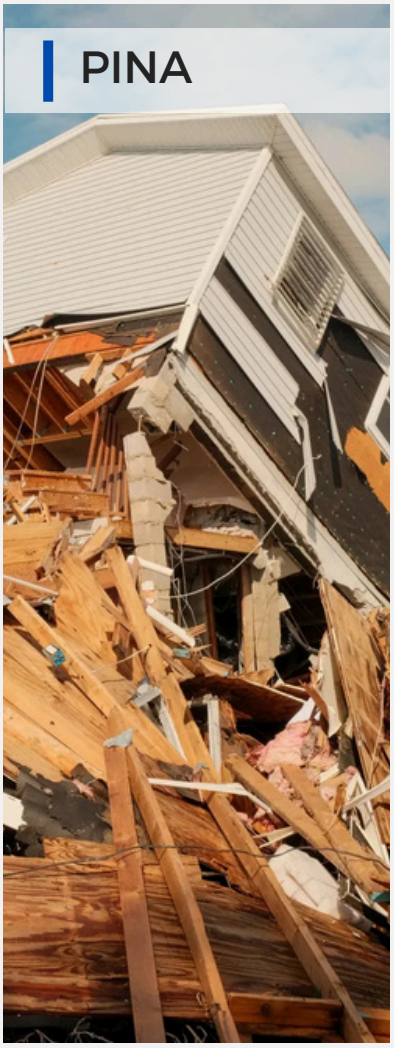
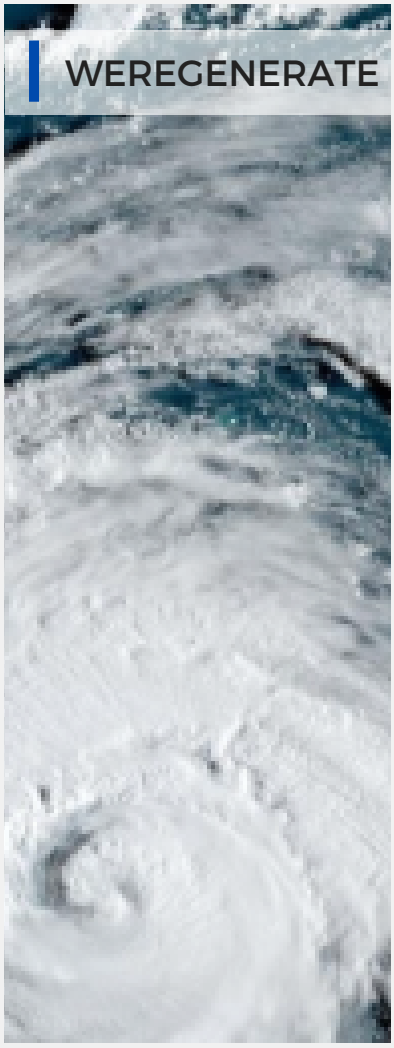
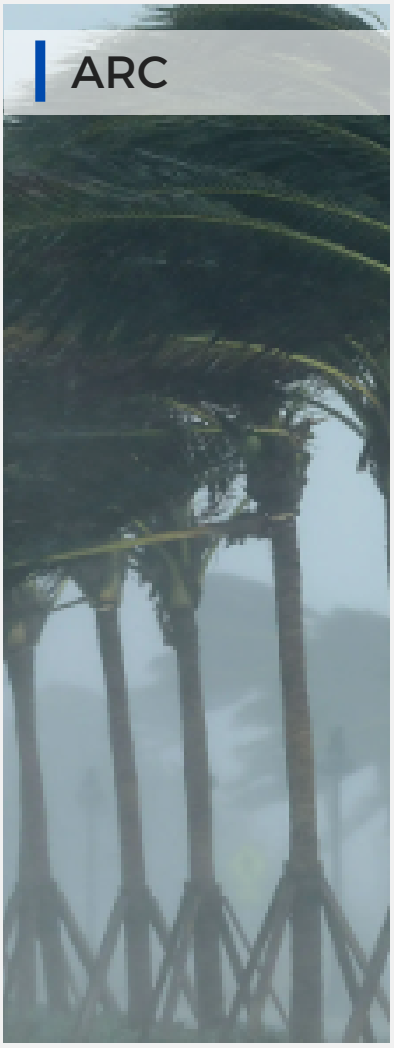






Hurricane Preparation Toolkit

PERMACULTURE SOLUTIONS FOR REDUCING RISK FROM HURRICANES, TYPHOONS, AND HIGH WINDS

Beta Version: 2025-08-20

HURRICANE

TABLE OF CONTENTS

IMAGE: TREE-BASED WINDBREAK

Introduction

This is a concise toolkit on how to prepare for and survive the aftermath of a devastating hurricane. We are focused on short term, last minute planning in this manual, and go into more detailed, long term solutions in our “Deep Dive” companion to this manual.

We’ve found that while damaging weather systems can be frightening, **having a clear plan based on well documented successful actions can bring a great deal of peace of mind.** Our intention is to make it as simple and accessible as possible for individuals and organizations to mitigate or where possible, entirely prevent damage from these systems as well as recover resiliently if damage is experienced.

You can find much of this information in various online resources. The advantage of this guide is that there are many elements in one place. You don’t have to hunt around to find them. In addition, **this toolkit includes inexpensive, DIY solutions for preparing and prevention for people interested in sustainable or regenerative living.**

Much of the guide is geared toward addressing needs of people who are not so prepared and have average homes. The suggestions are simple, inexpensive and can be done quickly. While they may not fully protect your home from a severe hurricane, they will create more resilience and a better chance.

The Deep Dive section (separate toolkit) includes more long term regenerative and resilient approaches that can benefit you not only in hurricanes, but year-round.
This guide focuses on preparation specific to hurricanes. See our **Overall Toolkit** (link) for preparation checklists and data for overall resilience to multiple potential disasters.

We urge you to follow our checklist and complete all parts of it, or as many as you can! Take one at a time and you will soon find you have completed all of them.

Hurricanes, typhoons, & cyclones

Hurricanes are large, violent, circulating wind and rain storms that form when the elements of ocean heat, and currents, moisture and wind direction are all conducive. When they achieve sustained winds of 74 mph (119 kmh), they become a hurricane.

In the west Pacific, they’re called typhoons. South of the equator, they’re called “cyclones.” Similar storms with milder winds are called tropical storms or tropical depressions; some of them have effects like hurricanes and may be dangerous as well.

Hurricane season in the US runs from June 1 to November 31, with most hurricanes happening between August and October. Keep in mind that before, during, and after a hurricane, things can be chaotic. **The earlier you can get the steps done, the better**. Some steps, like turning off appliances and covering all your windows, you will want to leave until shortly before the hurricane arrives. Others, like getting fuel, water, and other necessities or evacuating if it makes sense to do so, should be done early to avoid running out of supplies or hitting traffic jams.

Many people, even though they know they should, do not properly prepare for a disaster. No one likes to think about being in one. **One thing we've found helpful is to connect up with friends and create a game out of it, and do it together.** It is more fun, and you can share resources and knowledge and help each other prepare.

Most people survive hurricanes with minimal damage. If you do the below steps, your odds increase of getting through it with minimal damage. This is Mother Nature. She is very powerful sometimes. Hurricanes bring many ecosystem benefits to the land even while pounding it. They bring sediment and nutrients to areas, spread seeds and diversity, bring rain to dry areas, replenish barrier islands, regulate heat balance of the planet, and cleanse red tides and algae blooms. They also rid areas of mosquitoes temporarily, though they come back in standing water.

When we are fully prepared, and not in serious danger from winds or water, hurricanes can be a time to spend with friends or family, and deepen relationships. These are part of the rhythm of the planet, and we can co-exist with them in appreciation of their benefits and in awe of the power of nature.

Please note that this is a specialty toolkit. We address specific points unique to hurricanes in this guide. See our Overall Toolkit (link) for complete preparation checklists for multiple types of disasters.

What Is Bioregionalism?

Bioregionalism is the idea that our communities, economies, and identities should be rooted in the natural characteristics of the place we inhabit—**its watersheds, soils, native plants, animals, climates, and landforms**—instead of political borders or abstract markets. Rather than forcing a one-size-fits-all model onto every landscape, bioregionalism calls on us to **live within the ecological limits of our home region,** drawing our food, energy, materials, and culture from what can be produced sustainably within it. By aligning our lifestyles, governance, and trade with the unique patterns of each bioregion, we reduce ecological footprints, strengthen local resilience, and foster a deep sense of belonging to the land itself.

01

What is my risk?

There are three points of damage in a hurricane. We'll cover the best ways to protect yourself from all three of these, to the degree possible on your site.

Storm surge

Hurricane winds drive ocean waves onto shore. This tidal surge can be anywhere from a few feet to 30 feet (imagine either a wave or a multi-hour sea level rise 30 feet tall over your home, car, school, or business to get the picture). **The biggest risk for those near the coast and in an evacuation zone is the storm surge.** Coastal areas are some of the most heavily populated in the nation and often hard to evacuate from easily.

The height of the tidal surge is affected by the direction of hurricane winds (are they driving water toward land or away from it?), size of the hurricane, how strong it is, high tides, how the land is shaped (bays and inlets can drive higher surges), ground saturation, and how fast the hurricane is traveling. If enough of these are extreme, the surge can be significant.

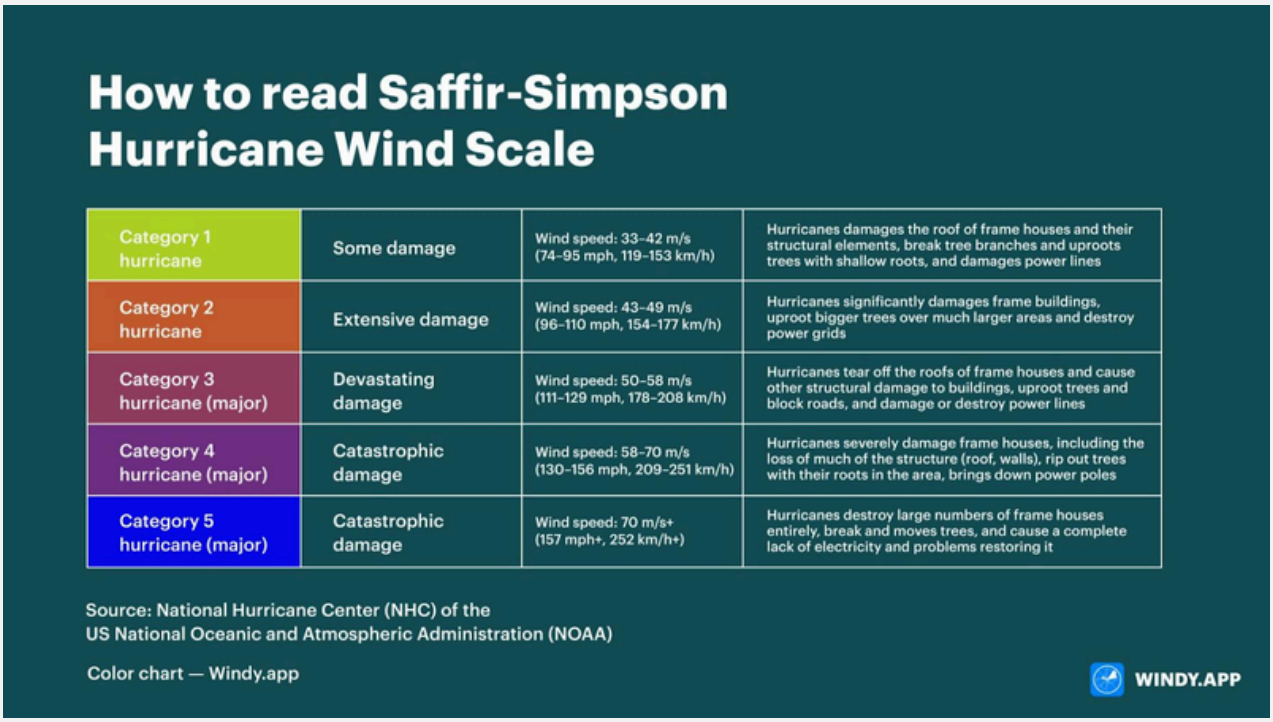
Storm surge acts not unlike a slow motion tidal wave–as high as a tidal wave but lasting much longer and traveling often much further inland. In downtown St Petersburg, FL, there were posts at one point with markings to illustrate where the storm surge might be in Category 1-5 hurricanes. In a Category 5 hurricane, per these poles, the water could reach into the second or third floor of some buildings. This is not something you want to be in. A good chunk of low lying land near water will be flooded even in a mild or medium strength hurricane that delivers a strong storm surge. Storm surges can travel inland for miles through river deltas, bays, and other low lying channels if conditions are right, adding to the flooding from excessive rain. **In some regions of southwestern Louisiana and southeastern Texas, the surge from Hurricane Ike traveled inland for approximately 30 miles.**

The ocean is powerful - storm surges can move buildings off of foundations and reduce them to matchsticks and drive large objects quickly against other objects and all living things.

02

Wind

Hurricanes are categorized by wind speed, in Categories 1-5. Cat 4 or 5 hurricane winds are capable of knocking over large trees, and ripping brick buildings to shreds. There are no Cat 6 hurricanes because damage from stronger winds in so-called “Super Cyclones” is essentially the same as Cat 5.



Flood

Hurricanes often drop record amounts of rainfall, sometimes over a wide area. Inland flooding has been responsible for more than half the deaths associated with hurricanes in the US. **One inch of rain on a 1000 square foot roof area produces 625 gallons of water to deal with.** In a large area, where water from a landscape of many square miles all flows into rivers or low lying valleys, this ends up being many millions of gallons and can cause extreme flooding. If this happens in a large watershed or floodplain, the flooding can become catastrophic. Floodwater can sweep away cars and buildings if moving fast enough. It can also be full of toxins and cause mold in homes. Floods can happen rapidly, or slowly, sometimes getting worse after the hurricane has passed.

Landslides

In hilly areas, hurricanes can create destructive landslides. During hurricane Helene, landslides created major damage in the Appalachian mountains, contributing to wiping out thousands of homes in the valleys and hollers.

Landslides are most likely to occur when the ground is saturated and keeps receiving moisture. **The soil starts behaving as a liquid**, but the heavier soil moves everything in its path with it, including massive trees and rocks, buildings, vehicles, etc. Water does this too, but landslides carry a different kind of mass and force.

Is there a way to predict a landslide? There are topographic indicators; lidar maps now can show us where landslides have previously occurred and are likely to occur again. The slope of the land can indicate likely places for landslides to start.

There are a number of signs in hilly areas that indicate when a landslide is imminent. If these are occurring, soil is saturated and earth is moving so it may be a good time to evacuate:

- Doors or windows stick or jam for the first time
- New cracks appear in plaster, tile, brick, or foundations
- Outside walls, walks or stairs begin pulling away from the building
- Slowly developing, widening cracks appear on the ground or on paved areas such as streets or driveways
- Underground utility lines break
- Bulging ground appears at the base of the slope
- Water breaks through the ground surface in new locations
- Fences, retaining walls, utility poles, or trees tilt or move.
- You hear a faint rumbling sound that increases in volume as the landslide nears. The ground slopes downward in one specific direction and may begin shifting in that direction under your feet.

If you can perceive the motion of any of this, you have little time. Move immediately to the highest point you can get to. While moving upward, stay on ridges, not indentations if possible.

See our “Flooding” and “Landslides and debris flows” toolkits for more info.

This sounds scary, and it is. People are often shocked at the sheer scale of damage a hurricane can wreak over a very large area. The good news is, there is a lot you can do to prevent or reduce that damage.

Preparing for a hurricane

Disaster planning

It's important to have a plan. Work through these checklists and complete as many of the items as you can. Print off short term prep checklists so you can easily complete them. Have a plan of how you will respond in any disaster.

Understand your resources and options

This is especially important if you live in a vulnerable area that is likely to experience flooding such as near the shore, on a barrier island, or on other low lying land. It is also important in these areas that you mitigate wind damage. Keep in mind that wind can also travel far inland and hurricane damage from wind has occurred far from the ocean in places like Ohio.

Take some time to find out the requirements of your local government regarding hurricanes and resources available to you. For instance, residents of barrier islands or other vulnerable locations can get re-entry tags before a hurricane strikes to ease their return to their home after a hurricane.

Since government requirements are not always sufficiently preventative or up-to-date with climate change, also study government regulations in other areas nearby. For example, Galveston island in Texas has stronger roof requirements than Houston further inland, but wind danger levels are not very different.

Some local governments offer services to hurricane victims above and beyond what FEMA or insurance companies provide. For example, Houston has cooling centers in the event of power outages in very hot humid weather. We cover this more in depth in the "After the Storm" section.

If you live in a flood zone and have a mortgaged property, chances are you are required to have flood insurance. If not, it is something to consider, especially if your home is likely to be badly damaged in a flood (because of the materials it's made of and other factors). Flood insurance is not available in every flood prone area. Communities and individual homeowners must meet certain requirements before it is made available to individual homeowners. Check with your local insurance agent for more information.

Should you stay or go?

If you are still thinking about staying even if you are in an evacuation zone, it's good to understand the power of water in a flood. There are numerous videos on Youtube of little creeks that have flooded to two feet deep in a parking lot taking out the entire lot of cars, or water a few feet deep moving buildings off of their foundations. **More people die from drowning, driving their cars through flooded roads, than in any other way in a hurricane.** Ocean surges are especially powerful. Check out our resource section for some examples.

Remember, it isn't just the speed of the water, it is the mass or weight of it. It is a massive force going all the way upstream and weighing many tons. If it is moving, it is potentially dangerous. Often, hurricanes hit when the ground is already saturated, which means, with storm surge and rain both, flood waters can rise rapidly and keep rising after the hurricane is gone. **Floodwaters often peak several days after the hurricane passes, in some cases, weeks.** So keep that in mind if you are in an evacuation zone. It can be terrifying to try to leave during a hurricane, and people die trying.

If you are not in an evacuation or near a flood zone (keep in mind these storms create 1000 year floods routinely) and you live in a sturdy structure, you may decide to stay in a less intense hurricane, but understand that they can be unpredictable, and some can get strong at the last minute (like Michael, which went to a Category 5 one day before landing). Even if you are in a block house that is boarded up, a Category 4 or 5 storm, depending on various factors, can take your roof off fully or partially. Look at photos of Puerto Rico after Maria, or Pensacola after Michael for some examples (again, in the resource section).

We are being brutally honest because if you're reading this, we want you to be safe. We've heard enough stories from hurricane survivors, a couple of them laying in the bathtub or huddled in a closet while 100+ mile per hour winds ripped through their collapsed home for hours, that it is clear that it is not something most people want to experience twice, if they survive.

In New Orleans during Katrina, more than 1500 people died, mainly in flooding, because they didn't or couldn't evacuate and the flood prevention infrastructure failed. We've gotten better at evacuating now, so there are fewer deaths. And note, homes that have been retrofitted for hurricanes (with hurricane straps on roofs, etc) generally survive them. If there are many older

trees, especially native trees, in your neighborhood but 30 ft. or more from your house, winds will be slowed down though the risk of a tree or tree limb hitting the house does exist. See our landscaping section in our Deep Dive guide for suggestions on resilient landscaping, including specific tree lists. There are a number of factors that can reduce the impact on your home, and most homes that are not on the front lines of a direct hit do survive. **If your home is exposed to the ocean or there is little cover between you and the ocean, your risk is much higher.** These are all points to assess when making a decision to buy, rent, or leave.

Many people do choose to stay and are ok. Often, the home is not damaged enough to put them at risk even if there is some damage. Homes in the US are often solidly constructed and many in Florida have been retrofitted to be stronger. In Texas, this is partly true, but there are also many manufactured homes that are extremely vulnerable to damage even in a Category 1 hurricane. Only you know what decision you should make regarding the risk. We're providing data that can help you make a decision.

When to evacuate?

A hurricane may be headed toward you. What do you do?

First, it's important to understand the warning systems.

Watches and warnings for tropical storms and hurricanes are based on wind speed. Wind speed can determine how much damage there will be to structures and also how high the storm surge will be.

Tropical storm watch means that there is a storm system that could be or is a tropical storm or hurricane that could impact the area in 48 hours. Winds are between 39-73 mph

Tropical storm warning means that a tropical storm is expected in the warning area; issued up to 36 hours before tropical storm force winds hit.
Hurricane watch means that a storm system producing 74 mph winds could impact the area in question.
Hurricane warning means that a hurricane with 74+mph winds is expected and that you should seek shelter.

Storm surge advisories are also provided. This communicates how high the surge is likely to go. This can change from hour to hour depending on if the hurricane changes direction or strength -- which routinely happens. This is why you may want to evacuate early if you're vulnerable to storm surge, and there is a risk of the hurricane strengthening. Storm surge will be strongest where the hurricane's winds are headed inland. It's hard to predict where that will be exactly until sometimes just hours before the hurricane hits.

The **cone of uncertainty** is well named. This is because hurricanes routinely change direction and size in sometimes pretty unpredictable ways. This cone illustrates where the center, or eye of the storm may end up going. Keep in mind that **the hurricane is much larger than the eye and can impact areas outside of the cone.** To see if you're in the danger zone, look at the edge of the cone and the size of the hurricane to determine if there is a risk that it could affect you.

Should you evacuate if there is a watch or warning? There are four factors that can help you decide: (1) your evacuation zone, (2) your flood risk, (3) the strength of the hurricane, and (4) your comfort level. Let's explore each a bit further.

(1) Your evacuation zone This zoning tells you how vulnerable you are to damage from storm surge or flooding.

You can find this by searching your county or state name plus “hurricane evacuation zone.” Most counties/states have a database where you can enter your address and see exactly what zone you are in. If you’re in a low-lying coastal zone, the chances are greater you will be ordered to evacuate. People who stayed have sometimes ended up trapped in their attic or on the roof by storm surge, or worse. If you’re in a “non-evac” zone, there are some circumstances where you may still want to evacuate, but you can also choose to shelter in place. The old adage is “Flee from water, hunker for wind.”

(2) To determine your flood risk from rain go to FEMA’s Flood Risk website. Enter your zip code and click on “Discover your risk.” Understand that the FEMA map is outdated and risks have risen, so if you are near a flood zone and only a little higher in altitude, you may want to consider yourself at risk, especially if rainfall could be exceptional either where you are or uphill from you. **Redfin** also offers flood maps for every home address as well as fire and other risks. In some areas there may also be up-to-date river measurements online and automatic warning systems like sirens or notifications. These systems have become more affordable in recent years and more places have them.

(3) The strength of the hurricane. This is tricky because if conditions are right, a hurricane can rapidly intensify when close to shore, leaving little or no time to evacuate. If the water is warm, there is not much wind shear (wind blowing at an angle, weakening the hurricane) and your site is in an evac zone, you may want to strongly consider evacuating. Michael, Ian, Harvey, and other hurricanes have intensified or turned suddenly and lives were lost as a result. Local weather stations have not always predicted the intensity correctly and may tend to exaggerate threats or play them down. We recommend following meteorologists like Ryan Hall Ya’ll or others who have proven to make accurate, fact based reports. Statistically, erring on the side of caution saves lives as well as reducing trauma.

On the other hand, some hurricanes have weakened at the last minute. This has the effect of making people complacent. Remember, all it takes is one big one.

(4) Your comfort level. Ultimately, the call is up to you. This manual hopefully communicates the real risks of sheltering in place. If you feel you're prepared for those, then it's your decision as to where you'd rather ride it out. If you're not sure or would rather not risk it, have solid evacuation plans and use them.

So, a hurricane is headed toward you. ***What do you do?***

Action steps

Evacuation

It's important to have a plan. **Work through these checklists and complete as many of the items as you can**. Print off short term prep checklists so you can easily complete them. Have a plan of how you will respond in any disaster.

--**Use your NOAA weather radio for alerts** and or Hurricane Tracker app or follow local apps for evacuation alerts. The county or city will announce which zones should evacuate, depending on the severity of the hurricane. If you are told to evacuate, please do so! You put other people's lives at risk when you do not evacuate and then need assistance.

--**Even if you are not given an evacuation order,** if you're not sure about your safety while sheltering in place, you should follow these steps to evacuate. Note that lives have been lost in some cases because the hurricane turned at the last minute and evacuation orders came late.

--**Keep in mind that evacuation has its own risks,** including massive traffic jams that could keep you in a car for 24 hours in a severe windstorm. This is why we advise you to evacuate early if you're in an evac zone. The general rule is, evacuate from water whether given an order or not if there is potential risk, but evacuate from wind only when you are in a structure that is likely to be compromised (the risk increases if the hurricane is strong) and you determine the roads are clear enough. Otherwise it may be safer to shelter in place or find a very sturdy local structure such as those often opened by local authorities as shelters.

This illustration shows the damage that can be done by different Categories of storm. Land reduces wind speed; the further inland you are, the more chance that winds will be reduced when they reach you.

--**Stay tuned for updates** on where the hurricane is headed. Use a NOAA radio, check the NOAA website, and listen to proven, trusted meteorologists who provide clear, thorough and specific information. Keep in mind that hurricane paths and intensities forecast by the models are statistical guesses based on copious data and complex models, and like all guesses, are sometimes wrong by a lot.

--**Review your evacuation plan and be ready to execute it.**

--**We recommend leaving early when possible**, before the rush. Freeways can get very crowded and backed up for miles. Gas stations can run out of gas, restrooms may not be available for hours. If you wait until the last minute to leave, be prepared to sit in your car for many hours without access to facilities.

--**Work out your evacuation route** (we recommend back roads if they will be safe - freeways will be clogged unless you leave early). Let people know where you will evacuate to, and let them know again once you leave.

--**Get everything ready to go - go bag** in the car, valuable documents, pets and family prepared, anything else packed that you want to take.

--**If your location may flood**, arrange to move any vehicles out of the area ahead of time or during evacuation.

Where to go

1. Red Cross or other local shelters. These are generally safe, even in a Cat 4 or 5.

2. Leave the area. Hurricanes can be somewhat unpredictable. Some have changed course last minute and headed toward where people had moved to. Study the paths of hurricanes like Irma or Harvey compared to their projected paths (and many others) for some examples. Be prepared to move far enough out of the area to not be in hurricane country at all. Consider a mini-vacation to Ohio maybe. Or visit your relatives you haven’t seen for a while in a distant state. See our Resources section for a list of places that give discounts in hurricanes including Airbnb’s, hotels, etc.

Short term preparation

If you stay at home

One good thing about a hurricane is that you usually have at least 3 days to prepare for it. If you're in the cone, you should do all the preparation steps you can ahead of time, leaving only shuttering windows and last minute tasks for last. Hurricanes can change speed and direction and usually do. Many people do as many steps on this list as possible before hurricane season starts, in May. Think of it as the routine house and yard work you'll do in May each year.

If everybody took these steps, hurricanes could be much less traumatic and easier to recover from. You want to be prepared with what can help you during a hurricane, and also afterwards if there is no power or water or easy access for a while (could be days, or worse case scenario, weeks).

If you stay at home

This list focuses on the specialty items you will find most useful in a hurricane if sheltering in place. Please see our "Overall Toolkit" checklists for a general list that is useful in most disasters (or even an occasional power failure or other circumstance).

- [ ] Plenty of stored water for drinking and staying cool.
- [ ] Battery powered personal fans. It could be hot, you could be without power. Have a way to stay cool. Hopefully, you have screened windows that open and rooms that get plenty of natural light.
- [ ] If the freezer is working: Kerchiefs you can use with ice or cold water to cool yourself off.
- [ ] Waterproof bags or containers for valuable documents (keep them stored, ready to go).
- [ ] Tarps for roof or other repair.
- [ ] Window coverings.
- [ ] Methods to secure doors and garage doors from wind.
- [ ] A boat or canoe if in a flood zone - a potential life saver (an inflatable kayak takes up very little space).
- [ ] A working flashlight within reach, especially when sleeping. Headlamps are preferred - you will want both hands free if your home is starting to flood.

Store water

Water is life. Don't mess around. **Store enough for your needs!** Portable is good. Rain tanks can be used to protect house walls and windows from wind and flying debris while also providing emergency water for many uses.
Ensure you have a working water filter (Berkey, Boroux, or Family Life Straw are inexpensive, portable low tech solutions, and there are a number of others out there that are good).

Make sure the water filter is operational (test it if you haven't used it for a while).

Store as much water as you can. Hopefully, you have a rainwater tank. Rain tanks can be used to protect house walls and windows from wind and flying debris while also providing emergency water for many uses. But if you don't, fill up your bathtub and any other container that will hold many gallons of water. Purchase some 5 gallon containers from the store and fill them. **Keep in mind, you may not have access to water from either the city or your well for days or weeks if the grid is down and you don't have your own electric source.** You will need 2 gallons per person per day. That is minimal use with bare minimum water used for bathing or cooking. Add gallons as needed. Then figure out the needs of your animals and plants.

Superchlorinate your pool, especially if you won't be there right after the hurricane passes. The pool can be a good water source after a hurricane if it isn't filled with algae. See "Using a pool as a water source." (link)

Don't forget to store water for your animals. Animals have died because of lack of water after a hurricane, especially large animals kept in pens.

Don't forget your plants need water as well. Do you have a plan on how to keep your plants alive if there is a drought (hurricanes often pull dry air in behind them) and you don't have water access? If you have a greenhouse operation, can you access water for your seedlings? Do you have a garden or crops growing? Potted plants? Think through how much water you would need if your power was off for two weeks or more and it didn't rain.

Consider using a dry/compost toilet system. Flushing the toilet takes a lot of water, and you may not be able to do so with no water running. So be prepared to handle your waste. See "DIY Compost toilet" (link) for more info.

And the simple lesson is - store more water than you think you will need. And be thankful when you don't have to use it!

Buildings

Many states have greatly increased their building standards so as to withstand hurricanes. Buildings built after 2002 in Florida are required to have these higher standards, and earlier in some parts of Florida. Some older buildings have been retrofitted. If you live in a building with these updates, you are more secure than if you are in an older structure. We will address older structures below.

Note: Manufactured housing can be damaged even in a Category 1 and totally destroyed in a Cat 2 or above. If you live in one, make plans to evacuate if you're in the danger zone.

Protect property from wind

Cover windows and secure openings - 1-3 days before a hurricane arrives with hurricane shutters or plywood. If using plywood it needs to be minimally ¾". Make sure the wood is plywood and not particle board. You are not fully protected if you have less than ¾" as flying objects can penetrate. If you do not cover your windows, and anything breaks any of them and wind gets inside three things will happen:

1. Water damage to whatever is exposed, and likely wind damage too.

2. Your roof could come off, more windows can break, etc. The risk of this is much greater in a Cat 4 or 5. Most houses do not have roof damage in Cat 1 or 2 storms, and there may be limited damage in a Cat 3 (shingles missing, for instance). It is not true that open windows will help "balance out the pressure." They will make you (if you're staying there), and your home much, much more vulnerable to damage on a number of fronts.

3. The risk comes not just from the wind speed, but the fact that the pressure lasts for many hours. Think about flying glass and other debris at 100+ miles per hour. People have been killed that way. There is an attrition effect as joints and glass weakens, shingles blow off, etc. Allowing wind inside of your house increases the problems exponentially because it works to weaken your structure from both the inside and the outside.

You will need to ensure doors cannot fly open, either by covering them with plywood or bolting them shut. Bolts at the bottom and top of doors, extending 1” into the doorframe should be sufficient. A 2X4 against the door at the bottom, screwed into the wall works as well.

When not under threat, plywood can be turned into a usable shop table using saw horses. **Plywood can be predrilled and fitted to bolts pre sunk in the periphery of windows.**

Close all doors inside your home. If there is a breach in one room, this can help protect the rest of your home.
Secure your garage doors -- these can blow open and cause structural failure in a heavy wind event.
1. Disengage the automatic door opener
2. Manually lock your door
3. Install a hurricane brace

You can install windows with hurricane resistant glass, or install hurricane shutters for your windows. These are expensive, but easy to secure in case of a hurricane. Plywood is the least expensive solution. Here are more details about securing windows and doors:
https://apps.floridadisaster.org/hrg/content/openings/openings_index.asp

Note, many people have not covered their windows in a Cat 1 or 2 and been fine, even in older structures. Some have had breakage or leaking damage at that level, which allowed internal damage to the home. If windows break in Cat 3 or above, which is possible from flying objects, the house could be at severe risk of damage.

Prepare your yard

Pick up loose objects around the yard that could become missiles in 100 MPH wind. This could be tools, or lawn chairs, pool equipment, buckets, garden pots, etc. Walk around your yard specifically looking for anything that isn’t tied down. **Turn outdoor tables upside down, lay potted plants on their sides, secure garden tools, etc.**

Last minute trimming. It’s too late to do proper tree trimming if a hurricane is headed your way (this should ideally be done in May, before hurricane season starts), but if you have branches overhanging your house that are half dead or

otherwise, do what you can to get as much of that cut back as you can. Even if you cut back some of the leafiest parts of a tree to let some of the wind flow through, it can prevent full tree loss. Reducing wind resistance can save trees. Opening up fruit trees so wind can pass through can save them.

Protect property from flooding

If you are in a potential flood or evac zone, you should take appropriate precautions whether you stay or evacuate. Find out what the storm surge is expected to be on the high end and prepare for that.

Storm surges can be unpredictable, sometimes going very high because of a combination of high tide, heavy rain and already saturated ground. The biggest amount of damage is usually on the homes nearest to the seashore or waterways.

Sandbag entrances to your home, garage and other areas that may help prevent flooding. These likely won't stop significant flooding but can help prevent minor flooding. There are "sandless" sandbags and other flood barriers you can purchase ahead of time, and local cities and towns usually give sandbags away for free if a hurricane is imminent.

Move necessity items and valuable items to higher positions in your home, on countertops or second floor. This can include food, appliances, computers, and other valuables. **Think about what you will need when you return, and what you will most miss.** Figure this out before a hurricane hits.

Turn your breaker off and turn off gas if you expect to be flooded. This can save lives.

Move gas cans and other toxins as high as possible. This includes your generator, if you have one.

These can create a toxic stew that can make parts of your home non-recoverable if flooded. If you have water resistant containers, put valuables in them.

Move electric vehicles and bicycles out of range of flooding. These have caused fires when flooded, compounding the damage to structures.

Energy

Realize that in most hurricanes, even mild ones, the electric grid can be down for days, or weeks in some cases. If you don't have an off grid source for electricity, there are a number of suggestions in other sections on how to handle that.

Turn off all appliances shortly before the hurricane hits, to avoid shorts, etc. You can unplug anything non essential. Some people turn off their breakers and natural gas lines totally during the hurricane and use lanterns. You should know how to do all of this before the hurricane hits. If you don't know, ask a neighbor or a friend.

If you have a generator, ensure that it is working, serviced, and you have fuel for it that is safely and properly stored, not vulnerable to flooding. Don't assume fuel will be available right after the hurricane if your generator is powered by something other than natural gas.

Ensure your solar oven, rocket stove or other alternative fuel source is protected from wind or water.

Ensure you disconnect your solar/battery system from the grid before using, if the grid goes down.

Be aware that electricians will be repairing wires and you cannot put any power (like a solar system or whole house generator) on the power grid while they are doing that or you put them at risk. **Make sure your solar system has an "off grid" switch that cuts the power to/from the grid.** Also, understand that utility workers literally are working around the clock to get your power back on, and be nice to them when you see them. Take them some snacks. Thank them. Chances are, they are exhausted.

Food

Ensure the freezer and refrigerator are full. Fill containers with water and freeze ahead of time or add other items that can be frozen if you don't have an off grid power source and you have food you want to preserve. A full freezer/refrigerator stays cold longer than an empty one. Turn the refrigerator to its coldest setting 24 hours before the hurricane hits to create maximum cold. Even if you have a generator or solar to run your refrigerator, it will save power that you may need elsewhere. Do not overfill containers, because water

expands when becoming ice and will break the container. Once you lose power, avoid opening the refrigerator as much as possible to conserve the coldness inside. If you have time, cook up perishable foods from the refrigerator and freeze them.

Ensure you have food you can eat without cooking. Even if you have a way to cook after a hurricane, it's nice sometimes to not have to. If you don't have electricity back up, focus on foods in the refrigerator that will soon go bad, then eat the foods from the freezer. If it is too much food for you and your family to eat before it goes bad, share with neighbors. **When the perishable foods are used up, eat the foods that don't need refrigeration and store well as your main food supply.**

Prepare gardens

Lay potted plants on their sides. They are less likely to be damaged by wind. You never know which direction the wind will hit and it will come from multiple directions, but facing SW is often the safest. If there is a place surrounded by bushes or sheltered, in a corner, place them there for protection. You don't need to worry about them getting too much water on their side, but if they are important to you, or if they are exposed enough that the wind could thrash them or pick them up even, bring them inside or move them somewhere more protected.

Trim your fruit trees. If some of your fruit trees are very dense, choose a few branches to trim that will open them up and let air flow through. Even if you have limited time, trimming a couple of branches can save the tree. Note that removing foliage on the interior branches but not on the branch ends makes them more prone to being whipped around by wind, leading to broken branches and fallen trees more often than not. Often, trees will drop limbs that are weak or dead in a hurricane. This is mother nature's way of tree trimming. If you can, trim weak or dead branches. Ideally, you would do this at the proper season, keeping in mind preparation for hurricanes as well as the general health of the tree. Many Floridians trim their trees in May or earlier, in preparation for hurricane season.

If you are growing young trees, learn how to train them for maximum branch strength. Branches in most trees should generally angle out from the trunk at right angles before moving upwards at about 60°. Wooden clothespins can make this happen. If the main trunk develops a forked stem (two equal trunks separating apart at a steep angle that was not suppressed at a young age),

cut one of the fork branches severely back at about 1-2 ft to reduce the weight and allow the more vertical trunk to gain dominance and strength. High winds and a forked trunk especially with lots of fruit will often split through the occluded bark at the trunk fork.

Harvest food that is ready or near ready. The winds will likely knock it off the tree or plant. Harvest or cut back herbs, as leaves may be stripped.
Ensure doors to garden sheds are securely fastened and won't blow open. There are earth anchors and cables that may help if winds aren't too high.
Ensure greenhouses or hoop houses are fully secured with no openings if possible. Wind causing pressure from the inside can cause the structure to fail. If the hurricane is severe enough, consider removing hoop house roofs or slashing openings in the plastic, especially if you can't secure openings. Otherwise, the frame can be bent or pulled out and more damage done. Plastic is less expensive and easier to replace than framing. We are aware of a number of enclosed hoop houses that have been through a Cat 2 with no damage but there is often damage in stronger storms.

Protect animals

If you are traveling to a hotel or remote location, take your pets. If the hurricane is bad enough, you may not be able to return to your home for many days. In some locations, it has been weeks.

If you can't keep your pets with you, arrange to board them somewhere safe. **Don't ever leave them in your home if there is a risk of flooding or home damage.** Your animal may die, or someone could risk their life to save them.

If there is no risk of flood or home damage, pets often prefer to stay home, in a familiar location, than to travel to a shelter which is chaotic, noisy, and full of other strange animals. You know your pet. One family left their cat at home taking guests and friends (who were nervous) to a local shelter. They knew they could get back to the house and confident he would be ok and would be very nervous around dogs barking at the shelter. They nonetheless created a mini shelter in a walk-in closet. A small inner room (like a bathroom) can be used that is familiar to the animal. Place food, water and a litter box in the space. This can help your pet feel safer.

Livestock and outdoor animals

A chicken coop may not be adequate for chickens in a storm, depending on how it is constructed. If it's solid, you may want to lock them inside the enclosure with food and water, but only if there is zero risk of flooding. One family places their chickens in a fully enclosed stall in the stable during hurricanes with plenty of food and water. It is more secure than their coop and they are far above any possible flooding.

Large animals are often left in the pasture to fend for themselves in a lesser hurricane. In a category four or five, there is a high risk that some could be injured, depending on how sheltered the land might be or how good their instincts. This can also happen in a lesser storm depending on a variety of risk factors. Flooding in Texas left at least a few dead cows in trees. Wind has dropped trees on animals and killed them, and lightning has also killed livestock.

If at all possible, move large animals out of the risk zone of a major hurricane if you are near a coast, in a flood zone or otherwise vulnerable. Ideally, arrangements would be made well before a hurricane threatens as to where you will go and how you will transport large animals.

NOTE: If you cannot remove your animal from a potential flood zone, do not ever leave animals locked up if there is any risk of flood or storm surge. Many animals have drowned that could have survived, simply because they were caged or prevented from seeking higher ground.

During the storm

Choose a place in your home with the most protection to stay in during the worst of the hurricane which could last a number of hours. This might be a room in the middle of your home with few or no windows, or a smaller room surrounded by other rooms. Hurricane Dorian was slated to be 250 miles across moving at 13 MPH, but it stalled over the Bahamas. Thus, Category 5 winds (157+ MPH) lasted more than 24 hours in the affected areas. High winds for that length of time can do some serious damage.

After the storm - recovery

Be prepared for no electricity for a week or more after the hurricane. After hurricane Irma, electricity was not restored to some areas throughout Florida for anywhere from 3 days to more than a month. In heavily forested areas, like Houston, falling trees and branches have destroyed many miles of overhead utility lines. Try to keep your own trees from endangering your utility connections. In Puerto Rico, some people waited a year before electric service was restored. This is an excellent reason to have a solar system with battery storage that can operate with or without utility companies.

People miss their refrigerator the most in a lot of cases, and it draws more power than some generators can deliver. If you don't have enough generators or solar power to run your refrigerator after the hurricane, consider investing in an electric " travel cooler" or smaller super energy efficient refrigerator for emergencies.

Important recovery steps

Photograph and document any damage before and after for insurance purposes. Be thorough. Photograph each damaged item that has value. You should do this well before any disaster strikes and have a copy stored off site or in the cloud, and then do it again after damage can be assessed.

Apply for everything as soon as you can - insurance, FEMA, Red Cross, County programs, etc.

Keep a notebook or file, in addition to a folder on your computer documenting everything that happened and any damages. Use spreadsheets when possible. You will use it extensively. This makes it easy to communicate to insurance agencies, etc. It could mean thousands of dollars to you.

It could mean thousands of dollars to you. In the notebook keep:

- Items lost, serial numbers, approximate worth, details of damage
- Notes of all phone conversations
- Copies of any correspondence to you or from you
- Copies of any forms you filled out for anybody
- FEMA or insurance passwords, PIN numbers, claim numbers, etc
- Receipts (take photos of them - they degrade - or even better, get electronic ones).
- Repair contracts, permits, receipts, photos, license and insurance numbers of contractors.
- If you repair things yourself, verify whether insurance will pay, and if so, what they need from you exactly in order to do that. Get it in writing, preferably in your contract with them.

Please be aware that unfortunately, disreputable and incompetent contractors tend to prey on disaster victims. Do your homework, get references, get more than one quote, ensure the company is legitimate. Companies have been known to completely replace people's roofs who didn't need it, driving up insurance costs for everybody and putting the homeowner at risk for an insurance fraud charge. See our Overall Toolkit (link) for more information on recovery.

Safety

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

You may not be able to return to the area if there is a toxic release, downed electrical wires or other safety issues. This is why the contents of your go bag are so important.

Don't travel through water, especially if it's moving. Even six inches of water can move a vehicle off the road, engines can be easily disabled at slightly higher levels, and just drying out the interior of a water intrusion is costly. Drowning is the leading cause of death in hurricanes, and drowning in vehicles is the #1 way that happens. Flooding can crest days after a hurricane passes, depending on the topography of the land.

Keep in mind that flood water can be contaminated and contain dangerous debris or even vipers. Underground or downed power lines can also electrically charge the water. Wading in it can be a risk.

Your property - home

Ensure the home is structurally stable. If it has damage from tree fall or wind and you're not sure how it has been damaged structurally, get a professional to inspect it before entering.

Open windows and doors to let the air circulate. This ventilation will help remove foul odors and protect you from collected gas. It also will help dry out the house. If you have power, there are machines and services that can dry out water damage to floors and cabinets much quicker than you can do it yourself, and perhaps prevent mold from developing.

Keep generators outside, at least 20 feet from any open windows or doors to avoid carbon monoxide poisoning.

Your property - electricity and gas

Avoid contact with loose or dangling electrical wires, and report them to the power company. Inspect all areas of your property for loose wires.

Be aware that electrical appliances can be wet and electric shocks can occur. Turn off the electricity if you're able to do so, especially if there is still residual flood water in the home.

Check for gas leaks. Do not strike a match or lighter or relight appliances until they have been inspected.

Your property - water

City or well water may be contaminated and not be safe to use without filtration and boiling. Don't give it to your animals either. 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.

Drink, wash dishes, bathe, and clean with bottled, boiled or treated water only until you get the all clear on your water supply. Keep in mind that while this protects you from pathogens, it doesn't protect you from chemicals or PFAs, etc, that might have ended up in the water. This is an excellent reason to have an enclosed rainwater storage system with a filter.

Report broken sewer or water mains to the water department or the appropriate department in your region.

Your property - toxins

Flood waters can carry many forms of toxins. These can include pesticides, agricultural chemicals, heavy metals, and petroleum products. Biological contamination 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.

If your home has been wind damaged and ceilings, insulation, etc, are exposed, keep in mind that asbestos and lead based paint are common in building materials of older homes especially.

Mold can be a significant health issue in flood damaged homes. Be sure to wear a mask, and wet mold thoroughly before cleaning to reduce spread of spores.

If you suspect asbestos or other serious toxins may be present, call your local Health Hazards agency. 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.

Always wear an N95 mask minimally and protective clothing in flooded homes. Be sure to sanitize whatever gets dirty. Keep children or pets safe from being exposed to toxins they may ingest or absorb through the skin. Dispose of perishable, contaminated, or water-soaked foods, including any water or food for animals. This will also ensure that stray or wild animals cannot eat it.

If your home flooded, get clothing and other cloth material out of the house as soon as possible to reduce mold and mildew. Hanging them on a clothesline in the sun can do wonders. You may have to discard them however.

Recommended safety equipment for cleaning if there is concern about toxic exposure or other injury.

- [ ] N95 masks or better
- [ ] Hard hat
- [ ] Safety goggles

- [ ] Hard toed boots or rubber boots
- [ ] Heavy gloves
- [ ] Disposable coveralls may be appropriate in some cases to protect your skin and clothing

If you are exposed to flood waters through a cut or nose/mouth, clean thoroughly and see a doctor. If your tetanus shot isn't current, get a shot.

Wash thoroughly after cleaning.

Repairs

Assess for any repairs and analyze which are most important to fix, and which can wait. What will be further damaged if not repaired? It's essential to address mold fast to reduce further damage. If electrical outlets were flooded, change them.

If the roof has any damage, get it effectively protected right away with a strong tarp or suitable material until it can be repaired. Make sure your temporary fix doesn't leak.

Pump out the basement if it is flooded, but do it gradually. Drain one third of the floodwaters each day to minimize further structural damage. Shovel out the mud while it is still moist, and dry rugs and carpets thoroughly.

Clean up any water damage as soon as possible, before mold sets in (see water damage section). The most important action after a flood is to dry everything out as quickly as possible. Use many large fans to do this. As many as you can run. Simultaneously, get the mud out of the house that can cause mold and may have toxins in it. See below for more details on cleaning. Make any temporary repairs necessary to prevent further losses, including repair to fencing needed to keep animals confined.

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, liability insured, worker 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, and you don't want to be paying for accidents by these workers.

If you repair things yourself, verify whether insurance will pay, and if so, what they need from you exactly in order to do that. Get it in writing, preferably in your contract with them.

Cleaning a flood damaged building

The biggest issue will be persistent mold. Thus, you must either clean or remove everything that could allow it to survive, including under the floor, crawl space, subflooring, etc.

1. **Get the mess out** - remove all debris, mud, furniture, and other items from the house that got wet. Sort it into three piles:
2. **Things you want to save**: clothing and cloth can usually be washed in bleach and salvaged. Books and similar can be dried; Red Cross has directions. Other valuables like art can also be cleaned. All must be cleaned and dried.
3. **Things of value** that must be thrown away. Furniture cushions, beds, particle board, computers or other electronics, etc. Place it all together and take good photos. The insurance adjustor may also want to see it so don't throw it out yet.
4. **Garbage**: Flooded carpet, food exposed to flooding, papers you're not salvaging, etc, should all be disposed of. Ensure you check with your local waste management as to how to sort or discard it.
5. **Clean up any 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 (follow the label directions) and leave for 15 minutes. Some have used Effective Microorganisms to clean up mold, even black mold, successfully. They may even be able to get into hard-to-reach spaces to destroy mold because they actually consume the mold.
6. **Check the floors**. Remove carpet if flooded, it can't be recovered. Remove any floor or subfloor that has been soaked and can't be thoroughly cleaned and dried out.
7. **Dry out the walls**. This may entail removing any drywall that got wet, insulation 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.
8. **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 will need special attention.
9. **Everything needs to be fully dry** before you start rebuilding.

Drying out your home

1. Open the house when humidity is lower outside, close it up when humidity is higher
2. Open closets, remove drawers. Get as much air exposure and circulation to anything that is wet, as possible.
3. Use fans, as many as you can.
4. Run dehumidifiers, especially in enclosed areas like closets.
5. Use desiccants, like clay cat litter, biochar
6. Consider hiring a professional if the damage is very bad. They have machines that do this faster and more efficiently.
7. Be patient - the drying process can take several weeks. Don't cover up anything until it is fully dry.

Tree aftercare - flooding

Remove salt - If you feel there may be salt water damage on plants, flush them with fresh water as soon as possible after the storm. This will be more effective on well-drained soils than on clay unless there is a steep slope. You may 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 and soil well above the root ball can damage bark and promote rot.

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. Do not fill higher than just above the first roots, do not cover the tree trunk or stem with soil.

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. Disinfect blades with 90%+ alcohol, dilute bleach, or hydrogen peroxide.

Remove mulch - While this is counterintuitive to permaculturists, 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.

Garden beds - If your garden or farm was flooded, there is a risk that flood waters were contaminated. You may need to remove the soil from your garden completely and start over.

Tree aftercare - wind

Be aware of weakened trees and tree limbs, and use full safety procedures when working with fallen or weakened trees.

Inspect all trees to see if they're leaning and check the ground for signs that the tree may be partially uprooted. If you see exposed roots, cracks, or fissures in the soil, if the ground is higher on one side of the tree than the other, or if the tree is leaning, call a certified arborist ASAP for a complete inspection. It may be possible to straighten smaller trees, but larger trees with disturbed roots may need to be removed.

If your trees fall down, especially young trees, prop them back up after the storm. Chances are, they will recover and be fine. This is routinely done by orchards and they are able to save many of their trees. You may need to wait a couple of years for a good harvest again or to find out how well the tree will survive, but that may be better than starting over completely. Some orchardists remove some of their trees, and leave the ones that appear least damaged, hedging their bets.

Don't fertilize your tree, as more nutrients won't help at this point. The tree may be in shock, let it recover. The water and lack of oxygen was a stressor to your trees, so it's best to remove any other causes of stress such as compacting soil with machinery, other disturbance of roots, over pruning, over mulching, over or under watering (let the soil dry out for 2-3 inches

before watering), or bark injuries.

Some trees are much more vulnerable to flood damage than others. Some can be killed after a few days in water. Others can handle up to 30 days. See our flood resistant tree lists for different bioregions in the Appendix.

A tree injured by flooding may not show some signs of stress for days or weeks. These signs include:

- Yellowing leaves
- Premature loss of leaves
- Smaller leaves than usual
- Watersprouts growing from the base or trunk of the tree
- Dieback of branches in the tree canopy
- Brown, dry leaves

These signs can also occur from lack of water or other stressors. When in doubt, call a certified arborist. Note that some arborists will recommend removing a tree even when it can be saved. It's worth it to seek recommendations in your area for arborists who have a reputation for working to save trees.

Large animals

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.

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.

Waste

Keep your trash well contained. It may take a while to pick it up and if it gets scattered or blows around, it could contribute to the toxicity in the area.

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.

As in any disaster, storm surge, flooding or wind damage may have spread toxins in your home or yard or any local area you travel to. If you've had flood damage especially, wear appropriate protective clothing and masks when cleaning up.

Source: FEMA, Red Cross, individual disaster responders

More resources

See our Deeper Dive Hurricane Toolkit (coming soon) for more in-depth information on landscaping, building planning and other regenerative solutions in hurricane country.

Please see our Toolkits on Flooding (coming soon) and Wind (coming soon) for more in-depth solutions for these damaging forces.

See our Overall Toolkit (link) for more in-depth general preparation such as expanded "bug out" lists, recovery checklists and resources and more.

Appendix - How much damage can a hurricane cause?

A flooded creek can move an entire parking lot of cars
https://www.youtube.com/watch?v=kYUpkPTcqPY

Of course, a storm surge is not a tsunami, but this gives the idea of the power of the ocean when it moves inland.

https://www.youtube.com/watch?v=YF3BtgemJco

A Category 5hurricane can take a roof off if it isn't properly tied down with hurricane ties. Even then, depending on how exposed your house is, it can pulverize a house. Note that in the below photos, houses next to the shore and that were the most exposed to both wind and water sustained the most damage. However, Michael knocked down entire forests 50 miles inland, per on the ground reports we received, and there was damage to vulnerable housing. South Florida has more stringent hurricane code for buildings and many are built to withstand even a Cat 4 or 5 hit. Counties in North Florida have weaker codes.

https://www.businessinsider.com/hurricane-michael-photos-mexico-beach-florida-2018-10#resident-tony-feller-is-one-of-the-residents-who-stayed-in-mexico-beach-6

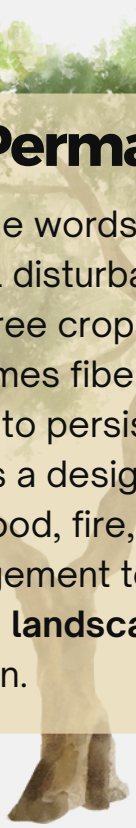
Building codes in Florida

https://www.wunderground.com/cat6/South-Floridas-Hurricane-Building-Code-StrongAnd-North-Floridas-Could-Be-Stronger
https://en.wikipedia.org/wiki/Hurricane-proof_building
https://www.wsj.com/articles/one-early-lesson-from-irma-hurricane-building-codes-work-1505559600

See Resource section for some data on your options.

https://www.youtube.com/watch?v=NIDrBRlFvd4

https://www.businessinsider.com/hurricane-michael-photos-mexico-beach-florida-2018-10#resident-tony-feller-is-one-of-the-residents-who-stayed-in-mexico-beach-6 https://www.aeroedgeusa.com/index.php/videos-hurricane-roof-testing/hurricane-protection-for-roofs



What Is Permaculture?

Permaculture is a contraction of the words ‘permanent’ and ‘agriculture’ which reconcieves annual tillage and soil disturbance-based agriculture into a **perennial-plant based agriculture** favoring tree crops, cover crops, and minimal soil disturbances. From agriculture comes fibers, fuels, medicines, foods, and other essential requirements for culture to persist and thrive. Permaculture has come to now mean ‘**permanent culture**’. As a design science, permaculture studies and catalogues **natural solutions** to flood, fire, extreme heat, droughts, climate adaptation, and ecosystem management techniques both old and new. Using permaculture design, we can build **landscapes, buildings, and communities** that resist disasters by their very design.

About

This Hurricane Preparation Toolkit is one of a series of **free guides** designed to help you prepare for disasters. It provides regenerative solutions to create more resilient landscapes, ease recovery, build long-term resilience, and restore local ecosystems.

These guides were created in response to the widespread damage caused by Hurricane Helene, southern California wildfires, and other recent devastating disasters. The Permaculture Institute of North America (PINA), Association for Regenerative Culture (ARC), and WeRegenerate have come together as the **Disaster Resilience Initiative** to produce this series of educational resources on disaster management viewed through an integrated, multi-solution, permaculture lens.

Our guides outline **step-by-step** actions to lessen impacts and protect yourself from imminent disasters, prepare quickly, and develop longer-term resilience strategies. In addition to these resources, we offer monthly town halls, an online forum, and are developing a comprehensive online library of regenerative solutions, online summits, a resource directory, and other educational and networking opportunities.

These collated, targeted resources support community leaders, groups, and individuals in preparing for and responding to fire, flood, hurricane, tornado, landslide, other extreme weather, and economic or social crises—helping to **rebuild homes, communities, and environments in a more resilient and regenerative way**.

We've gathered best practices from a wide range of sources, including wildfire specialists from California, Australia, and Canada, as well as permaculturists working in fire-prone regions. We are grateful to the many experts who contributed to this document through their generous advice and free materials.

This is a **community based project** and a living document. We are actively seeking input from others to improve this information. Please contact us if you have resources to share or if you'd like to contribute to this project in other ways.

If you print, printing in black and white will save ink. A print copy of checklists is **here (link)**, to place in your bug-out bag. We will continue to update this manual. For the most up to date versions and access to all other guides see: **PcX.earth/disaster**

WORK IN PROGRESS

PROJECT OVERVIEW

Project Information	Details
Project Name	Disaster Resilience Initiative
Project Managers	Jesse Tack, Lee Barnes, Suzanne Bonefas, Elizabeth Lynch, Koreen Brennan
Project Start Date	September, 2024
Project End Date	Continuous

1. Project Summary

Objective	To create a complete set of free resources for all disaster types in North America and Hawaii from the permaculture perspective
Scope	Across many media types, we will produce: checklists, printouts, guides, research libraries, town halls, summits, interviews, etc.

2. Project Milestones

click here

Milestone	Date	Result	Status
Overall Preparation Guide	Sep, 2024	Guide	In Progress
1st Town Hall	Nov 15, 2024	Video	Complete
Open Disaster Resiliency Working Group	Nov, 2024	Open Working Group	In Progress
2nd Town Hall	Dec 13th, 2024	Video	Complete
3rd Town Hall	Jan 17th, 2025	Video	Complete
4th Town Hall	Feb 21st, 2025	Video	Complete
5th Town Hall	Mar 21st, 2025	Video	Complete
Fire Preparation Toolkit	Mar, 2025	Guide	In Progress
Winter Prep Toolkit	Coming soon	N/A	In Progress