DISASTERS EXPLAINED.

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DISASTER RESPONSE

TROPICAL STORMS

A tropical storm is a very powerful low-pressure system, that has strong winds and heavy rainfall. Tropical storms are destructive, causing severe damage to buildings and infrastructure.

Hurricanes, cyclones and typhoons are all tropical storms. The only difference is where they form:

- **Hurricanes** are formed over the North Atlantic Ocean and Northeast Pacific
- **Cyclones** are formed over the South Pacific and Indian Ocean
- **Typhoons** are formed over the Northwest Pacific Ocean.

WHAT IS A HURRICANE?

When the maximum sustained winds of a tropical storm reach 74 miles per hour, it's called a hurricane. Hurricanes are some of the most powerful storms on Earth, drawing their energy from warm tropical waters.

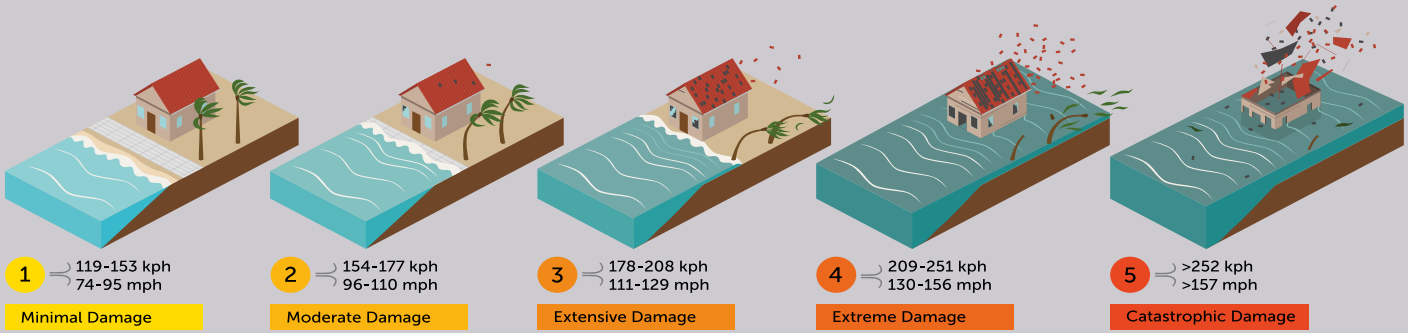
Hurricane season officially runs from June 1 to November 30. Usually, there will be between six and eight hurricanes spread across this period. The 2020 season was extremely active, producing 14 hurricanes (top winds of 74 mph or greater), including seven major hurricanes (top winds of 111 mph or greater). This is the second-highest number of hurricanes on record.

HOW IS HURRICANE STRENGTH MEASURED?

The Saffir-Simpson wind scale is designed to measure the destructive power of Atlantic hurricanes. Hurricanes can be classified in five categories according to their sustained wind speed. The scale estimates potential property damage.

Hurricanes reaching category 3 and higher are considered major hurricanes because of their potential for significant loss of life and damage to property. Category 1 and 2 storms are still dangerous and require preventative measures.

THE SAFFIR-SIMPSON WIND SCALE



WHAT CAUSES HURRICANES AND TYPHOONS?

Hurricanes and typhoons need specific conditions to form and persist. The sea temperature needs to be at least 27°C, which is why they only form in the tropics.

The air above the sea heats up via convection and this warm, moist air rises. As the atmosphere heats up, the pressure changes and lowers at the surface.

Wind from the surrounding areas fills in the space left by this area of low pressure, while the Earth's rotation causes the wind to spiral and become cyclical.

The eye of the storm tends to form once the wind speed reaches 74 mph – the point at which a tropical storm is reclassified as a hurricane or a typhoon.

When tropical storms reach a land surface, they begin to lose their energy and die out. This is because they are no longer receiving heat energy and moisture from the ocean, which is needed to drive them.

WHAT ARE THE EFFECTS OF A HURRICANE?

When a hurricane strikes a coastal area, it results in a number of serious hazards. These include a deadly combination of high winds, heavy rainfall and coastal storm surges.

Storm surge is water from the ocean that is pushed towards the shore by the strong winds and low pressure. The rise in water level can cause severe flooding in coastal areas, and combined with the normal tides, can increase the water level by 30 feet or more. This can cause extensive damage; destroying buildings and severely eroding beaches and coastal roads.

Strong winds associated with hurricanes can damage and destroy buildings, bridges and vehicles. Debris, such as signs or broken materials, can become airborne and penetrate anything with missile-like force. Hurricanes can also knock out power to entire communities, preventing vital communications and hampering rescue efforts.

Heavy rainfall is produced by hurricanes and is heaviest in the 6 hours before and the 6 hours after the hurricane reaches landfall. This can cause devastating flooding and is the major cause of hurricane-related deaths.

HOW IS CLIMATE CHANGE AFFECTING TROPICAL STORMS?

Tropical storms are a natural part of our climate. Whilst climate change is not increasing the number of tropical storms, rising temperatures are causing storms to become much more intense and have a far more devasting impact.

With the warming of the Earth's climate, there is more energy available in the atmosphere and ocean waters to fuel tropical storms. In the past 20 years, hurricane-prone regions have experiences an increase in severe, more powerful tropical storms, that bring more damaging wind speeds, high storm surges and more extreme rainfall. In addition, rising sea levels are likely to make tropical storms more destructive, with increases in coastal flooding and subsequent storm damage along coasts.

SINCE 1995 THERE HAVE BEEN 17 ABOVE-NORMAL ATLANTIC HURRICANE SEASONS, AS MEASURED BY THE ACE INDEX . SO, WHILE THERE AREN'T NECESSARILY MORE HURRICANES, THOSE THAT FORM APPEAR TO BE GETTING STRONGER WITH MORE CATEGORY 4 AND 5 EVENTS.

FLOODS

Floods are among the most common and destructive of all weather-related natural disasters. They can cause widespread devastation, resulting in loss of life and servere damage to personal property and critical infrastructure.

WHAT ARE FLOODS?

Floods are often caused by heavy rainfall, rapid snowmelt or a storm surge from a tropical storm or tsunami in coastal areas. There are three common types of floods:

Flash floods are caused by heavy rainfall in a short period of time, usually less than 6 hours. Excessive rain falls so fast that the underlying ground cannot drain it away fast enough. Flash floods can rip through riverbeds, urban streets or mountain canyons, sweeping away everything in their path.

River floods are caused when consistent rainfall, heavy rainfall or snow melt forces a river to exceed capacity, overflowing onto the surrounding banks and neighbouring land.

Coastal floods happen because of a combination of high tides, storm surges and onshore winds. A storm surge is a temporary large-scale rise in seal level, over and above normal tide. They are caused by severe storms, waves and low atmospheric pressure. Often, the worst coastal flooding occurs when the peak storm surge coincides with high spring tide.

WHAT ARE THE EFFECTS OF FLOODING?

The consequences of flooding can be devastating. The immediate impact of flooding includes loss of life, damage to property, destruction to crops, livestock and critical infrastructure. It can make vast areas uninhabitable and leave families homeless and vulnerable. Between 1998 and 2017, floods affected more than 2 billion people worldwide.

Flooding can cause communications to go down, blocking roads and leaving whole communities trapped and inaccessible for days, often without safe food or clean water.

Even after the flood waters recede, the risk still remains. The land is often left covered in mud, contaminating the water with sewage and other toxic materials.

The stagnant water left behind by a flood also creates a breeding ground for mosquitoes. This can lead to an increase in the spread of serious disease and the risk of deadly outbreaks.

According to the World Health Organization, drowning accounts for 75% of deaths in floods.

HOW IS CLIMATE CHANGE AFFECTING FLOODS?

Climate change has contributed to an increase in the intensity and frequency of floods in some regions. While coastal floods have increased due to rising sea levels, flash flooding has increased due to our warmer atmosphere and its ability to hold more water. In fact, for every 1°C increase in temperature, the air can hold 7% extra water vapour. When this air rapidly cools it leads to an increase in the intensity and frequency of rainfall.

At this current rate, 147 million people may be at risk of flooding by 2030.

WILDFIRES

Even though wildfires are classified as natural disasters, only 10-15% of them happen on their own in nature. The other 85-90% result from human causes, including unattended camp fires, debris fires, discarded cigarettes and arson.

WHAT ARE WILDFIRES?

Wildfires burn millions of acres of land every year globally. A wildfire can be defined as any type of uncontrollable fire that is spreading across wildland, including pastureland, forest, grassland and peatlands. Many regions experience distinct wildfire seasons, driven by wet and dry periods, and human practices such as agricultural burning. However, other regions have a risk of fire year-round.

Once a fire begins, it can spread at a rate of up to 14 mph, but there are several factors that determine how the fire spreads. These three factors include fuel, weather and topography.

The amount of flammable material that surrounds the fire is the **fuel** which can help wildfires spread. If there is a lot of fuel, the fire will burn more intensely, causing it to spread faster. The faster it heats up the material around it, the faster those materials can ignite.

Extremely dry **weather** conditions and warmer temperatures allow for fuels to ignite and burn faster, adding to the rate at which a wildfire spreads. Wind also supplies the fire with additional oxygen pushing the fire across the land at a faster rate.

Slope is the most important factor in **topography** in relation to wildfire. Fires usually travel uphill much faster than downhill. The steeper the slope, the faster the fire travels. Fires travel in the direction of the ambient wind, which usually flows uphill. Additionally, the fire is able to preheat the fuel further up the hill because the smoke and heat are rising in that direction.

WHAT ARE THE EFFECTS OF WILDFIRES?

Despite wildfires commonly happening in rural areas, they can occur anywhere and have massive economic, social and environmental impacts. Once the fire begins it has an immediate effect and can be deadly, destroying homes, crops, and wildlife habitats. Wildfires can disrupt transportation and, communications, and contaminate water supplies.

Wildfires increase air pollution in surrounding areas and can affect health. Many pollutants found in wildfire smoke can cause a range of health issues, including respiratory and cardiovascular problems. Particles and gases from wildfires can be carried over long distances, affecting air quality in regions far away.

Wildfires also simultaneously impact the climate by emitting carbon dioxide and other greenhouse gases that will continue to warm the planet well into the future. They damage forests that would otherwise remove CO2 from the air.

HOW IS CLIMATE CHANGE AFFECTING TROPICAL WILDFIRES?

Climate change has increased wildfire risk through warmer temperatures and drier conditions that lengthen the wildfire season, increase the chances of a fire starting, and help a fire spread.

Increasing heat, as well as changing rain and snow patterns have vastly increased the likelihood that fires will start more often and burn more intensely and wildly than they have in the past. Rising temperatures evaporate more moisture from the ground, drying out the soil and making vegetation more flammable. At the same time, winter snow packs are melting earlier, meaning that the forests are drier for longer periods of time. As a result, the number of days with 'fire weather' conditions have increased.

DROUGHTS

Many places around the world are affected by drought. Droughts are not a sudden hazard event, like hurricanes or earthquakes. Instead their beginning and end are hard to gauge and they can last for months or even years.

WHAT ARE DROUGHTS?

A drought is a period of time when an area or region experiences below-normal precipitation. The lack of adequate precipitation, either rain or snow, can cause reduced soil moisture or ground water, diminished stream flow, crop damage and a general water shortage.

Droughts are the second most costly weather events after hurricanes.

There are three main types of droughts:

Meteorological drought – when the amount of precipitation received in a specific area is less than the average.

Hydrological drought – when reduced precipitation impacts water supply, e.g. there is decreased streamflow, soil moisture, reservoir and lake levels, and groundwater.

Agricultural drought – when the lack of precipitation impacts agricultural activities, e.g. soil moisture or reservoir levels of irrigation.

WHAT ARE THE EFFECTS OF DROUGHT?

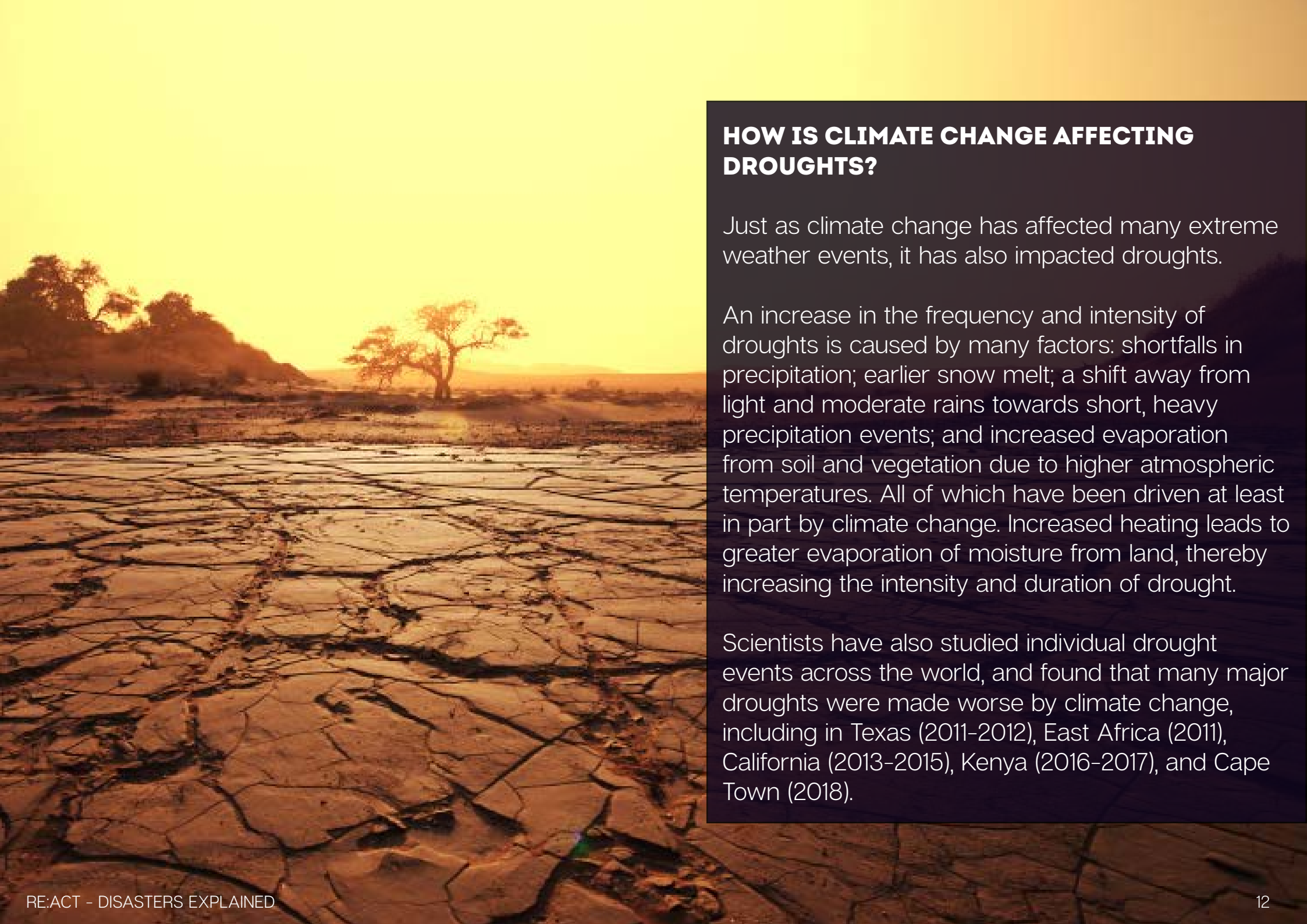
Droughts are the most serious hazard to livestock and crops in nearly every part of the world. Drought threatens livelihoods, increases the risk of disease and death, and fuels mass migration.

Drought in developing nations is notorious for creating water and food insecurity and exacerbating pre-existing problems such as famine and civil unrest. Drought conditions often provide too little water to support food crops, through either natural precipitation or irrigation using reserve water supplies. The same problem affects grass and grain used to feed livestock and poultry. When drought destroys food sources, people go hungry. When the drought is severe and continues over a long period, famine may occur.

Faced with the impacts of drought, many people will flee a drought-stricken area in search of a new home with a better supply of water, enough food, and without the disease and conflict that are often present in the regions they are leaving. This can result in the displacement of entire populations.

Drought conditions can also provide a substantial increase in wildfire risk. As plants and trees wither and die from a lack of precipitation, they become fuel for wildfires.

An estimated 55 million people worldwide are affected by droughts every year.



HOW IS CLIMATE CHANGE AFFECTING DROUGHTS?

Just as climate change has affected many extreme weather events, it has also impacted droughts.

An increase in the frequency and intensity of droughts is caused by many factors: shortfalls in precipitation; earlier snow melt; a shift away from light and moderate rains towards short, heavy precipitation events; and increased evaporation from soil and vegetation due to higher atmospheric temperatures. All of which have been driven at least in part by climate change. Increased heating leads to greater evaporation of moisture from land, thereby increasing the intensity and duration of drought.

Scientists have also studied individual drought events across the world, and found that many major droughts were made worse by climate change, including in Texas (2011-2012), East Africa (2011), California (2013-2015), Kenya (2016-2017), and Cape Town (2018).

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