



NATURAL HAZARDS
Some natural hazards are weather events (tropical and extra-tropical cyclones, tornadoes, thunderstorms, lightning, hailstorms, high winds, snow storms, freezing rain, dense fog, thermal extremes and drought). Others are related to weather, climate and water (floods and flash floods, storm surges, high waves at sea, sand- or duststorms, forest or bush fires, smoke and haze, landslides and mudslides, avalanches and desert locust swarms).



Time- and space-scales of hazards

Each hazard is in some way unique. Tornadoes and flash floods are short-lived, violent events, affecting a relatively small area. Others, such as droughts, develop slowly, but can affect most of a continent and entire populations for months or even years.

Multiple hazards

An extreme weather event can involve multiple hazards at the same time or in quick succession. In addition to high winds and heavy rain, a tropical storm can result in flooding and mudslides. In temperate latitudes, severe summer weather (thunder and lightning storms or tornadoes) can be accompanied by heavy hail and flash floods. Winter storms with high winds and heavy snow or freezing rain can also contribute to avalanches on some mountain slopes and to high runoff or flooding later on in the melt season.

Geophysical hazards

Some National Meteorological and Hydrological Services and specialized centres have responsibility for investigating geophysical hazards including volcanic explosions (airborne ash) and tsunamis, and hazardous airborne matter (radionuclides, biological and chemical substances) and acute urban pollution.

WEATHER CLIMATE WATER

HAZARDS

FLOODS AND FLASH FLOODS

Floods can occur anywhere after heavy rain events. All floodplains are vulnerable and heavy storms can cause flash flooding in any part of the world. Flash floods can also occur after a period of drought when heavy rain falls onto very dry, hard ground that the water cannot penetrate.

Floods come in all sorts of forms, from small flash floods to sheets of water covering huge areas of land. They can be triggered by severe thunderstorms, tornadoes, tropical and extra-tropical cyclones (many of which can be exacerbated by the El Niño phenomenon), monsoons, ice jams or melting snow.

In coastal areas, storm surge caused by tropical cyclones, tsunamis, or rivers swollen by exceptionally high tides can cause flooding. Dikes can flood when the rivers feeding them carry large amounts of snowmelt. Dam breaks or sudden regulatory operations can also cause catastrophic flooding.

Floods threaten human life and property worldwide. Some 1.5 billion people were affected by floods in the last decade of the 20th century.

LANDSLIDE OR MUDSLIDE (MUDFLOW)

Mudslides and landslides are local events and usually unexpected. They occur when heavy rain or rapid snow or ice melt or an overflowing crater lake sends large amounts of earth, rock, sand or mud flowing swiftly down mountain slopes, especially if these are bare or burnt by forest or brush fires.

They can reach speeds of over 50 km/h and can bury, crush or carry away people, objects and buildings. In Venezuela in 1999, after two weeks of continuous rain, landslides and mudflows shot down a mountain, washing away towns and killing an estimated 15 000 people.

STORM SURGE

Low surface air pressure at the centre of a tropical cyclone allows the sea level to rise as a dome 2-5 m high and up to 80 km across. Strong onshore winds push water ahead of them, generating large waves that grow higher when they reach shallow water. The combination of wind-driven waves and the low-pressure dome produces a storm surge—a huge volume of water driven ashore at high speed and of immense force. It can wash away everything in its path. A massive storm surge left 300 000 people dead in the coastal wetlands of Bangladesh in 1970.

AVALANCHE

An avalanche is a mass of snow and ice falling suddenly down a mountain slope, often taking earth, rocks and rubble with it. Avalanches can be highly destructive, moving at speeds in excess of 150 km/h. The moving snow also pushes air ahead of it as an avalanche wind strong enough to cause serious structural damage to buildings, woodlands and mountain resorts.

Thousands of avalanches occur every year, killing an average of 500 people worldwide.

DESERT LOCUSTS

Desert locusts inflict damage in Africa, the Middle East, Asia and southern Europe. When weather and ecological conditions favour breeding, the insects are forced into a small area. They stop acting as individuals and start acting as a group. Within a few months, huge swarms form and fly downwind in search of food.

Swarms can be dozens of kilometres long and travel up to 200 km a day. A small part of an average swarm (or about one tonne of locusts) eats the same amount of food in one day as 10 elephants or 25 camels or 2 500 people. They jeopardize the lives of millions of farmers and herders in already fragile environments.

Locust plagues during or immediately after drought conditions can spell even greater disaster, as was the case in several Sahelian countries in 2005.

AIR POLLUTION

Pollutants include particulate matter and noxious gases from industry, vehicles and human activities.

Smoke and haze result from forest or wildland fires or from slash-and-burn forest or crop clearing or ash from volcanic explosions in stable air conditions. Smoke, haze and pollution have serious implications for human health—the local population may have to wear gas masks. They reduce visibility; air and road traffic can be disrupted.

Smog, acid rain, the ozone hole and an adverse increase in the greenhouse effect are also caused by air pollution. Stable atmospheric conditions often lead to a concentration of pollutants.

DROUGHT

The primary cause of any drought is deficiency of rainfall. Drought is different from other hazards in that it develops slowly, sometimes over years, and its onset can be masked by a number of factors. In some cases, droughts are recognized too late for emergency measures to be effective.

Drought can be devastating: water supplies dry up, crops fail to grow, animals die and malnutrition and ill health become widespread. Drought is often associated with the arid regions of Africa, particularly the Sahel. In recent years, droughts have also struck India and parts of China, the Middle East, Australia, parts of North America, and Europe.

TROPICAL CYCLONES

Tropical cyclones are areas of very low atmospheric pressure over tropical and sub-tropical waters which build up into a huge, circulating mass of wind and thunderstorms up to hundreds of kilometres across. Surface winds can reach speeds of 200 km/h or more.

About 80 tropical cyclones form every year. Their names depend on where they form: typhoons in the western North Pacific and South China Sea; hurricanes in the Atlantic, Caribbean and Gulf of Mexico, and in the eastern North and central Pacific Ocean; and tropical cyclones in the Indian Ocean and South Pacific region.

ENVIRONMENTAL DEGRADATION

Storms erode beaches and coastlines. They cause damage to fragile and often unique ecosystems such as mangroves and coral reefs. Warmer temperatures bleach corals and place animal, plant, fish and bird species at risk from extinction. These impacts not only cause a loss of biodiversity, they also put livelihoods at risk, not least in the tourism sector.

Rising sea-level and flooding increase saltwater intrusion into surface and groundwater sources.

HEAVY RAIN AND SNOW, STRONG WINDS

Heavy rain and snow are dangerous for vulnerable communities. They can exacerbate rescue and rehabilitation activities after a major disaster, such as the earthquake in Pakistan in October 2005. They bring havoc to road and rail transportation, infrastructure and communication networks. An accumulation of snow can cause the roofs of buildings to collapse.

Strong winds are a danger for aviation, sailors and fishermen, as well as for tall structures such as towers, masts and cranes.

Blizzards are violent storms combining below-freezing temperatures with strong winds and blowing snow. They are a danger to people and livestock. They cause airports to close and bring havoc to roads and railways.

THUNDERSTORMS, LIGHTNING, TORNADES

Severe thunderstorms give rise to sudden electrical discharges in the form of lightning and thunder. They often bring heavy rain or hail, strong winds and occasionally snow.

In some parts of the world they trigger tornadoes. Tornadoes are particularly common in the Great Plains of North America but they can and do occur anywhere, especially in temperate latitudes. They can cause severe damage. Other associated phenomena include downbursts and flash floods.

Worldwide, lightning during dry periods is a significant factor in starting wildfires in forests and grasslands.

HAILSTORMS, ICE STORMS

Precipitation in the form of large hailstones can reach diameters of over 10 cm and can fall at speeds of over 150 km/h. Worldwide losses to agriculture in a typical year are more than US\$ 200 million. Hailstorms have also caused deaths and great damage to cities around the world.

In a matter of minutes an ice storm can deposit a layer of ice heavy enough to bring down power and telephone lines and snap branches from trees. The ice covers roads, rail tracks, and runways, making driving extremely hazardous, delaying trains, and closing airports.

FOREST OR WILDLAND FIRE

Massive and devastating fires can be triggered during and after periods of drought, by lightning or by human action in almost all parts of the world. As well as destroying forests, grasslands and crops, they kill livestock and wild animals, damage or destroy settlements and put the lives of inhabitants at risk.

DUSTSTORMS/ SANDSTORMS

Duststorms and sandstorms are ensembles of particles of dust or sand lifted to great heights by strong and turbulent wind. They occur mainly in parts of Africa, Australia, China and the USA. They threaten lives and health, especially of persons caught in the open and far from shelter.

Transportation is particularly affected as visibility is reduced to only a few metres.

THERMAL EXTREMES

Heat waves are most deadly in mid-latitude regions, where they concentrate extremes of temperature and humidity over a period of a few days in the warmer months. The oppressive air mass in an urban environment can result in many deaths, especially among the very young, the elderly and the infirm.

In 2003, much of western Europe was affected by heat waves during the summer months. In France, Italy, The Netherlands, Portugal, Spain and the United Kingdom, they caused some 40 000 deaths.

Extremely cold spells cause hypothermia and aggravate circulatory and respiratory diseases.

FOG AND SMOG

Fog is a suspension of very small, usually microscopic, water droplets in the air.

Dense fog has a serious impact on transportation when the visibility is significantly reduced. Highways, airports and ports are closed for safety. Fog can cause considerable economic losses.

Smog is a combination of fog and air pollution. It has serious implications for human health.



WEATHER CLIMATE WATER
NATURAL HAZARDS

- Tropical cyclones
- Drought
- Severe thunderstorms
- Lightning
- Tornadoes
- Hailstorms
- Ice storms
- Thermal extremes
- Duststorms/sandstorms
- Fog
- Heavy rain and snow
- Strong winds
- Storm surge
- Floods and flash floods
- Landslides/mudslides
- Avalanches
- Desert locust plagues
- Forest or wildland fire
- Air pollution



NATURAL HAZARDS



Weather • Climate • Water

