and clearing trees near waterways prevented rainwater from infiltrating into the ground and feeding more gradually into waterways, which caused higher water levels in major rivers. Additional June storms were the last straw. As water flowed from saturated fields into streams and rivers, flood levels continued to rise for days after the rain ended.

IMPACT: Crop damage exceeded \$8 billion, roads were closed for days from both flooding and water damage to the pavement; This included impacts to major freeways and railways. Levees were breached in multiple towns in Iowa and thousands of people had to evacuate. Power outages occurred throughout Eastern **Iowa**.

IMPACT: In Cedar Rapids, where the worst flood damage occurred, flooding started on June 9 and peaked on June 12. Floodwaters didn't recede until June 18th.



About 15% of the town of Cedar Rapids, Iowa was flooded in a series of heavy rainstorms in 2008, including the downtown area and government buildings. The city and region have since implemented a number of nature-based solutions to mitigate future flooding. See our Flooding Deep Dive Guide for more information on mitigating flood damage. US Army Corp of Engineers: <https://www.iwr.usace.army.mil/Media/News-Stories/Article/1641311/10-lessons-learned-from-the-cedar-rapids-2008-flood-in-new-iwr-report/>

Flash flooding

Flash floods often strike in deserts, drylands, and mountainous areas. With fewer plants to slow or absorb water, or in narrow canyons where water is concentrated, runoff rushes to the lowest point fast.

If you're in a valley or canyon, you may be at risk even if there is no rain nearby — the storm could be many miles upstream, with flooding arriving hours or days later.

IMPACT: A deadly flash flood occurred in July of 2025 in the Guadalupe River watershed in Kerr County, **Texas**, where water rose 26 feet in 45 minutes, reaching a height of 37 feet above normal overnight, killing more than 135 people.

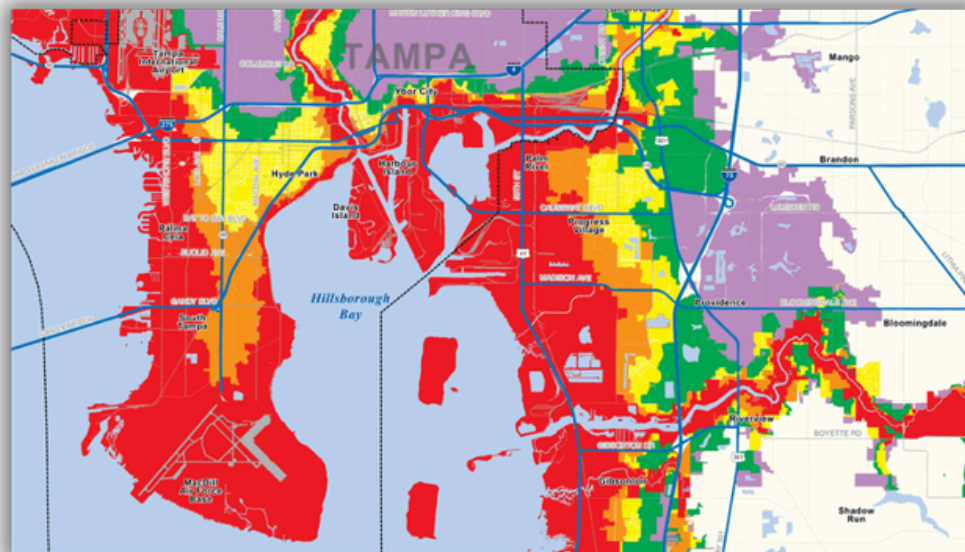
Storm surges

Storm surge happens when strong winds send ocean water inland. In the worst storms, surge can exceed 20 feet—higher than a two-story roof, and can tear buildings from foundations. Once an ocean surge arrives, escape may be impossible.

Surge can travel far inland via bays, estuaries, and rivers. During Hurricane Ike, water reached about 30 miles inland in parts of southwestern Louisiana and southeastern Texas.

Severity depends on wind speed, storm speed, tide, approach angle, and coastline shape. Low, wide coasts, bays and inlets are vulnerable.

Urban development can unfortunately increase storm surge risk by removing natural barriers like mangroves, wetlands and trees.



Hillsborough County, FL

Map of evacuation zones for Tampa Bay. Tampa Bay has many Zone A areas (red, most vulnerable) because of low land and heavy development. A narrowing bay and river inlets funnel surge inland.

If you're near a coast or a river near the coast, you can determine your risk of storm surge via county evacuation zone maps (such as the Tampa map above). For a general idea, see this map for the entire US.

<https://experience.arcgis.com/experience/203f772571cb48b1b8b50fdcc3272e2c/page/Category-1>.

If you find that you are in an evacuation zone, you are at risk of experiencing a potentially unsurvivable storm surge. Take evacuation orders seriously.

Surge damage is occurring more frequently, even in heavy thunderstorms, because of development, beach erosion or shifting.

IMPACT: On Hattaras Island in **North Carolina**, 27 homes have been destroyed from storm surge, 22 of these in 2024-2025.

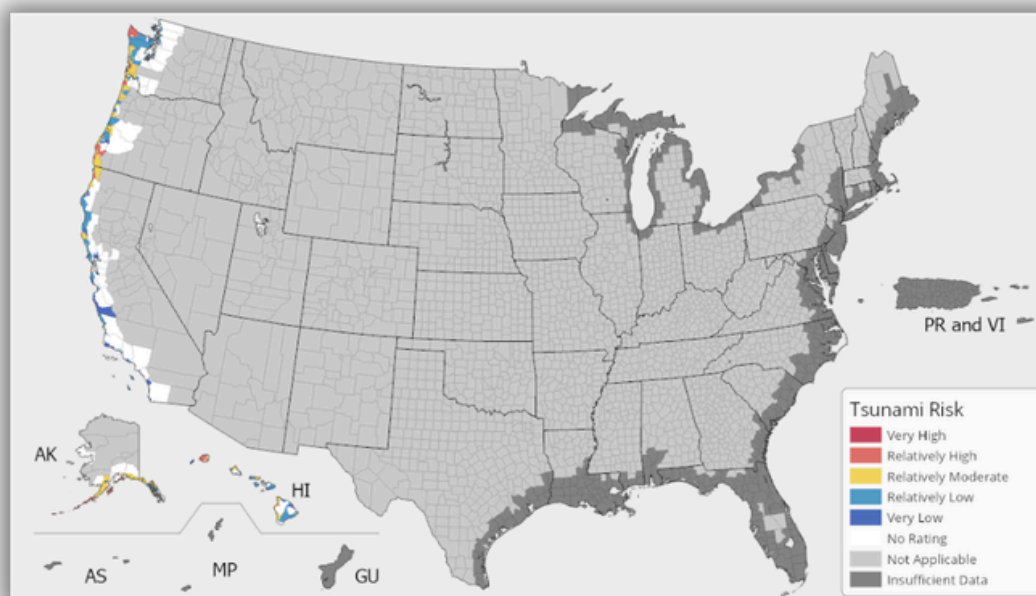
Tsunamis

Tsunamis are large, powerful waves caused by offshore earthquakes. Distant earthquakes may allow hours of warning; nearby quakes may give only minutes.

Like surge, tsunamis can move buildings. If you're at the coast and feel a strong quake, go to high ground immediately—don't wait for a warning.

Expect aftershocks and multiple waves. Risk can persist for hours or days. In the US, parts of the **Pacific Coast** are vulnerable to tsunamis.

See <https://www.tsunamizone.org/knowyourzone/> . **Washington** state has a well developed tsunami evacuation and warning system and most locations on the Pacific Coast have maps directing people where and when to evacuate.



[Tsunami | National Risk Index](#) (click for an interactive guide per county)

→ There are additional risks that earthquakes can cause. See our [Earthquake Toolkit Guide](#) for more on those hazards.

Mudflows

Floods often carry heavy debris flows which increase the risk and impact. There is a specific type of material flow which carries its own risks, however.

Mudflows occur when clay soils in hilly or mountainous areas become so saturated that they liquify. They can be more voluminous than floodwaters

alone and can thoroughly scour whatever is in their path because of the volume and weight of the soil. They've been known to move rocks as large as houses, and anything else in their path, adding to their bulk as they move downward. They can reach 20 feet or higher and grow as they pick up debris.

Other factors and locations that predict where mudflows may occur:

- In areas where landslides have occurred before
- In channels along streams and rivers
- On steep slopes
- At the bottom of valleys or canyons
- Where wildfires have destroyed vegetation
- Where human modification of the land has destroyed vegetation

IMPACT: In 2018, Montecito, **California** experienced a series of devastating mudflows during a severe series of rainstorms after wildfires in their region had killed foliage and trees whose roots would normally have held the soil in place. The flow traveled more than 2 miles, killed 23 people, destroyed more than 100 homes and damaged 300 more in this small community. Access to Santa Barbara was compromised for almost two weeks with up to two feet of mud and debris blocking 30 miles of highway.



*Photo by U.S. Coast Guard District 11 PADET Los Angeles District 11 PADET Los Angeles - United States Coast Guard (direct image link), Public Domain,
<https://commons.wikimedia.org/w/index.php?curid=65414771>*

This [USGS map](#) shows where landslides are likely to occur. Local regions often have more detailed landslide risk maps, such as this [Western North Carolina map](#), where one's specific address can be checked.

What are 100 and 500 year flood zones?

You may have heard the term “100 year flood zone”. That doesn’t mean it floods only once every 100 years. It means there is a 1% chance that it will flood in any given year. That is misleading as well because the odds build up over time. For example: The odds are 1 in 4 over a 30 year mortgage that your home will be flooded if you live in a 100 year flood zone. Even that is misleading because of changing rain patterns; some areas are experiencing more extreme flooding than they ever have in our lifetimes, or more frequent flooding.

During Hurricane Harvey in 2017, Houston experienced what some say is a 20,000 year flood event. Some locations are experiencing more than one 500 or 1,000 year flood events within a 10 year period.

Actions to take

Because many areas are experiencing record flooding, be prepared for more and worse flooding than your area has experienced in the last generation or so.

There are some types and volumes of flooding that cannot be protected against but must be escaped from if you are within a flood zone. These include:

- extreme events where lower risk homes in 500 year floodplains are completely engulfed
- extreme mudflows, exacerbated by fire, dams failing, sudden glacial failure
- rapidly moving volumes of water (flash floods, storm surge, tsunamis).

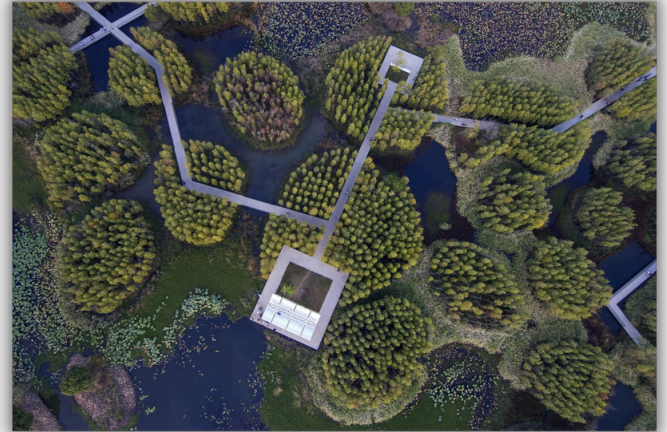
Many of us have seen photos of the village that was completely buried by glacial melt in **Switzerland** or homes buried in landslides or roofs covered in extreme rain events. Water is extremely powerful and can move even large, well-built buildings completely off their foundations.



You should evacuate out of the area if you suspect you are in the potential path of such an event or if ordered to evacuate.

Beyond evacuation, this guide offers protections for you, animals and buildings in milder cases of flooding, which can also be devastating if you're not prepared.

We are sharing this information to clearly and accurately describe the realities that millions of people around the world have already experienced, so that you can take steps now to be more prepared for the potential impacts.



*A Tale of Two Cities. Flood-ready cities are possible, as demonstrated by **China's** “sponge city” approach (right). Designing with natural systems—mangroves, estuaries, and deltas—is a hallmark of scaled-up permaculture design. <https://apnews.com/article/floods-entertainment-asia-beijing-climate-and-environment-54f2b3282cad5ce8f165914f38023bdb>*

What Is Permaculture?

Permaculture is a design approach that implements **nature-based solutions** to flood, fire, extreme heat, droughts, other disasters and climate adaptation. Using permaculture design techniques, we can build **landscapes, buildings, and communities** that resist disasters by their very design. Permaculture is a contraction of the words ‘permanent’ and ‘agriculture,’ a study of food growing techniques used in cultures that have sustained themselves, their water supply and soil fertility for thousands of years.

Permaculture design principles can also be applied and work well with built environments, energy, finance and communities, **thus the word has come to mean “permanent” “culture.”**

Part 4:

What to do when a storm is coming

A major storm is headed toward you. The extent of flooding is not yet clear, and you're not sure whether or when to evacuate. What do you do?

Checklist: Stay aware of your risks as they evolve

- Check [NOAA's Storm Prediction Center](#) or [Hurricane Tracker](#) for detailed information about potential storms or listen to NOAA's weather channel
- Check the [USGS real time flood map](#) for current flood warnings in your area.
- Check the [USGS National Water Dashboard](#) which gives you a live reading of local streams to find the closest gauge and its "flood stage."
- Keep in mind that if you are at risk, you should evacuate well before flooding reaches you.
- Use your risk assessment for your location to decide if or when to evacuate or shelter in place. Remember to consider your evacuation route and when it might be blocked by fallen trees, flood waters, etc, and to consider the risk of traveling once the storm arrives.

→ Our [General Guide Toolkit](#) offers additional useful information for evacuation or sheltering in place such as detailed evacuation steps, medical kit checklist and "bug out bag" checklists.

Evacuate or shelter in place? What to consider.

There can be risks to either evacuating or sheltering in place. This decision tree gives you a general guide on when to leave or stay. The old saying is "*Flee from water, shelter from wind.*"



Evacuate

Evacuate if any of these conditions exist.

- ☐ **An order is issued** to evacuate from your area.
- ☐ **You are in a flood evacuation zone** and a forecast surge could reach past your floor.
- ☐ **Your access road** historically floods before peak rainfall/crest, or bridges on your route are low-lying.
- ☐ **You don't have sufficient food**, water, supplies, or you or others with you have medical conditions or other special needs that you can't meet in your house over the next several days.
- ☐ **Flash-flood risk exists** (canyons, steep drainages) and heavy rain is imminent; you may have minutes, not hours. If you're in a canyon, even if well above the floodplain, in an extreme event, a record flood may reach you and roads, water or other infrastructure may be compromised for weeks.

Shelter in place

Shelter in place only if **all** of these conditions exist.

- ☐ **Your home sits well above** the forecast flood level
- ☐ **You can shut off power** and close backflow/isolating valves
- ☐ **Roads will remain safe**, or are too unsafe to evacuate, or likely to close
- ☐ **You are not at any risk of flooding** and can sustain water, medicines, communications and safe power necessities for 72+ hours if facilities and roads are down.



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Part 5:

Evacuate (prep and response)

If evacuation orders are given or conditions indicate it, go early. Waiting increases the danger.

- Never drive through floodwater. Just a few inches of water can sweep a car away.
- Follow official updates, not rumors without sources.

IMPACT: During Hurricane Helene, many people chose to stay in their home, certain that it would be above the flood line. A number of people ended up evacuating at the last minute, only when flood waters were rising in their home. Because roads or driveways were blocked by water, they had no choice but to evacuate by foot, in the dark, up the mountain in the middle of a hurricane. Not the best circumstance!

IMPACT: Every season, people who decided to evacuate during a hurricane don't survive, because of wind damage or flooding that occurs once they are in their vehicle. With trees and utility poles down, your evacuation route may be blocked and storm surge that could easily move or flip vehicles can cover roads rapidly.

Shelters

If you want to leave your home and need good options of where else to go, a shelter may be the best option. The American Red Cross, schools, churches or non-profits may operate shelters during flood events in your area. Contact your city/town, county or local American Red Cross to find out if and where there are shelters available.

Assess first

- Will there be heavy winds or other risks that make evacuation more challenging once the storm starts?
- Is it possible for your evacuation route to flood? If so, evacuate early if there is a risk to staying.

Tips to remember

- Don't assume levees and other flood barriers will stop record floods; plan for floodwaters to exceed barriers and leave early if weather reports predict an extreme event
- Go to the shelter before the storm hits if your route may be flooded
- Let someone know where you are going and when you leave
- Leave a note inside your home for others who may have access
- Check on your neighbors, if you are able to. You may have neighbors who will have difficulty evacuating or may need medical treatment. Check to see if they need assistance in getting to a shelter or you may consider hosting them during the storm.
- If you decide to go to a shelter afterwards, ensure streets are clear enough to get there and that there are openings at the shelter (call first). Being stuck in a storm or washed out roads in a car is worse than being stuck in your home. Some shelters don't accept people after a storm begins, and shelters can fill up and stop accepting more people.

Other destinations

This section contains potential places to evacuate other than official shelters.

Family, friend or neighbor

If there is a risk of your home or access to it flooding, staying at a friend's or family member's house on higher ground can be a mutually beneficial solution. You can be safer and help each other recover.

In hurricane country, people hold "hurricane parties." A group of friends will go to the home least likely to be impacted and stay together for the hours or days it may take for the storm to move through the area.

Businesses, organizations, community groups

Local employers, religious organizations, schools, non-profits or other organizations may open their doors to house people whose homes are at risk. They may have a disaster resilience plan including extra food and water for short-term relief. It's worth asking an employer, local organization or local business to find out. You may be able to help them implement such a plan if they don't have one.

Checklist: Evacuating animals

All animals

- ☐ **Don't ever leave animals** tied up or in an enclosed area if you evacuate. There are hundreds of cases of people risking their lives to save animals trapped in kennels or stables who are about to drown, and many other tragic cases of them drowning.
- ☐ **In some states, it is illegal to restrain or abandon** an animal in a way that puts the animal at risk.
- ☐ **Make arrangements** for where your pets can go, well ahead of time. Take them with you, if you can, but be aware that not all shelters will accept animals.

Large animals

- ☐ **Work out a location** or locations where you can take large animals that is well above the floodplain if their paddock or pasture is at risk of being flooded. Move them well ahead of the event. If you cannot move them in an emergency situation, open gates and affix them to stay open, so animals can seek higher ground themselves or try to swim to safety.



Part 6: Shelter in place (prep and response)

→ If you choose to shelter in place, please see our [General Guide Toolkit](#) to assess what you will need in order to do so. It may be days before you can leave or get supplies if the larger area is badly flooded.

Important! In a flood situation, you should be sure your location is well above expected flood line and that there is no risk of your building flooding before you decide to stay. You do not want to be in a building that is flooding if there is any way to avoid it. Keep in mind that record floods can go many feet higher than expected.

Remember, many flood deaths occur when people attempt to evacuate too late, particularly by vehicle. Once roads begin flooding, evacuation can become much more dangerous or impossible.

Emergency preparation

Note: If you are not capable of implementing all of the below steps, you should evacuate early

- Work out how you will leave your shelter and move to higher ground if it starts flooding
- Work out how you will signal for help and move to higher levels if you are caught and your home starts to flood
- Move valuables, medications, documents and anything else you may need to the highest point
- If flooding is imminent, turn off the electricity at the main breaker only if you can do so without entering water. Never touch electrical equipment while standing in water.
- Have a supply of safe drinking water available. Flooding can contaminate wells and disrupt or contaminate water systems. If you rely on a private well, do not drink the water after flooding until it has been determined to be safe.
- Don't flush the toilet if sewage backup is possible - this can happen with either a sewer or septic system.
- Keep emergency equipment such as flashlight, phone, power bank, or radio with you and ready to move if needed.
- Have a way to signal from a window - whistles, bright colors, flashlights.

If the flood is approaching or entering your shelter

- Don't try to drive through floodwater - move to the highest ground on foot if possible
- Do not walk through floodwater. Even six inches of fast-moving water can knock you off your feet. Never assume floodwater is safe to cross because it looks shallow.
- Don't walk through still floodwater if electric lines are down or they may be contaminated. There may also be sharp objects or other risks you can't see.
- Move to higher ground by foot or by any means possible, if weather and terrain permit
- If you can't leave the home: Move to the highest location in the home where you can leave through a window or opening.
- Don't enter or stay in rooms where live electrical outlets are covered or you see electrical arcing.
- Do not retreat into a closed attic if rising water could trap you there. If the attic is your only route to a higher level, make sure there is a way to escape from it before entering. People drown in attics because they can't get out.
- If water is rising rapidly and you cannot safely leave the building, move to the highest accessible location. If necessary, move onto the roof and signal for help.
- Stay visible, use bright clothing or other ways to signal for help such as a flashlight at night.
- Climb to the roof if water is rising fast or already several feet high.
- Call 911 immediately and give your location, then conserve your phone battery.
- Continue to signal your location visually.

Manufactured housing

- Don't shelter in a manufactured or mobile home when flooding is expected. FEMA recommends evacuating before flooding begins. Manufactured homes are particularly vulnerable to flood forces and can fail structurally..

If these steps concern you, they should! Consider if you're willing to experience the flooding of your shelter when deciding to evacuate or shelter in place. And always, evacuate early if at all possible.

—————→ If you're well above the flood line and choose to shelter in place, please see our [General Guide Toolkit](#) to assess what you will need in order to do so. It may be days before you can leave or get supplies if the larger area is badly flooded.

Part 7: Protect your home (prep and response)

If you could be impacted by a flood, there are simple steps you can take to protect your belongings and the space where you live whether you stay or evacuate.

→ More permanent protections can be found in our [Flooding Deep Dive Guide](#).

Tips for success

- ☐ **Find out what the storm surge** or flood level is expected to be on the high end and prepare for that.
- ☐ **Some of these steps take time**, so start preparing early if a catastrophic flood is possible. If you are at risk, the more of these you can complete or prepare well before a flood, the safer you'll be.
- ☐ **Practicing doing the last-minute steps** will quickly let you know what you may have forgotten or overlooked.

Priorities

- ☐ **Preventing water** from getting into your home.
- ☐ **Protecting from damage by toxins** or electric fires. You can clean up many forms of water damage. Toxins and fires are harder to remedy.

Remember

- ☐ **Take photos of your home** and belongings before damage for insurance purposes - do this well ahead of time if possible and keep storage of them in a safe place with valuable documents or take them with you.
- ☐ **Keep backups of documents** or digital data at a different location. If you haven't done this earlier, you may not have time if a flood is imminent.

Checklist: Keep water out of your home (do this first if flood is imminent)

Important! Sandbags and flood barriers are the most effective means of flood damage protection for the cost. If you do nothing else, do this.

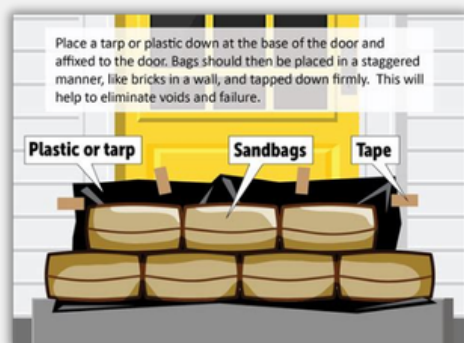
☐ **Deploy temporary flood barriers**, such as sandbags, portable flood gates or shields, inflatable floodwalls, and flood skirts to entrances to your home and other areas that may help prevent flooding. These likely won't stop major flooding but can prevent damage from minor flooding. Local cities or counties usually give sandbags away for free if a hurricane or flood is imminent.

☐ **Focus on thresholds**, including garages and basement windows. Threshold barriers prevent water from entering garages and homes through the threshold, one of the key entry points.

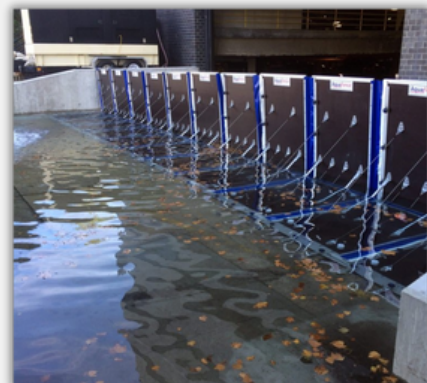
☐ **Use a fitted flood barrier** if you have one. There are many types of manufactured flood barriers including inflatable, metal, and plastic, for purchase. We don't recommend a particular brand, but if properly constructed, they do work and industrial versions are used by hospitals, universities, companies and more. We recommend doing due diligence and reading reviews about flood barriers as some work better than others. Some have been tested and are compliant with FEMA.

☐ **Ensure your flood wall** is high enough for a record flood. Some of the worst damage has occurred because people didn't predict how bad flooding could get. Having some simple and adequate preparation in place can make the difference between extensive or catastrophic flood damage and remediable damage or no damage.

☐ **Prep and ready any pumps** you may have such as sump pumps, or pond or puddle pumps (see [Deep Dive](#) for more information on these).



Simple sandbag barrier. Using a tarp or other barrier under the sandbags reduces the possibility of leaks. Tarps should be waterproof and heavy duty. Illustration: Hillsborough County.



This [Aquafence floodwall](#) is one example of a FEMA compliant flood barrier.

Checklist: Protect basement and pipes

Even if you protect entrances, floodwaters can enter via sewer pipes or basements

- ☐ **Clean gutters**, downspouts, and splash pads, along with any nearby drainage ditches or storm drains, to ensure water can flow freely away from your home (this should be done early, and regularly maintained).
- ☐ **Close sewer** or septic backflow valves, if you have them. Sewage backwash can create a lot of damage and is not fun to clean!
- ☐ **Plug sinks, tubs and toilets** with plugs or bungs and weigh them down to inhibit backflow, if you don't have backflow valves

Checklist: Prevent toxic exposure

Floodwaters can release toxins that may be contained into your environment. Toxins that soak into your walls, floor or furniture can be difficult or impossible to remove. The best handling is to prevent floodwaters from reaching them.

- ☐ **Move gas cans** and other toxins as high as possible. This includes your generator, if you have one. These substances can create a toxic stew that can make parts of your home non-recoverable or much more expensive to recover when flooded if toxins soak into the walls or floors/subflooring.
- ☐ **Shut off electricity** at the breaker panel and unplug appliances/battery chargers if you expect to be flooded. This can prevent fires/electric shock
- ☐ **Turn off natural gas** at the main, or if you can't, turn off gas furnaces and water heaters. If you don't know how to do this, it's best to learn this from a professional or someone who understands it well. Learn how to do this well before a flood event. This can help prevent petroleum toxin damage to your home. Some gas companies prefer to do this themselves, check with them if in doubt.
- ☐ **Anchor your fuel tanks** if you can't move them to higher ground. Unanchored tanks can float, rupture, and release fuel.
- ☐ **Move any vehicles** that you aren't driving out of the flood risk area. Vehicles release toxins and are often, on a practical basis, unreparable once flooded.
- ☐ **Move EVs**, E-bikes or other large lithium ion batteries out of the flood zone before a flood.

Important: Lithium ion batteries can combust after being flooded, sometimes days later; houses have been burnt down because of a battery fire. They can also release toxic gas or cause high voltage shocks. Be sure to move EVs and other lithium ion batteries to ground well above the expected flood.

Checklist: Protect valuables

☐ **Move necessity items** and valuables up high, on countertops or second floor or attic, or to a different location on higher ground. If you have water-resistant containers, put valuables in them. This can include food, appliances, computers, important papers, and both financial and personal valuables like photos or art. Think about what you will need when you return, and what you will most miss. Figure this out and have a plan before a hurricane hits or flood happens.

☐ **Store valuable documents** in a waterproof bag or dishwasher (dishwasher is waterproof). Ensure the container is tightly closed and sealed.

☐ **Use flood barriers** to protect key utilities you can't move. If relocation or elevation of utilities and appliances to higher floors is not possible, you can protect service equipment in place using sandbags, low floodwalls and shields or wrap them in waterproof tarps to mitigate flood damage if they are vulnerable to flooding.

☐ **Elevate major appliances** onto concrete blocks if feasible and you can do so safely.

☐ **Move frozen/refrigerated items** to a friends house out of the flood zone

Preparing with others

Preparing with neighbors, family, friends or groups can be very helpful. Groups can keep each other informed, help with evacuation and preparation, and work together to move water away from buildings. If someone isn't home, neighbors, friends or family may be able to install barriers and prepare their home for them, and vice versa. In attached homes or homes that are close together, a coordinated plan between neighbors, friends or family can make the difference between success and failure, especially when using flood barriers. In some cases, it might make sense for neighbors to invest in a barrier to prevent floodwaters from entering the entire neighborhood. This may need permitting, as the water will be sent elsewhere, which may put others at risk.



Part 8:

Protect property (prep)

Below are more in-depth steps for those who own or steward their home or land and should be done well before a flood is imminent. They can further reduce your risk of damage from flooding.

→ Our [Flooding Deep Dive Guide](#) has more in-depth solutions, suitable for deeper resilience and recovery. Even if you're not ready to implement these, you may get some useful ideas from the solutions offered. Also covered are techniques you can use when building or rebuilding that can harden your home so that even if water gets in, your home will be fine and recover quickly.

Flood insurance

If the place where you live is vulnerable to flooding, you can protect your personal belongings with flood insurance. This is often a separate policy from standard home or renter's insurance, so be sure to check. You can use FEMA's [flood policy quoting tool](#) to get a quote on flood insurance premiums. This can also give you a sense of the property's flooding history.

If you are a homeowner located in a flood zone, chances are you are required by mortgage lenders to have flood insurance. If not, it is something to consider, especially if your home is likely to be badly damaged in a flood. Flood insurance is not available in every flood prone area. Communities and individual homeowners must meet certain requirements before flood insurance is made available to individual homeowners. Check with your local insurance agent for more information.

Even if you don't have insurance, sometimes relief organizations have funds to replace items.

Landscaping

Your roof produces a tremendous amount of additional water runoff and concentrates it around the foundation of your home. If you are able to landscape around where you live, the key action to take is to move water away from the building and other areas you don't want flooded, and create more places where water can go and be absorbed.

Checklist: Landscaping

☐ **Ensure rain from your roof** drains away from your home and doesn't pool. If you have gutters, make sure the downspout sends water to a place in your yard where it continues to move away from the building. A short or absent downspout directs water against your home where it is more likely to penetrate through cracks or insufficiently sealed doors or windows. If you don't have gutters, note where rain pools nearest your home from your roof, and create emergency drainage away from that area. In an emergency, this can be done with crude ditches or plastic sheeting.

☐ **Reroute water** with simple berms. If there are sections of your yard where you know water pools near your home from a driveway or street, you may be able to reroute it with simple "earthworks" such as a berm that guides it around your house to an area where it can drain. Simple ditches or logs can be helpful in rerouting water to some degree.

Building

A building does not have to be inundated by a river or flood waters to experience severe damage from an extreme rain event. Basements are often a source of flood damage because of pressure from saturated soil. Bad drainage can cause water to seep under door sills or through basement windows. Sealing your home to keep water out is also important.

Checklist: Building

☐ **Seal any cracks** in your basement walls or floors with water resistant mortar and masonry caulk or hydraulic cement, which expands when wet.

☐ **Seal cracks** in windows and doors; there are materials that are waterproof and meant to keep out water and moisture.

☐ **Install a toilet bung** to prevent flood water from coming up through your septic or sewer system. If flooding is severe, this doesn't always work.

☐ **Install check valves** on sewer or septic pipes. Plan to spend \$100 or more per valve to have a pro install them, or do it yourself for \$10-\$15 each to ensure sewage can't back up into the standing water in your home. This can create major health issues and complications. Toilet bungs are not always sufficient. Don't skimp on this. Install at a point in the pipe that's easy to access for repair.

☐ **Permanently raise utilities** such as furnaces, HVAC and hot water heaters above the expected flood line by placing them on blocks or moving them to an upper floor if the floor they're on is expected to flood.

☐ **Acquire and prepare** easily stored and assembled scaffolding, shelving, boxes, etc, to use to raise furniture before a flood.

Lessons learned

When surveyed, a number of people who have been flooded in the **UK** wish:

1. That they kept all **flood related materials** in one place that is quick and easy to access (extra pumps, flood barriers, tools for installation, etc)
2. That they coordinated more with **neighbors**
3. That they had done more of the **simple preparation** steps beforehand
4. That they **documented** damages better
5. That they had followed the **clean up steps** exactly; they would have salvaged more items



Part 9:

After the flood (recovery)

Below are more in-depth steps for those who own or steward their home or land and should be done well before a flood is imminent. They can further reduce your risk of damage from flooding.

The three main topics in this section are:

- **Safety** for people and animals
- **Recovery**: Steps to avoid mold and other damage to your home
- **Recovery**: Caring for landscapes, farmland, animals

Significantly more people die or are injured from accidents while driving through damaged areas, cutting up trees, repairing roofs and other flood preparation or recovery work than from the flood itself.

For this reason, authorities may not allow you to return to the area if there is a toxic release, downed electrical wires or other safety issues. This is one reason the contents of your go bag are so important. If the area is open for returning, you will want to assess the risks of returning, for yourself.

Contact Your Family and Loved Ones:

Let your family and close friends know that you're okay so they can help spread the word. The [American Red Cross's](#) Safe and Well listing offers one way to do this if you don't have cell service.

→ See our Communications section in our [General Guide Deep Dive](#) for other options.

Safety for people and animals

Checklist: Life-safety first

☐ **Don't travel through water**, especially moving water. Use a boat or kayak rather than walking if you must traverse flooded areas to avoid unseen currents or other risks.

☐ **Avoid flooded roads** - crests may arrive hours or days later in some areas. Drowning risk is highest in vehicles. Even six inches of water can cause loss of control of the vehicle, and 18 inches can move it off the road. Drowning is the leading cause of death in hurricanes and floods, and drowning in vehicles is the most common way that happens.

☐ **Assume toxic contamination** or risk of electric shock. Flood water can be contaminated with petroleum products, raw sewage or contain dangerous debris. Underground or downed power lines can electrically charge the water. Wading in it can be a risk, especially if you have open cuts or wounds.

☐ **Watch for wildlife** seeking high ground that may feel threatened or cornered by you.

☐ **Watch for drop-offs** or damaged roads. Roadbeds, bridges and ground may be undermined.

☐ **Use proper sanitation.** If you are exposed to flood waters through a cut or your nose/mouth, clean thoroughly and consider seeing a doctor. If your tetanus shot isn't current, get a shot.

☐ **Wash any exposed areas** thoroughly after working on your home. Use safety equipment for clean-up to avoid toxic exposure or injury from debris. See "Toxins" below for more information.

No flush toilets available or sewage system is not working? See "compost toilets" in our [General Deep Dive Guide](#) for an alternative toilet to use while it's flooding and afterwards during cleanup, if needed.



Mental health

Before, during and after a flood event it's important to pace and take care of your and others' mental and emotional well-being when your lives have been impacted. Take breaks as needed; processing your feelings can be helpful. We each have our own way of doing this, whether it is conversation with a friend, working with a professional, through a spiritual practice, or whatever works best for you.

Others around you may be experiencing emotional effects from trauma as well. If you're helping someone else recover emotionally, it's just as important to know what not to do as to know what to do, and to know when to refer that person to trained or experienced practitioners.

Disaster Psychology

Through long experience, first responders have learned how to interact with people experiencing trauma from disasters. These tips can be useful for anybody involved in response or recovery.

→ See the Mental Health section of the General Guide for more information.

Safety equipment for cleaning

- ☐ N95 mask or better
- ☐ Hard hat
- ☐ Safety goggles
- ☐ Hard toed boots or rubber boots
- ☐ Heavy gloves
- ☐ Disposable coveralls or PPEs may be appropriate in some cases to protect your skin and clothing from toxins

Safety on your property

Floodwaters can damage infrastructure, carry toxins, cause mold, and create hazards from electricity. These are the things that can put you and yours at risk and should be addressed first. Be sure to read this entire section to be aware of all the different risks that can occur.

Checklist: Home

- ☐ **Wait for the police** or fire department to clear your return home. They may check for downed power lines or other risks before providing access to a flooded area.
- ☐ **Before entering**, ensure the home is structurally stable. If it has damage from treefall or wind and you're not sure how it has been damaged structurally, get a professional to inspect it before entering. Floors and walls may be damaged depending on the severity and length of flooding.
- ☐ **Open windows and doors** to let the air circulate. Allow some time for this to occur before beginning work. This ventilation will help remove foul odors, protect you from collected gas, and will also help dry out the house.
- ☐ **Run fans** in every room if possible, to assist with circulation and drying.
- ☐ **Keep generators outside** and at least 20 feet from any open windows or doors to avoid carbon monoxide poisoning.
- ☐ **Assess for leaks.** If roof or other damage can cause additional water damage from rain, cover with a tarp or another temporary fix. Waterproof canvas tarps tend to last much longer than plastic tarps. Make sure your temporary fix doesn't leak.

Checklist: Electricity and gas

- ☐ **Turn off the electricity** before entering the home. Sometimes officials will do this before allowing people into the area. Standing water may be electrically charged and electrical appliances can be wet, causing shocks.
- ☐ **Inspect all areas** of your property for loose wires. Avoid contact with loose or dangling electrical wires, and report them to the power company.
- ☐ **Check for gas leaks** or damage to gas appliances. Do not strike a match or lighter or relight appliances until they have been inspected.
- ☐ **Don't try to charge** or turn on battery powered devices or tools that have been exposed to flooding.
- ☐ **Dispose of wet batteries** properly; they can ignite, release toxic gases, cause chemical burns and can be risky to transport even days after exposure. The larger the battery, the greater the risk. Contact your fire department for information on safe disposal.

Checklist: Home

Toxins are poisonous substances, especially those produced by bacteria that cause disease. Multiple chemical or biological contaminants can end up in flood waters, permeating anything the waters touch. It is a priority to determine if toxins are present as special protection may be needed before contacting or disturbing anything.

What to watch for

- ☐ **Asbestos and lead** from paint are common in building materials of homes older than 1978. You could expose others or their pets to toxins if not properly cleared. In many cases, governments will require a professional team to clean up some locations before allowing homeowners to return; the risk is too great.
- ☐ **Chemicals.** Pesticides, agricultural chemicals, heavy metals, and petroleum products are often carried by flood waters.
- ☐ **Biological contaminants** may include bacteria, parasites, and viruses such as *E. coli*, *Listeria*, *Salmonella*, and Norovirus originating from upstream farms, rural septic systems, sewage systems, and raw manure, including raw human sewage.

How to remedy

- ☐ **Contact your local Health Hazards** agency or a professional if your home is older and has been damaged, with ceilings, insulation, etc., exposed, or if you suspect your home has been exposed to toxic chemicals or pathogens.

—————> See our [Toxins Toolkit and Deep Dive Guides](#) for more information on this topic.

Water

Both private wells and public water treatment plants can be impacted by floods - toxins can enter the water supply, or distribution infrastructure can be damaged. This condition may persist for days or weeks, depending on the extent of the damage.

- ☐ **Report broken sewer** or water mains to the water department.
- ☐ **Don't use water without testing.** Don't give untested water to your animals either. City or well water may be contaminated and not be safe to use without filtration. Your city or water management district or water utility will have more information, but don't assume that your water has been tested, especially immediately after the event.

IMPACT: Water treatment plants and water supply infrastructure have been impacted by floods in multiple parts of the US.

→ See our [General Deep Dive Guide](#) for more information on rainwater storage systems and filters, which would be of great service in situations where water supply may have been compromised.

Cleaning up

Mold can be a significant health issue in flood damaged homes. Even if only the crawl space was flooded there could be health issues if not addressed. To avoid permanent damage from mold, you must either dry and clean or remove everything that could allow it to survive, including under the floor, crawl space, subflooring, etc.

Handle it fast! Once mold penetrates surfaces or spreads extensively, it is much more difficult, and dangerous, to clean. Consider using professionals if it gets to that point or if flood damage is extensive. There is a point where materials, including under floor or structural supports, may need to be removed which can be quite expensive. Thus, it is important to start the drying and cleaning process as soon as possible.

Checklist: Drying out your home

Mold grows in moisture. Taking aggressive steps to dry out your home can save untold expense and time later.

- ☐ Remember - **wear protective equipment**, especially a face mask, gloves and eye protection! There may be mold and toxins in mud or on items and surfaces.
- ☐ **Provide electricity** via a generator or solar panels if the grid is down (likely in a mass flood). You'll need it for fans and pumps.
- ☐ **Use a puddle or pond pump** to remove remaining water and silt if needed. If the basement is badly flooded, pump it out gradually; drain one third of floodwaters each day to minimize structural damage.
- ☐ **Open windows and doors** when humidity is lower outside (usually on sunny days), close it up when humidity is higher (overnight, rainy days)
- ☐ **Open closets**, remove drawers. Get as much air exposure and circulation to anything that is wet as possible.
- ☐ **Use fans**, as many as you can. Multiple fans in each room are not too many.

- ☐ **Run dehumidifiers** and/or air conditioning, if possible, especially in enclosed areas like closets.
- ☐ **Use desiccants**, like clay cat litter or biochar to soak up moisture where drying is more difficult.
- ☐ **Don't cover up anything** until it is fully dry. Be patient - the drying process can take several weeks.

Checklist: Cleaning your home

- ☐ **Get the mess out** - remove all debris, mud, furniture, and other items from the house that got wet. Sort it into three piles:
 - ☐ **Things you want to save:** clothing and cloth can usually be washed in bleach or sun dried and salvaged. Books and similar can be dried. Other valuables like art can also be cleaned. All must be cleaned and dried as soon as possible to salvage them. See [our library](#) for step by step methods for salvaging valuables such as art.
 - ☐ **Things of value** that must be thrown away. Furniture cushions, beds, particle board, carpet, computers or other electronics, etc. Take good photos and place everything together outdoors. The insurance adjustor may also want to see it so don't throw it out yet.
 - ☐ **Garbage:** Food exposed to flooding, papers you're not salvaging, most items if exposed to toxins, etc, should all be disposed of. Ensure you check with your local waste management as to how to sort or discard it.
 - ☐ **Wet mold** thoroughly before cleaning to reduce spread of spores.
 - ☐ **Clean up any mud** or dirt on non-porous surfaces thoroughly. Any surface that is porous (like drywall) will need to be replaced. Scrub with soap and water to remove any surface dirt and mold.
 - ☐ **Apply bleach** to all surfaces exposed to floodwaters (follow the label directions) and leave for 15 minutes. Some have used vinegar or other substances to clean up mold.
 - ☐ **Check the floors.** Remove carpet if flooded, it can't be recovered. Remove any flooring or subflooring that has been soaked and can't be thoroughly cleaned and dried out.
 - ☐ **Dry out the walls.** This may entail removing any drywall and insulation that got wet, and opening up the wall to the studs. Outside walls should be checked too. Plaster, brick or concrete should be ok but other materials may need additional handling. (See below for details)
 - ☐ **Check heating** and AC systems. If water got into the ducts, it can create a very unhealthy mold situation that will be sent airborne through your home. The system may need professional cleaning.
 - ☐ **Ensure everything is fully dry** before you start repairing or rebuilding.

→ More information on preventing deep or permanent mold damage to walls, appliances, furniture and personal items can be found in our [Flooding Deep Dive Guide](#).

What to clean with?

There are many references on how to remove mold and water damage from clothing, art and books. It can be a laborious process to ensure all mold is safely removed from these items. However, it is well worth it to clean surfaces that can be more easily cleaned such as wood or metal.

Bleach is often the first choice to kill microorganisms, but it also adds to the toxic load in the environment, including your body, and can be damaging to many surfaces. It can kill beneficial microorganisms in soil that destroy harmful bacteria. It cannot be mixed with other substances, like vinegar, as it can produce a quite toxic gas. There are other alternatives.

Vinegar - Less toxic than bleach, it effectively kills most mold and bacteria, including black mold, because of its high acid content. Use full strength, let sit on mold for 10-15 minutes, and wipe off. It can also help remove stains left by mold. Use vinegar on moldy glass, plastic, porcelain, stainless steel, or vinyl. Undiluted vinegar is safe to use on almost any material that isn't wood, granite, marble, or some other type of stone. Spray it on plastic, stainless steel, and glass to kill mold on these surfaces. You can also apply it to mirrors, non-stone tiles, grout, sinks, toilets, bathtubs, and showers.

Borax is a type of salt considered safe for household use as long as you don't inhale or ingest it. It kills mold by disrupting its pH level, allowing it to break down. Mix 1 cup (204 grams) Borax with 1 US gal (3.8 L) of water in a spray bottle, then spray it on the moldy area. Brush the solution into the mold, then wipe the area with paper towels.

Effective Microorganisms eat black mold and other forms of mold. It can be more effective than other forms of cleaning in some situations because it is living, and can pursue the black mold into places difficult for other cleaners to reach. Spray it on the affected area and let it sit. It doesn't work on every material. More study on how effective this is in relation to other cleaners and to determine the most effective ways to use it would be helpful. There are companies that specialize in using microorganisms to clean up pollution and toxins in soil and water, such as ponds.

Checklist: Waste

- ☐ **Keep your trash** well contained. It may take a while for trash service to arrange for pick-up and if it gets scattered or blows around, it could contribute to the toxicity in the area.
- ☐ **Organize trash.** Though it is often the last thing on one's mind when cleaning up damage from a hurricane, if possible, the trash should be organized into categories such as organic material (downed trees, etc), building materials, metals, etc. Some locations require this in order to pick it up, so check with your local waste management division.

Checklist: Repairs

- ☐ **Assess for repairs** needed and analyze which are most important to fix, and which can wait. What will be further damaged if not repaired? It is most essential to keep things dry to reduce further damage.
- ☐ **Repair infrastructure** damage that threatens safety.
- ☐ **Repair or protect** leaky roofs or other damage that might let in more moisture.
- ☐ **Repair water damage** once cleaning and drying are fully completed. If doing repairs yourself, ensure you use full safety procedures

Checklist: Insurance

- ☐ **Organize your documentation** as you go. This includes photos, videos, notes, receipts, contractor bids, government info, correspondence, etc. See our General Toolkit for detailed step by step actions to ensure you get the insurance you're due.
- ☐ **File a claim** as soon as possible. While most insurance companies don't cover flood damage without a specialized policy, there may be other damage, such as wind, that is covered. There may also be grants or other funds available from local government, non-profits or other sources.
- ☐ **Save receipts** for any repair related expense. See our the Recovery: Insurance section of our General Guide Toolkit for more information about what to track and why.
- ☐ **If you repair things yourself**, verify whether insurance will reimburse you for repairs, and if so, what they need from you exactly in order to do that. Get it in writing, preferably in your contract with them.
- ☐ **Make any temporary repairs** necessary to prevent further losses that you can while waiting for insurance claims to process, including repair to fencing needed to keep animals confined.
- ☐ **Change electrical outlets** if they were flooded.

Checklist: Waste

- ☐ **Take insurance money** for your flooded car. It will continue to give you problems (much better to move it before it gets flooded!)
- ☐ **Use only licensed**, insured and verified contractors for repairs you don't do yourself. There are far too many scammers out there preying on disaster victims. And you will need permits/contractors for insurance purposes.

Important: If your home flooded once, it could happen again. While we recommend considering moving away from any flood prone area as your best defense, if you do rebuild in the same location, we strongly recommend you research our "[Deeper Dive Flooding Guide](#)". You can prevent future damage if you rebuild for resilience.

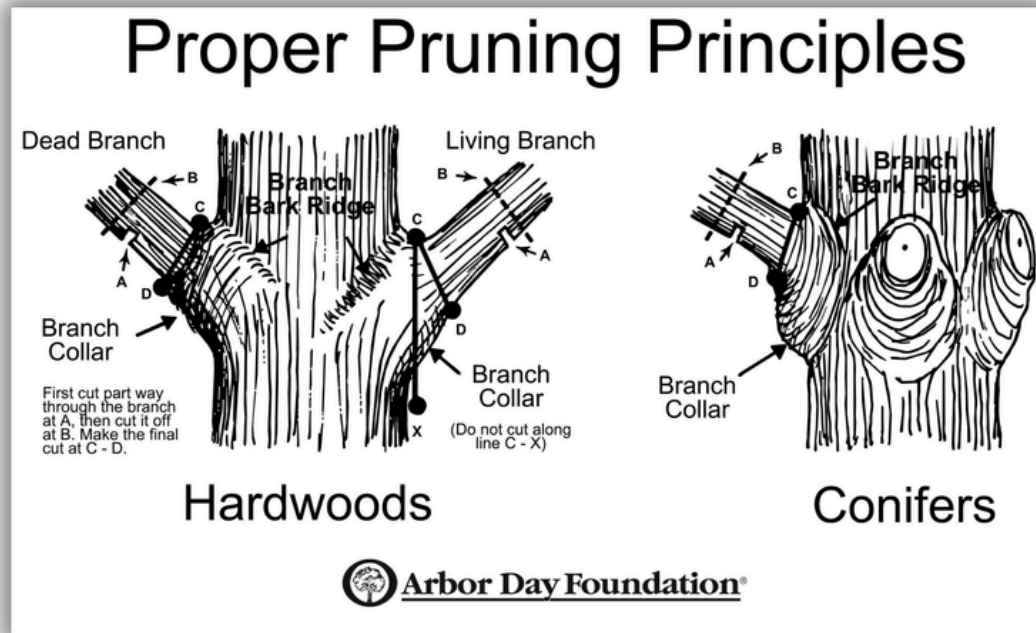
Checklist: Tree aftercare

If trees have been flooded:

- ☐ **Remove salt:** If you feel there may be saltwater damage on plants, flush them with fresh water. You can save your plants by doing that. Hurricanes often carry salt with them, especially if you live within a few blocks of the sea. Some plants are more sensitive to salt than others.
- ☐ **Remove sediment:** Once most of the water has drained, remove sediment, trash or dirt that may have been deposited. A layer of sediment 3 or more inches deep can suffocate tree roots. Remove sediment from around the tree trunk and bark especially; this area is especially vulnerable to diseases present in moist soil and organic material. No more than one inch of sediment against the trunk should remain.
- ☐ **Protect the roots:** Tree roots can be eroded by severe flooding. This makes the tree more vulnerable to uprooting and health issues. Fill in around the roots with soil similar to what the tree has been growing in, ensuring there are no air pockets underneath the roots. You should see the beginning of roots at the base but no more than that.
- ☐ **Remove dead branches:** Once the tree bark has fully dried, prune any broken, dead, damaged or diseased branches. When the bark is wet, pruning can expose the tree to disease pathogens. Don't leave short stumps on pruned branches. Rather, cut just outside of the branch collar.
- ☐ **Remove mulch:** While removing mulch is counterintuitive to many, removing mulch can allow the saturated soil to dry and tree roots to breathe.

☐ **Straighten trees:** Is the tree leaning? A large tree that is partially uprooted may need to be removed, depending on the circumstances. A certified arborist can help determine this. Smaller trees can often be straightened and staked until roots have regrown.

☐ **Support health:** Don't fertilize right away, the tree needs time to recover. Ensure there is minimum stress on the tree from other sources, if you can, as recovery time could accelerate.



Prune on the branch side of the collar to help the wounds caused by pruning heal faster Drawing: Arbor Day Foundation

Checklist: Recovering gardens and farmland

Farms or gardens may have been exposed to toxins in the water, including heavy metals, petroleum products or raw sewage, depending on what is upstream. Sediment may compromise the health or quality of the soil. Large or sharp objects may have been deposited in the field, and access points may be damaged.

Determine the damage

- ☐ **Use caution** when first accessing fields as bridges, roads or other access infrastructure may be compromised.
- ☐ **Wear protective gear and boots to protect from toxins or sharp objects.**
- ☐ **Check for objects deposited on the land.**
- ☐ **Check for soil contamination.** Contact your local Extension Service for information on what to test for and where. The least expensive approach may be to grow beans on the soil in question and have a lab do a bioassay for

☐ **Use a soil probe** to determine the depth of sediment deposit. Is it congruent throughout? Layers of different types of sediment may cause drainage issues.

☐ **If more than 2"** take soil samples from different types of sediment to determine nutritional composition. Do a soil jar test to determine how sandy the soil is. If less than 2", impact will be minimal.

Repair the damage

☐ **Contact local** farm and gardening groups. Cooperatives, garden clubs, and other groups may have programs to assist recovery.

☐ **Remove visible debris** from the field. Farms in North Carolina after Hurricane Helene had vehicles, parts of buildings, propane tanks and other items in their fields. Some debris may be buried and not discovered except through tillage or other digging.

☐ **Remove newly deposited sediment.** If undesired. In some cases, many inches or even feet of sand can end up on a field. Most farms, especially those that have worked for years to build healthy soil, will choose to remove sand. Sediment may also include valuable topsoil from other regions.

☐ **Remove or bioremediate** contaminated soil. We recommend using bioremediation techniques rather than removing good topsoil, if practical or possible. See our guide on Toxins for more information on bioremediation.

☐ **Replace lost topsoil.** If erosion has removed topsoil, ensure any replacement soil you get has appropriate nutrition and is toxin free. Not every state or region regulates soil quality for companies using reconstruction materials (grading, filling gullies) or topsoil.

☐ **Plant a fast** growing cover crop if the decision is made to leave the sediment deposit undisturbed, to help integrate sediment into the system more rapidly.

Checklist: Large animals

☐ **Provide fresh water.** If pastures have been flooded, especially with seawater, the water could cause illness or death of animals. Hauling fresh, uncontaminated water to pastured animals after the event should be done.

☐ **Remove mud.** It is especially important to remove mud from barns as horses and livestock will develop foot problems which can be severe or even fatal if they stand in mud for too long.

☐ **Toxins in pastures.** The same issues may exist for pastures as for farmland or gardens. Pastures may have been inundated with floodwater mixed with petroleum products or raw sewage for instance, depending on what is upstream.

Footnotes

<https://revkin.substack.com/p/study-finds-global-surge-of-flood-21-08-04>

Information from [North Carolina Extension Service](#)

<https://restorationmasterfinder.com/restoration/10-tips-to-follow-after-a-flood-damage/>

Meet the Disaster Resilience Team!

The Disaster Resilience Initiative Team

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