



Atmospheric Pollution & Climate Change (APCC) Environmental Information System (ENVIS) Resource Partner

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Compendium of Extreme Weather & Air Pollution Events

**Global & National
2019-20**

**INDIAN INSTITUTE OF TROPICAL METEOROLOGY
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Indian Institute of Tropical Meteorology (IITM), Pune is a Resource Partner to Environmental Information System (ENVIS) on thematic area of Atmospheric Pollution & Climate Change (APCC). IITM-ENVIS works on generating knowledge products and spreading awareness through various activities, as a part of this we compiled the Extreme Events, that occurred every year. The Extreme Weather and Air Pollution events which occurred in the year 2019 are compiled in this publication. This book has short descriptions of such events with respect to region affected and magnitude of the events. We have tried to cover the major episodes of such events from around the world and classify into categories which are simple to understand and easy to refer.

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EXTREME WEATHER EVENTS – NATIONAL

1. Heat Wave

A heat wave is a prolonged period of excessive heat, often combined with excessive humidity. Excessive heat is determined by Heat Index Values. The heat index, also known as the apparent temperature, is what the temperature feels like to the human body when relative humidity is combined with the air temperature.

A heat wave occurs when a system of high atmospheric pressure moves into an area and lasts two or more days. In such a high-pressure system, air from upper levels of our atmosphere is pulled toward the ground, where it becomes compressed and increases in temperature.

Health Impact of Heat Waves -

Among the different consequences, effects on population resulting of exposure to extreme heat range from dehydration, heat exhaustion, deadly heatstroke, kidney problems, lethargy and death; along with other side effects such as poor work attendance and/or performance among the exposed population.



Physiological Effects -

For instance, heat increases skin and joint temperature, improves blood circulation and muscle relaxation and decreases joint stiffness. Cold will numb the pain, decrease swelling, constrict blood vessels and block nerve impulses to the joint.

Harmful Effects -

Heat causes heat exhaustion, which can be dangerous. The longer you spend in the heat, the more serious the effects on your body can be. Increased body temperature can cause heavy sweating, clammy skin, dehydration, tiredness, headache, dizziness, nausea, cramps, and a quick, weak pulse.

1.1 India Heat Wave, Soaring Up to 123 Degrees, Has Killed at Least 36

Source: timesofindia, 13 June, 2019

India's heat waves have grown particularly intense in the past decade, as climate change has intensified around the world, killing thousands of people and affecting an increasing number of states. Every year, most of the Indian states suffer by severe heat waves during summer months. The heat wave in India occur during the dry season, and typically lasts from March to July with peak temperatures in April and May. Although it remains hot until late October, Indian monsoons often provide some respite from the heat.

This year, the extreme temperatures have struck large parts of northern and central India, with Rajasthan, Madhya Pradesh, Uttar Pradesh and Maharashtra among the worst-hit states.



New Delhi - One of India's longest and most intense heat waves in decades, with temperatures reaching 123 degrees, has claimed at least 36 lives since it began in May, and the government has warned that the suffering might continue as the arrival of monsoon rains has been delayed. Twice in the past week, the temperature in the Churu area of Rajasthan, in northern India, reached 123 degrees Fahrenheit (about 51 Celsius). India's Meteorological Department warns that heat that extreme brings a "very high likelihood of developing heat illness and heat stroke in all ages." Several other parts of the state have recorded temperatures surpassing 118 degrees. Even as parts of India were complaining of a prolonged winter, other regions started feeling the heat as early as March this year. By the first week of June, the country underwent 73 spells of heatwave, 11 of them severe. In many of the 22 states and Union territories that have underwent at least

one spell of heatwave since March 1, there have been casualties. In Bihar alone, more than 200 have died.

Seven of these states are not part of the core heatwave zone. In some, like Jammu & Kashmir, heatwaves were almost unheard of.

In early March, when northern India was still recovering from cold wave conditions, Kerala was scalded. The IMD waited until the late March to call it a heatwave, by when the situation was already severe.

Yet it was unprecedented as temperatures did not cross the mandatory 40 degrees Celsius. The Thiruvananthapuram IMD office made an exception looking at people's discomfort due to high temperatures combined with humidity.

Tamil Nadu and Andhra Pradesh also suffered from early heatwaves (from March 7). The scorching sun was no kinder to Gujarat that suffered from a spell on March 21 that lasted three days.

The IMD recorded major heatwave spells in six states between March 28 and April 3.

India's principal weather agency declares a heat wave when the mercury is above normal by 4.5°C to 6.4°C and a severe heat wave when the gap crosses 6.4°C.

The sun was the most brutal to Maharashtra, where people reeled under heatwave conditions for 42 days between March 28 and June 5, 2019. Of these, the heatwave was severe on six days.

Next in line were Madhya Pradesh and Rajasthan with 24 and 18 days of heatwave, respectively. On non-heatwave days too the mercury didn't stay under normal.

Humidity compounded the problem in coastal states like Odisha and Andhra Pradesh and even in non-coastal Bihar. High relative humidity increases the felt temperature, causing more perspiration and increasing discomfort.

1.2 Heat waves to continue in Maharashtra, Rajasthan, Madhya Pradesh

Source: downtoearth.org.in, 7 June, 2019



While 2018 was the sixth warmest year on record in India, intense heatwaves across the country has soared temperatures in 2019 as well. Maharashtra, Rajasthan and Madhya Pradesh — the worst affected states — are likely to experience consistent and severe heatwave conditions over the next five days, the Indian Meteorological Department (IMD) has alerted.

The condition is likely to be similar in Telangana and Chattisgarh.

Lack of pre-monsoon rains, coupled with dry, hot winds moving from the northwest have brought heatwave conditions in the country.

The rising temperatures have led authorities to issue a severe warning for Madhya Pradesh and Western Rajasthan.

Some parts of Maharashtra are facing drought. In Maharashtra, the heatwave is expected to prevail upto June 10, following which a light drizzle accompanied by a thunderstorm is anticipated in isolated pockets. Monsoon has been delayed in the region by six days in the state, the IMD said.

In Maharashtra, the total number of heatwave related deaths have gone up to eight and a total of 456 cases of heat-related illnesses. The intense heatwave have also spiked the temperature in Delhi (43.4 degree Celsius).

The condition is expected to continue till the end of the week, however, the IMD also predicted thunderstorms and dust storms later in the week. Besides, Punjab and Himachal Pradesh are also likely to get respite from heatwave conditions.

Impact -

The heat wave has caused multiple deaths and cases of illness. As of 31 May 2019, 8 deaths and 456 cases of illness due to heat were reported in Maharashtra, at least 17 deaths in Telangana, and 3 deaths and 433 cases of heat stroke in Andhra Pradesh. On 10 June 2019, three passengers were found dead on a train as it arrived in Jhansi, apparently due to the extreme heat. A fourth passenger was found in critical condition and brought to a hospital where they died of overheating. In the state of Bihar, heat-related deaths reached 184 on 18 June according to Al Jazeera, while according to Zee News the death toll was 139 on 19 June 2019.

2. Heavy Precipitation Causing Floods and Landslides

Heavy precipitation refers to instances during which the amount of rain or snow experienced in a location substantially exceeds what is normal. What constitutes a period of heavy precipitation varies according to location and season. Due to heavy precipitation flood occurs. Also flood can result from other phenomena, particularly in coastal areas where inundation can be caused by a storm surge associated with a tropical cyclone, a tsunami or a high tide coinciding with higher than normal river levels. Other factors which may contribute to flooding include; volume, spatial distribution, intensity and duration of rainfall over a catchment; the capacity of the watercourse or stream network to convey runoff; catchment and weather conditions prior to a rainfall event; ground cover; topography; and tidal influences.

Landslide was mass movement of rock, debris, and soil or earth material down the slope. The factors which influence whether a landslide will occur typically include slope angle, climate, weathering, water content, vegetation, and overloading, geology, and slope stability, Natural causes include: elevation of pore water pressure by saturation of slope material from both intense or prolonged rainfall and seepage, vibrations caused by earthquakes, undercutting of cliffs and banks by waves or river erosion, volcanic eruptions. Both the natural disaster will result in -

- Loss of life
- Economic loss
- Destruction of Infrastructure
- Impact on River ecosystem

Below are the extreme flooding events & landslides which occurred in the year 2019



Flood in Sangli



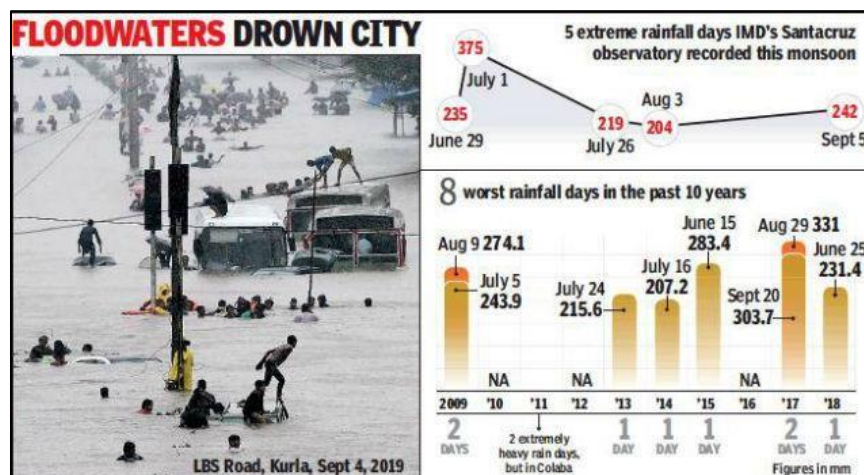
Landslide

The 2019 Indian floods were a series of floods that affected over thirteen states in late July and early August 2019, due to incessant rains. At least 200 people died and about a million people were displaced. Karnataka and Maharashtra were the most severely affected states. It was the heaviest monsoon in last 25 years. More than 1600 people died between June and October 2019. Thirteen states of India were affected by floods due to heavy rains in July–September 2019. Now the reporters are telling that there are 500 lost and 1000 killed.

2.1 Mumbai: Five extremely heavy rain days in Monsoon 2019 alone, eight in past decade

Source: timesofindia.com, 29 September, 2019

MUMBAI: The city recorded as many as five “extremely heavy” rain days this monsoon, when over 200mm of downpour lashed the city within a 24-hour span and disrupted daily life. The numbers are worrisome—and worthy of Swedish 16-year-old climate activist Greta Thunberg’s attention—when one considers that the eight preceding “extremely heavy” rain days occurred over a stretched-out period of a decade, from 2009 to 2018.



“The overall trend in the last decade shows an increase in extreme heavy rainfall events not only in Mumbai but all over the country, which is an impact of climate change,” said R V Sharma, former deputy director general of IMD Mumbai.

2.2 Bihar and Uttar Pradesh: More than 100 dead in fresh India flood chaos

Source: [bbc.com](https://www.bbc.com/news/india-51184444), 30 September, 2019

More than 100 people have died due to flooding caused by heavy rains in the Indian states of Uttar Pradesh and Bihar, officials have said.

Railway traffic, vehicular movement, healthcare services, schools and power supply have been disrupted in both states, officials said.

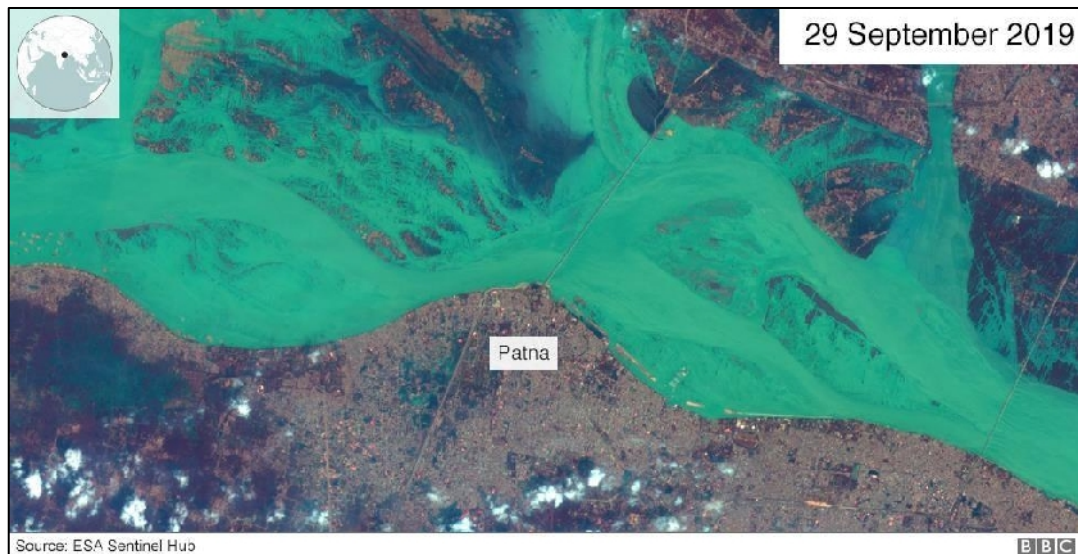
An Uttar Pradesh government report said 93 people have died since Thursday. In eastern Uttar Pradesh, flooding caused officials to relocate more than 500 prisoners from the Ballia district jail to other prisons after water entered three buildings.

The Additional District Magistrate told reporters that officials were awaiting permission to move all of the prison's 850 inmates to Azamgarh jail, which is about 120km (74 miles) away.

The death toll in Bihar is 29, according to the state disaster management authority. The impact on its main city, Patna, has been grabbing headlines.

Satellite images from 20 September and 29 September show the extent of the flooding as the Ganges river overflowed due to the torrential rains in the region.





The city has been deluged with rain since Friday, submerging many residential areas. People are navigating the main roads - which are dotted with abandoned and partially submerged vehicles - by boat.

The PTI news agency quoted an official as saying that the amount of rain the city received was "completely unexpected". In many parts, the rain water has mixed with overflowing sewage, and the dirty water has entered several homes, according to reports.



Healthcare has been disrupted in the state

Similar scenes have been reported from neighbouring Uttar Pradesh as well. "The condition of the water is very bad - the condition of Varanasi is very bad. Drainage arrangements have gone very bad," one local in the northern city of Varanasi told Reuters news. The state government has asked the Indian Air Force for helicopters and machines to pump out water.

2.3 Vadodara rains updates: City limps back to normalcy after 2 days of heavy flooding

Source: indiatoday.in, 2 August, 2019

Most parts of the city remained inundated till Thursday night in spite of intensity of rain decreasing, as waters of the Vishwamitri river started entering the city as it breached its banks.



NDRF personnel rescue people from flood-affected areas in Vadodara.

After Vadodara and surrounding areas in central Gujarat were pounded by heavy rains for the past two days, the city is limping back to normalcy.

NDRF teams were still undertaking rescue operations in the flooded and low-lying areas of the city. Five people died and over 5,700 were evacuated on Thursday.

Most parts of the city remained flooded till Thursday night in spite of intensity of rain decreasing, as waters of the Vishwamitri river started entering the city as it breached its banks. However, the situation was far better on Friday morning.

2.4 Water in Gujarat recedes, more crocodiles seen on Vadodara roads.

Source: indiatoday.in, 4 August, 2019



Crocodile being rescued from Vadodara

Vadodara along with many other cities in Gujarat witnessed heavy rainfall on Wednesday, resulting in flooded streets. Along with a flood like situation the city also experiences infiltration by crocodiles, which are making the streets their permanent habitat because of the floods.

Videos of the situation were shared online by residents which showed crocodiles roaming on the streets filled with water.

Now, as the water is receding from the streets more videos of crocodiles on the water-logged lanes are surfacing on the internet. However, rescuers are doing everything possible to capture the animals safely. Videos and pictures from various parts of Vadodara showing rescuers capturing crocodiles are according to Times of India, Nitin Patel, rescuer from the forest department revealed that Our RFO had received a call from a resident of the society a crocodile after which our team had reached the spot and rescued the crocodile.

According to reports, heavy downpour was witnessed in Gujarat. Vadodara, on Saturday afternoon, received another spell of heavy rain amid removal of floodwater.

2.5 Floods hit power, water supply in Sangli, Kolhapur in Maharashtra

Source: indiatoday.in, 9 August, 2019

Floods have hit the districts of Kolhapur and Sangli hard with the city of Sangli completely marooned, and over two lakh people living without electricity in affected areas, Maharashtra Chief Minister Devendra Fadnavis said on Thursday after conducting an aerial survey. Several water-supply schemes have become dysfunctional and crops and houses have been damaged with thousands shifted to safer places, Devendra Fadnavis said, adding that restoring water and electricity supply was the priority.

"During the aerial survey, I found most of the Sangli city surrounded by water. My helicopter was not given permission to land at Sangli and Karad. Since Kolhapur has an airport, I could land here and meet affected people," Devendra Fadnavis said.



Several water-supply schemes have become dysfunctional and crops and houses have been damaged with thousands shifted to safer places

Eleven rescue teams including five of National Disaster Response Force were operating in Sangli, and he had sought five more teams from the Defence Ministry for the district, he said. Teams of doctors were ready in Mumbai to travel to flood-affected areas with supplies of medicines, he said. Talking about nine persons drowning after a rescue boat capsized in Sangli, Fadnavis said it was carrying over 30 people and it turned turtle when its engine got stuck in a tree branch. The incident happened because of panic, he said. In Karad in Satara district flood water was receding, he said. Air-lifting of stranded persons is the last resort as it requires stable weather to enable hovering, he said. "As many as 223 villages in Kolhapur have been affected. 18 have been completely marooned. About

28,897 persons are affected out of which 8,923 people were shifted. 97,000 persons had moved out on their own earlier," Fadnavis said.

Some 38,000 people are staying in relief camps in 152 places in Kolhapur district and sixty boats have been pressed into rescue operations, he said. Four deaths have been reported in Kolhapur in rain-related incidents so far, the chief minister said. As many as 3,813 houses are affected in the district, out of which 89 are completely damaged, he said.

Those affected will get financial assistance along with food grains, and a compensation of Rs five lakh will be given to the kin of the deceased, the chief minister said.

As many as 390 water supply schemes in flood-affected areas have become dysfunctional while two lakh people are living without electricity, he said.

"Priority is being given to restoration of water and electricity supply," the chief minister added.

Crops over 67,000 hectares are damaged in Kolhapur district and there is the scarcity of petrol and diesel, he said.

The Mumbai-Bengaluru National Highway, which passes through Kolhapur, is closed. "We are working to ease the shortages," he assured.

2.6 Monsoon rains: Red alert in 9 Kerala districts; floods wreak havoc in Maharashtra, Karnataka

Source: [businessstoday.in](https://www.buzzfeednews.com/article/buzzfeednews/india-floods-2019), 9 August, 2019

Monsoon rains across India: Over 10,000 people have been evacuated to safe areas; over 27 people have drowned in Maharashtra; nine people have drowned in Karnataka, while over 44,000 people have been displaced



Flood in Kerala

Monsoon rains have wreaked havoc in Kerala, Maharashtra, Karnataka, Assam, Odisha and eastern part of India. At least 22 people have lost lives in floods in Kerala alone, and over 10,000 people have been evacuated to safe areas. At least 27 people have drowned in Maharashtra. In Karnataka, nine people have drowned while over 44,000 people have been displaced. Incessant rains have also triggered flooding in several parts of Madhya Pradesh, Goa, Gujarat, Andhra Pradesh, Odisha and West Bengal, leading to major devastation. The Kerala government has issued a red alert in the wake of excess rainfall. The Kochi International airport has suspended all operations till Sunday as the runway area in the airport is water logged due to flood. The Kerala government has declared holiday for the day for all schools. Wayanad, Kozhikode and Idukki are the most-affected districts. The Army and National Disaster Response Force (NDRF) have been called to rescue people stuck in flood-prone areas. Kerala had also seen the worst floods in a century in 2018, in which over 417 people lost lives and several went missing. As per the Indian Meteorological Department (IMD), the next two days will see more rains in Gujarat, Karnataka and Maharashtra.

2.7 Deaths, displacement as heavy rain and floods hit northeast India

Source: alijazeera.com,13 July,2019



Girls row a makeshift raft past submerged houses at a flood-affected village in Karbi Anglong district in Assam

At least 10 killed and a million people displaced in Assam state as water levels in Brahmaputra River continue to rise Rain-triggered floods and mudslides in India's northeast have killed over a dozen people and displaced more than a million from their homes, with officials warning the situation could worsen in the coming days. Heavy monsoon rains in Assam state killed at least 10 people in the past

72 hours, state authorities said on Saturday, while six people were reportedly killed in Arunachal Pradesh, which borders China's Tibet region.

"Ten people have died in separate incidents of drowning in the past three days and more than one million people [have been] affected, with the flood situation turning grave," a flood bulletin issued by the Assam government said.

The Brahmaputra River, which flows from the Himalayas into India and then through Bangladesh, has burst its banks, swamping more than 1,800 villages in the state, which is on maximum alert due to heavy rains.

Torrential rains have affected at least 25 of Assam's 33 districts and the federal water resources body said water levels in the Brahmaputra were expected to rise, with more rains forecast over the next three days.

"The flood situation remains extremely critical," Assam's Water Resources Minister Keshab Mahanta told Reuters news agency.

2.8 September rainfall in India on course to be highest in 102 years

Source: indiatimes.com, 30 September, 2019

Vigorous and relentless monsoon rainfall has put this month on course to be the wettest September India has seen in 102 years and lifted the June-September season's rain to 9% above normal, barely a percentage point short of excess monsoon rainfall.

With a day left in the month, all-India average rainfall in September stands at 247.1mm — 48% above normal and the third highest in India Meteorological Department's records since 1901.



September Rainfall

By Monday, the month's rainfall is likely to go past 1983's figure (255.8mm), as red alerts for very heavy rain have been issued for Gujarat and Bihar. If that happens, this will be the wettest September in India in over a century, behind only 1917 (285.6mm), when the highest rainfall for the month since 1901 was recorded. This year's monsoon, which began with a delayed onset and a 33% rain deficit in June, will officially end on Monday with the country recording the highest rainfall for the four-month period in 25 years. The all-India average seasonal rainfall stands at 956.1mm, 9% higher than the normal of 877mm till Sunday.

While the monsoon was adequate in northwest India, which currently has a slight deficit of 3%, the region clearly missed out on the rain bounty. Haryana, Delhi and east Uttar Pradesh in particular will end the season with high deficits.

2.9 Kerala rains: 24 landslides in 24 hours, 22 killed, 22,165 moved

Source: downtoearth.org.in, 9 August, 2019

Kerala, which is been hit by incessant rainfall, witnessed 24 landslides in the last 24 hours spiking the death toll to 22 on August 9, 2019. Nearly 22,165 people have been shifted to relief camps.



August 2019 Kavalappara landslide in the Western Ghats of India

Heavy rains have been battering the coastal state since August 7 and have thrown normal life out of gear. This is after the 2018 floods — the worst in the state's history — that killed nearly 500 people and incurred a loss of Rs 31,000 crore worth damages.

Of the 14 districts in Kerala, nine in the north have been put on red alert; three in central on orange alert, while two in south on yellow alert.

Across the state, 315 flood relief camps have been opened, according to an update from Kerala chief minister's office.

"These camps now host 22,165 people from 5,936 families. Wayanad has 105 camps, the highest in the state," an official from the CM's office said. Heavy rain, broken bridges and road blockades have hampered rescue operations. There is also no power supply in the worst-affected areas. A massive landslide at Kavalappara village in Malappuram district has reportedly buried 30 of the 70 houses. Many are feared to be dead, according to media reports at 2 pm on August 9. However, the incident occurred around 7 pm on August 8, claimed the local residents.

3. Cyclones

In meteorology, a cyclone is a large scale air mass that rotates around a strong center of low atmospheric pressure. Cyclones are characterized by inward spiraling winds that rotate about a zone of low pressure. Warm-core cyclones such as tropical cyclones and subtropical cyclones also lie within the synoptic scale.

There are two types of cyclones: middle latitude (mid-latitude) cyclones and tropical cyclones. Mid-latitude cyclones are the main cause of winter storms in the middle latitudes. Tropical cyclones are also known as hurricanes. An anticyclone is the opposite of a cyclone. Tropical cyclones, hurricanes or typhoons form when convection causes warm, moist air above the ocean to rise.



Tropical Cyclone

They begin as a group of storms when the water gets as hot as 80 °F (27 °C) or hotter. The Coriolis effect made by the Earth's rotation causes the winds to rotate. Warm air rises quickly.

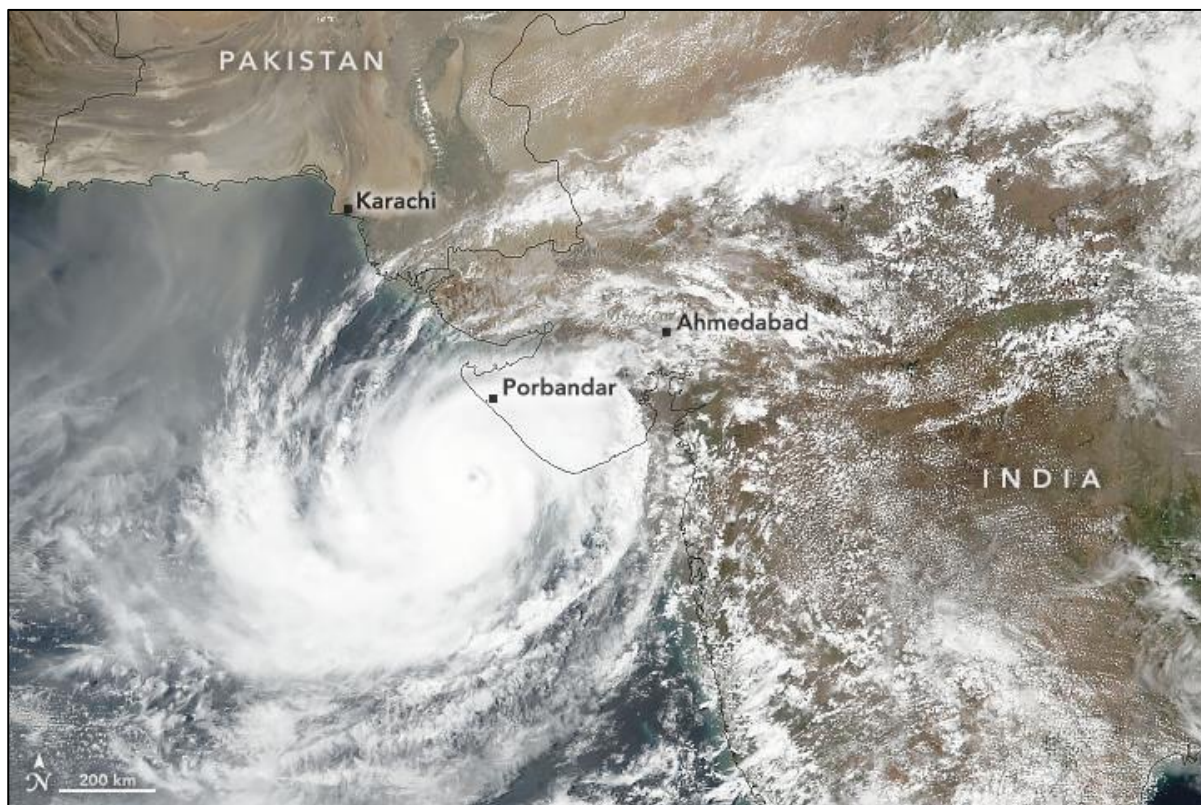
The main effects of tropical cyclones include heavy rain, strong wind, large storm surges near landfall, and tornadoes. The destruction from a tropical cyclone, such as a hurricane or tropical

storm, depends mainly on its intensity, its size, and its location. After the cyclone has passed, devastation often continues.

3.1 Cyclone Vayu Approaches Western Coast of India

Source: nasa.gov, 13 June, 2019

On June 12, 2019, Tropical Cyclone Vayu was barreling towards the western coast of India with sustained winds of 170 kilometers (110 miles) per hour. The storm spurred nearly 300,000 people to evacuate their homes in advance of what might have been the worst storm to strike Gujarat in 20 years. But then the storm changed direction. This image shows Vayu off the coast of Gujarat state on June 13, 2019, before veering west towards Oman. The image was acquired by the Visible Infrared Imaging Radiometer Suite (VIIRS) on the Suomi NPP satellite.



Cyclone Vayu

Although Vayu did not make landfall in India, gusty winds and rain from the edges of the cyclone knocked down trees and cut power in some areas. Strong winds and surging waves also damaged a 150-year-old temple near the city of Porbandar.

Some forecasters say the rains may bring some relief to the region, which has been experiencing a delayed monsoon season and record-high temperatures.

3.2 Kyarr and Maha Mark First Case of Two Simultaneous Cyclones over Arabian Sea

Source: weather.com, 1 November, 2019

This week, the Arabian Sea witnessed a peculiar occurrence with the formation of Cyclone Maha even as Kyarr prevailed over the region. On Thursday, the India Meteorological Department (IMD) confirmed that this was the first recorded case since 1965 of two cyclones occurring simultaneously in the Arabian Sea.



Cyclone Kyarr (on the left) has weakened whereas Cyclone Maha (near India's west coast) is set to intensify by Sunday.

In its weekly weather status and outlook report, IMD said that India received 200% excess rainfall in the week ending on Wednesday, October 30. The maximum rainfall of 56 mm was recorded in the southern peninsula under the influence of the two cyclonic storms and depression over the Bay of Bengal.

Central India registered the maximum departure, with a whopping 572% excess rainfall last week. As far as the overall monthly rainfall in October is concerned, India received 44% excess rainfall, while the central and southern regions received 99% and 54% excess respectively.

Going forward, the severe cyclonic storm Maha is likely to intensify further into a very severe cyclonic storm over the east-central Arabian Sea, closely following the track of Kyarr. Under its influence, heavy to very heavy rainfall is forecast over Kerala, coastal Karnataka and south Tamil Nadu on Friday.

The IMD has issued another depression watch over the Bay of Bengal for this week. The forecast suggests the formation of a low-pressure area over the north Andaman Sea on Sunday. The cyclonic system is very likely to move towards the east coast of India while intensifying into a depression over the east-central Bay of Bengal by November 5.

“Under its influence, widespread rainfall with isolated heavy to very heavy falls very likely to occur over Andaman and Nicobar Islands during the second half of week 1 (November 3 to 6),” forecasts IMD.

In the north, a fresh disturbance is approaching and is likely to bring scattered rain or snowfall over Jammu and Kashmir as well as Himachal Pradesh this week. Overall, only the southern states, Chattisgarh, Jharkhand and Gangetic West Bengal may remain drier-than- normal this week, while other parts of the country are likely to receive normal to above- normal rainfall.

3.3 Odisha Likely To Receive Heavy Rainfall Due To Cyclonic Storm "Bulbul": Weather Office

Source: ndtv.com, 8 November, 2019

New Delhi:

India Meteorological Department (IMD) has said that several places over Odisha are likely to receive heavy rainfall on Friday and Saturday, due to the influence of Cyclonic Storm "Bulbul".

The Pampan port authorities have hoisted cyclone warning as the fishermen have been warned against venturing into the sea for fishing till further orders.

Furthermore, West Bengal is also likely to be battered with moderate rainfall tomorrow.

The weather forecast agency further stated that the Cyclonic Storm Bulbul over the east- central Bay of Bengal has moved northwestwards with a speed of 27 kmph during the past six hours and has intensified into a Severe Cyclonic Storm.



Cyclone Bulbul in Odisha

"Under its influence, light to moderate rainfall at many places with isolated heavy to very heavy falls very likely over north coastal districts of Odisha on November 8 and November 9 2019 and light to moderate rainfall at most places with extremely heavy falls at isolated

places very likely over coastal districts of West Bengal on November 9, 2019," the IMD stated in its All India Weather Summary and Forecast Bulletin.

The IMD also mentioned about the cyclone "Maha" and said that some places over Jammu and Kashmir, Himachal Pradesh, Punjab, Gujarat are likely to receive rainfall in the next 24 hours due to its influence.

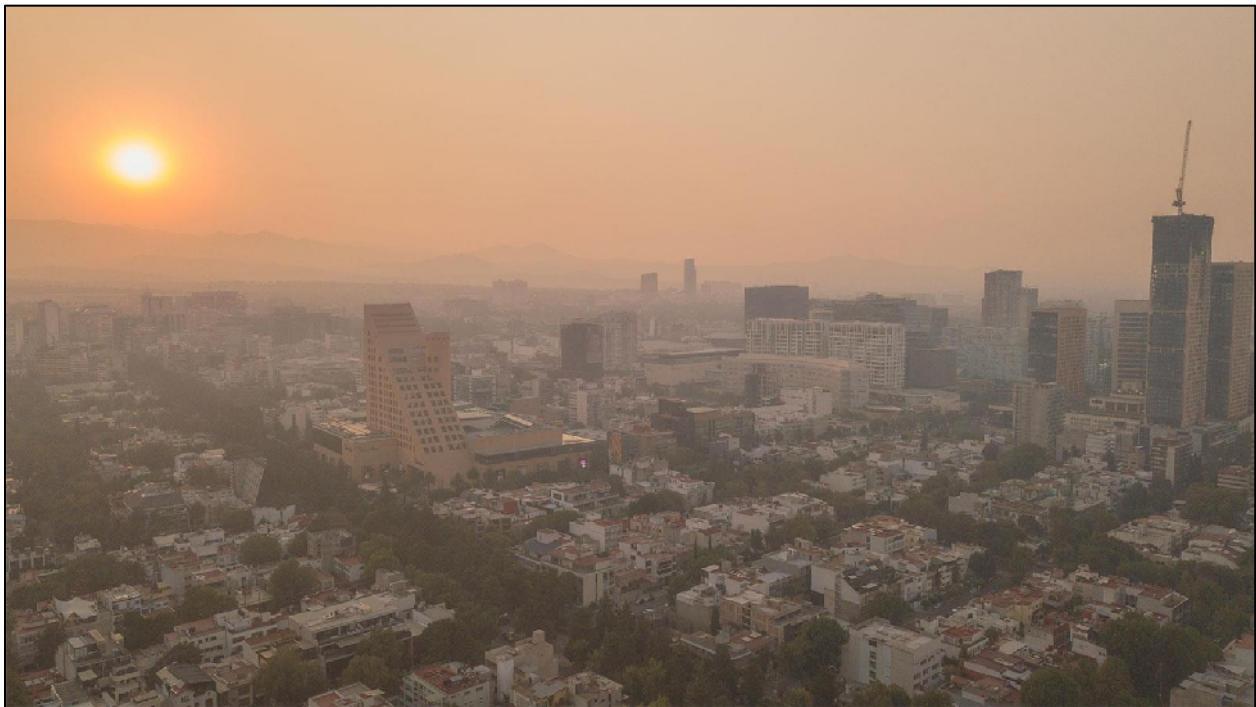
The sea condition is likely to be very high over central and adjoining northwest Bay of Bengal and rough to very rough along and off Odisha and West Bengal coasts.

The fishing operation has been totally suspended over Odisha-West Bengal coasts. The organization has advised fishermen not to venture into central and adjoining northwest Bay of Bengal and along and off Odisha-West Bengal coasts for the next few days. The fishermen out at sea are advised to return to the coast.

4. Smog & Urban Air Pollution

Smog is a yellowish or blackish fog formed mainly by a mixture of pollutants in the atmosphere which consists of fine particles and ground-level ozone. Smog which occurs mainly because of air pollution can also be defined as a mixture of various gases with dust and water vapor.

The term smog derives from smoke and fog; it was originally coined to refer to heavily polluted air that can form in cities (generally in winter under calm, stable and moist conditions) due to the emissions of sulfur dioxide and aerosols from the burning of fossil fuels (primarily coal and oil).



Smog

Types of Smog –

At least two distinct types of smog are recognized: sulfurous smog and photochemical smog. Sulfurous smog, which is also called “London smog,” results from a high concentration of sulfur oxides in the air and is caused by the use of sulfur-bearing fossil fuels, particularly coal.

Photochemical smog is produced when sunlight reacts with nitrogen oxides and at least one volatile organic compound (VOC) in the atmosphere. Nitrogen oxides come from car exhaust, coal power plants, and factory emissions. When sunlight hits these chemicals, they form airborne particles and ground-level ozone—or smog.

Health Effects –

Overall, smog is harmful to both the respiratory (lungs) and cardiovascular (heart) systems. It aggravates heart problems, bronchitis, asthma, and other lung problems. Smog reduces lung function even in healthy people. Even at low levels, ground level ozone and fine particulate matter are harmful.

urban pollution refers to the presence or introduction in cities and urban areas of poisonous or harmful substances. Urban pollution may come from natural sources, but the most detrimental are those emissions related to human activities.

4.1 Delhi air pollution surges to emergency levels

Source: theguardian.com, 3 January,2019

Air quality index at 12 times US government-recommended level and visibility low



Indian security forces in heavy smog in Delhi

Delhi residents woke to a thick, grey smog on Thursday as air pollution in the Indian capital surged to emergency levels.

The state-run Central Pollution Control Board's air quality index, which shows the concentration of poisonous particulate matter known as PM 2.5, stood at 440, up from 430 on Wednesday and about 12 times the US government-recommended level of 35.

Pollution levels hit 500 in some parts of Delhi, and there was very poor visibility in some areas. Last year the high was 450 on 23 December.

A sharp drop in temperatures and wind speed, combined with vehicle and industrial emissions, dust from building sites and smoke from the burning of waste, has increased pollution over much of north India including Delhi, which is home to more than 20 million people.

The cold weather has forced some people, especially those spending the night in the open, to burn small fires to keep warm, adding to the smog.

In October and November as pollution spiked, the government adopted measures ranging from a temporary ban on construction activities and waste burning to a clampdown on polluting industrial plants such as coal-fired power stations.

India is home to the world's 14 most polluted cities, with Delhi the sixth worst, the World Health Organization has said. Toxic air caused 1.24 million deaths in India in 2017, or 12.5% of the total, according to a study published in Lancet Planetary Health.

4.2 Delhi pollution levels remain 'severe', citizens advised to avoid outdoor activities

Source: timesofindia.com, 2 January, 2020

NEW DELHI: People in Delhi are still gasping for a breath of fresh air as the air quality of the national capital and its adjoining areas remained in the 'severe' category on Thursday. According to System of Air Quality and Weather Forecasting And Research (SAFAR), the overall Air Quality Index (AQI) of the national capital was 426 with PM10 docking at 407 and PM 2.5 at 276 at 9 in the morning today. In Noida also, the air quality was not satisfactory in the morning as the AQI at PM 10 was 359 and PM 2.5 at 424. According to SAFAR, "Under the influence of approaching western disturbance, increased surface winds and improved ventilation, AQI is forecasted to improve to the higher-end of the very poor category by the January 2." Further significant improvement in AQI towards the middle-end of very poor to poor category is expecting by January 3. The organisation further predicted that tomorrow's (Friday) top three air pollution hot spots of the capital are likely to be Vinobapuri, Okhla and Bawana. In an advisory, SAFAR has

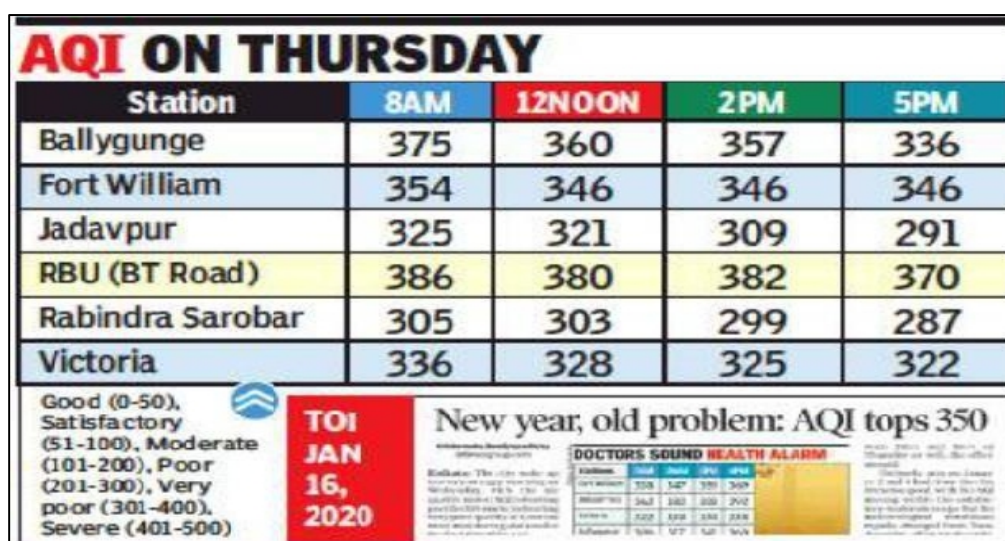
advised citizens to avoid physical outdoor activities including morning walks. "Stop any physical activity if you feel unusual coughing, chest discomfort, breathing difficulty or fatigue," it said. It has also advised people to keep windows of their houses closed and asthmatics to keep medicines handy.

4.3 Kolkata: Air quality falls further, inches closer to 'severe' category

Source: timesofindia.com, 17 January, 2020

KOLKATA: The city's ambient air quality on Thursday worsened, with air quality index spiking further, putting it closer to the worst possible category of air quality — 'severe' (401-500). In fact, the air quality of good zones in the city, including Rabindra Sarobar (lung of south Kolkata) and Maidan (lung of the entire city) also swung to 'very poor' category.

The wind velocity on Thursday also remained very poor — 2 meter/second. In this calm wind condition, city's ambient air has had a pile-up effect, with the day's pollutants adding up to the previous day's pollution level. The thermal inversion (soil is cooler than the air) has lowered the vertical wind movement causing very low dispersion of pollutants — particulate matters.



In winter — November to January — the calm condition was reported to be as high as 42%. February being a transition month, condition improves to a moderate 32% calm. The condition further improves and remains between 7-18% calm due to shifting southerly wind. The meteorological factors now govern movement of air and its pollutants in a big way, said a senior WBPCB scientist.

4.4 India suffers most pollution-linked deaths in world, study finds

Source: theguardian.com, 19 December, 2019

Pollution causes more than 2 million deaths a year in India, while Chad, Central African Republic and North Korea saw highest per capita rates.



People walk in front of the smog-covered India Gate war memorial in Delhi. India has the most pollution-related deaths in the world.

India leads the world in pollution-linked deaths—followed by China and Nigeria—according to a report published on Wednesday that estimated the global impact of contaminants in the air, water and workplace.

The report by the Global Alliance on Health and Pollution (GAHP) found pollution to be the largest environmental cause of premature death on the planet, causing 15% of all deaths – some 8.3 million people.

Among the 10 countries with the most pollution deaths in 2017, the latest year for which data was available, were some of the world's largest and wealthiest nations, as well as some poorer ones. India and China led in the number of pollution deaths, with about 2.3 million and 1.8 million respectively, followed by Nigeria, Indonesia and Pakistan.

The US came seventh with almost 200,000 deaths. "The report reminds us all that pollution is a global crisis," said Rachael Kupka, acting executive director of GAHP. "It does not matter where you live. Pollution will find you." Pollution-linked deaths rates were highest in some of the world's most impoverished countries where poor water sanitation and contaminated indoor air are major

killers. Chad, Central African Republic and North Korea saw the highest number of deaths per 100,000 people (287, 251 and 202 respectively), with India entering the per capita list at number 10 with 174 deaths.

“India has seen increasing industrial and vehicular pollution from urban growth while poor sanitation and contaminated indoor air persist in low-income communities,” the report said

On the other end of the scale, five nations in the Arabian Peninsula ranked among the 10 countries in the world with the lowest death rates from pollution, with Qatar reporting the lowest.

Drawing its data from the Institute of Health Metrics Evaluation, founded by the Bill and Melinda Gates Foundation, the report broke risk factors into four categories: air, water, occupational, and lead.

5. Wildfires

Wildfires are fires that burn out of control in a natural area, like a forest, grassland, or prairie. They often begin unnoticed. They spread quickly, and can damage natural resources, destroy homes, and threaten the safety of the public and firefighters. Humans cause most wildfires.

On a hot summer day, when drought conditions peak, something as small as a spark from a train car's wheel striking the track can ignite a raging wildfire. Sometimes, fires occur naturally, ignited by heat from the sun or a lightning strike. However, the majority of wildfires are the result of human carelessness.



Wildfire

Wildfires can occur anywhere, but are common in the forested areas of the United States and Canada. They are also susceptible in many places around the world, including much of the vegetated areas of Australia as well as in the Western Cape of South Africa.

5.1 Karnataka scrambles to contain wildfire in Bandipur forest

Source: hindustantimes.com, 26 February, 2019

The Karnataka government sought help from the Indian Air Force on Monday as it raced to contain fires raging in Bandipur forests, home to one of the country's most popular tiger habitat and where an estimated 3,000 hectares of land is estimated to have been burnt down over the last five days.



Rescue officials assist in extinguishing a forest fire at Bandipur Tiger Reserve, in Bandipur, Sunday, Feb 24, 2019.

An estimated 1,000 people — 300 local villagers and at least 500 state forest staff — too joined in fire-fighting efforts even as dry, windy conditions continued to fan the flames and officials grappled with a lack of local sources of water.

“Decided to use Air Force’s help to contain the fire. The Air Force chief was contacted and a request was placed for immediate help. The Air Force Chief responded positively and preparations are on for operation,” chief minister HD Kumaraswamy said in a tweet on Monday.

The chief minister also held a review meeting with chief secretary TM Vijay Bhaskar, senior police officers, and forest department officials to coordinate fire-fighting efforts.

The fire first came to notice on Friday, though it is unclear how many hours had passed before it started. Officials of the Forest Survey of India, a Union government agency that monitors forest fires using satellite reports, said alerts had been automatically sent out at 2:20pm on Friday.

The forest fire has gutted thousands of acres of land and is feared to have killed hundreds of wild animals, reptiles and insects. “Forest fires not only destroy habitats and food sources, but they also kill thousands of smaller mammals, ground-nesting birds, insects, slow moving reptiles and other wildlife species. Even young ones of animals such as tigers, leopards, dholes, chital, sambar deer are at times killed by forest fires as the mothers leave them in tree cavities and smaller dens,” said Sanjay Gubbi of the Nature Conservation Foundation.

The 874 sq km Bandipur national park and tiger reserve is among the most popular protected areas in India. The park, along with neighbouring national parks of Nagarhole in Karnataka, Mudumalai in Tamil Nadu and Wayanad in Kerala constitute one of the largest contiguous forests in India. Initial estimates indicate nearly 3,000 hectares may have been turned to ash – an area roughly the size of 1,500 grounds the size of the Melbourne Cricket Ground.

Environmental experts said the areas hit could take 25 years to recover. “Regardless of the reason, the damage caused this time is incredible. I think for the flora to recover completely, it might take another 25 years even,” said retired forest official HC Kantharaju said.

State forest officials said the principal cause of the fire is the weather, which has been unusually warm over the past month and is now marked by dry winds. But officials also suspect the role of “miscreants”, who may have deliberately started the fire to protest that forest department’s delay in hiring firespotters.

5.2 Forest Fires Spread in Uttarakhand Jungles

Source: weather.com, 11 May, 2019

As temperature rises in the hills of Uttarakhand, forest fires have engulfed 1,960 hectare of jungles, an official report said on Wednesday.

Significantly, the fires were spreading fast in the reserved forest areas where 1,466 hectares of forests were affected with 1,153 incidents so far, the report said.

According to the data provided by the forest department, a total of 73 fire incidents were reported during the past 24 hours in the state, taking the total number to 1,493.

This has resulted in a loss of Rs 35.41 lakh in terms of forest property. Almora and Nainital were the worst affected districts where 297 and 289 incidents have been reported. Dehradun and Tehri districts have reported 137 and 140 incidents.



Fire breaks out in the forests of Tehri Garhwal district in Uttarakhand, on May 11, 2019

The hill resort of Nainital with thick jungle cover on Wednesday recorded 28.3 degrees Celsius of maximum temperature which was a few notches more than the normal. Similarly, Almora and Dehradun recorded 34.1 and 38.8 degree Celsius of maximum temperature respectively. So far, 10 people have suffered burn injuries due to forest fires.

Within the last one fortnight, 960 hectares of forests have been destroyed in the fire in the state. Till May 13, nearly 1,000 hectares of forests were affected. Forest incidents were reported in all the 13 districts. Forest fires are common during summers in Uttarakhand where more than 70 per cent of the area comes under forest cover.

6. Dust Storm

A dust storm is a wall of dust and debris that is blown into an area by strong winds from thunderstorms. A dust storm is a wall of dust and debris that is often blown into an area by strong winds from thunderstorms. The wall of dust can be miles long and several thousand feet high.

Sandstorms -- also called dust storms -- are caused by strong winds blowing over loose soil or sand, and picking up so much of that material that visibility is greatly reduced. The widespread abundance of loose sand in deserts makes them the most common locations for sandstorms to form.



Dust Storm

Types of Dust Storm -

Four major dust weather types were identified: (1) frontal, (2) thunderstorm/convective, (3) tropical disturbance and (4) upper level/cut-off low. ... Dust storms associated with tropical disturbances (Type 3) are infrequent at all stations but are typically very intense, long lasting events.

Dust Storm Effect on Environment -

Dust storms cause soil loss from the dry lands, and worse, they preferentially remove organic matter and the nutrient-rich lightest particles, thereby reducing agricultural productivity. Also, the abrasive effect of the storm damages young crop plants.

Effect on Human Health -

The health of people can also be affected by dust storms. The dust particles in the air can lead to a number of respiratory problems, asthma especially. Also, viruses and microbes carried in the dust particles of dust storms over seas can cause disease in humans as well as respiratory problems.

6.1 13 Die Due To Dust Storm In Uttar Pradesh On Wednesday

Source: ndtv.com,14 June,2019

Lucknow:

At least 13 people have lost their lives in Uttar Pradesh in a thunderstorm on Wednesday, the office of the state relief commissioner said.

Siddhartha Nagar bore the maximum onslaught with four deaths reported from the district, followed by Deoria where three people died and Ballia where two died, state Relief Commissioner G S Priyadarshi told PTI on Friday.

One person was injured, while 22 animals have also died. As many as 93 houses have been damaged across the state, the official said.



As many as 93 houses were damaged in the dust storm in Uttar Pradesh

Meanwhile, the meteorological department said rain or thunderstorm was very likely at few places over eastern Uttar Pradesh on Sunday.

Rain or thunderstorm is very likely at isolated places over western Uttar Pradesh on Saturday and at a few places over western Uttar Pradesh on Sunday.

On June 7, a severe dust storm and lightning in the state claimed 26 lives and left over 50 injured as houses and walls collapsed and trees were uprooted.

6.2 Flights Hit At Delhi Airport For An Hour Due To Severe Dust Storm

Source: ndtv.com,12 June,2019

New Delhi:

Operations at Delhi's Indira Gandhi Airport were halted for nearly an hour and some flights diverted after a severe dust storm hit the national capital and adjoining areas this evening. The dust storm also brought down the temperature rapidly, bringing some respite from the sizzling heat wave. Temperature in the national capital had touched 48 degrees on Monday, the highest-ever recorded in June.

The weather department had said on Tuesday that temperatures were expected to dip. Private weather agency Skymet said heavy rain was expected across the National Capital Region.



A severe dust storm has hit the national capital Delhi this evening

"Earlier, (dry summer) wind used to come from the western side of Rajasthan. However, the direction of the wind has changed. As a result, we have witnessed a temperature fall of two-three degrees in all the North Indian states. It is expected to continue for the next three days and there will be a full respite to the heat wave in the region," a senior Met department official told news agency ANI.

The impact of Cyclone Vayu, due to hit the Gujarat coastline tomorrow, could play a role in temperature dropping, a senior weather department official had said.

"Definitely, just the way Delhi is getting affected by the western disturbances, Cyclone Vayu will have an impact on the weather conditions. However, a dust storm or thunderstorm can be predicted in the upcoming days in the northern region," he was quoted as saying by news agency ANI.

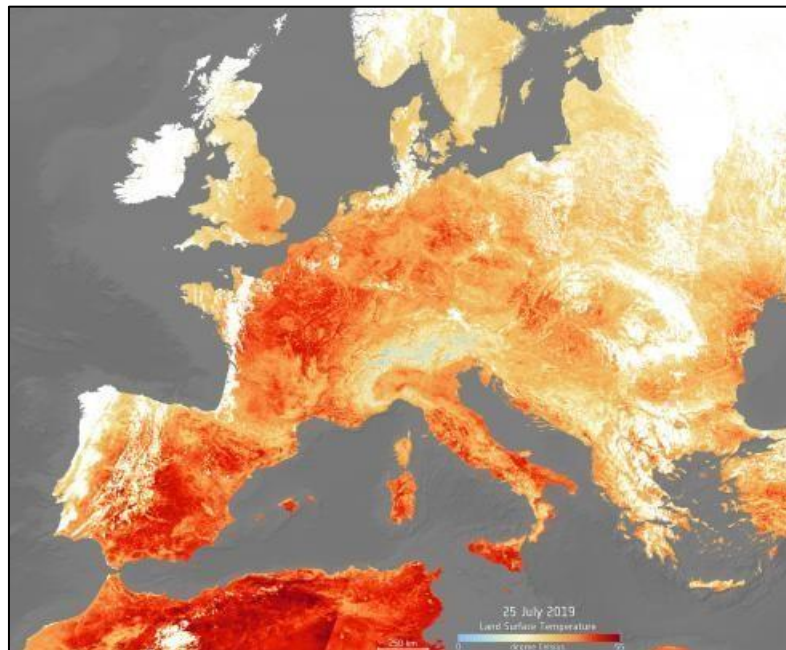
EXTREME WEATHER EVENTS – GLOBAL

7. Heat Wave

7.1 Record-breaking heat wave struck Western Europe and Scandinavia at the end of July 2019

Source: worldweatherattribution.org ,July,2019

After the extreme heat that took place in the last week of June 2019, a second record- breaking heat wave struck Western Europe and Scandinavia at the end of July 2019. In June, new all-time records were set in multiple places across Western Europe. In July, records were broken again, albeit in different areas.



Rank of annual maximum temperatures observed in Europe in 2019 compared to 1950 - 2018, based on the E-OBS data set

Taking into account both episodes, the spatial extent of broken historical records is large: in most areas of France, the Benelux, Switzerland, in western Germany, Eastern U.K. and Northern Italy. Some of these previous records were set as early as the 1950s, with some stations setting new records that have continuously been monitoring the weather for more than 200 years (e.g. Oxford, UK).

This figure is made with preliminary data and should be taken with caution as some measurements are not yet validated. The July episode was rather short and intense, with about four days of very high temperatures. In France, the highest amplitudes of the heatwave were found in Northern and Central parts of the country, with records of either 1947 or 2003 broken by a large departure on 25 July.

For instance, the historical record of Paris (Station Paris-Montsouris) of 40.4°C became 42.6°C and a temperature of 43.6°C was measured in Saint Maur des Fossés a few kilometers away from Paris city in a residential area. In Belgium and the Netherlands for the first time ever temperatures above 40°C were observed. In Germany the historical record of 40.3 °C (in Kitzingen, 2015) has been surpassed by almost 1°C (41.2°C at two stations) on 25 July, with one station reaching 42.6 °C (Lingen), which is thus the new - officially confirmed - German temperature record. In total, the old record was exceeded at 15 stations in Germany. In the UK, a new highest ever maximum temperature of 38.7°C was measured in Cambridge.

Further west, where the heatwave was slightly less intense, the record from 1932 (35.1°C) at the historic Oxford Radcliffe Meteorological Station (continuous measurements for more than 200 years; Burt and Burt, 2019) was broken by more than one degree, with the new record maximum temperature of 36.5°C.

7.2 Europe heat wave: record high of 45C expected in France

Source: [theguardian.com](https://www.theguardian.com), 25 June, 2019

Exceptional heat has been observed across the globe in recent week, with a string of European countries logging record highs temperatures that have caused disruption to transport and infrastructure and stress on people's health and the environment. As the heat dome spread northwards through Scandinavia and towards Greenland, it accelerated the already above average rate of ice melt. More than half of France was placed on an orange alert for intense heat Monday – the second-highest level on the scale.

National highest-ever temperature records, typically set in late July or August, are likely to be broken across Europe this week as a potentially deadly early summer heat wave sweeps across the continent.



People sit in the shade under a bridge in the center of Lyon, central France. More than half of France was placed on an orange alert for intense heat Monday _ the second-highest level on the scale. Photograph: Laurent Cipriani/AP

Meteorologists expect previous June highs to be approached and possibly exceeded in Austria, Belgium, the Czech Republic, Denmark, France, Germany, Luxembourg, the Netherlands and Switzerland, with all-time records likely to fall in some countries.

“The latest forecasts leave little room for doubt: we are heading for a new national record,” said Guillaume Woznica, a French forecaster, noting Météo-France was now predicting peaks of 45C (113F) in the southern towns of Nîmes and Carpentras on Friday.

7.3 Heatwaves in 2019 led to almost 900 extra deaths in England

Source: theguardian.com, 7 January, 2019

There was a statistically significant number of deaths in those under 65 in London, with 41 reported during the August heatwave.

The summer heatwaves of 2019 resulted in almost 900 extra deaths, according to statistical analysis from Public Health England.



There was a statistically significant number of deaths in those under 65 in London, with 41 reported during the August heatwave Photograph: Alamy

Over the past four years more than 3,400 people have died early during periods of extreme temperature in England. Global heating is increasing the frequency of heat waves and a cross-party committee of MPs warned in July that the UK was “woefully unprepared” for this impact of the climate emergency.

All regions of England were affected except the south-west, and almost all the premature deaths were among people aged 65 or over. The frail elderly with heart or kidney problems are most at risk in a heatwave and dehydration can also lead to dizziness and falls.

8. Heavy Precipitation Causing Floods and Landslides, Cyclones

8.1 Sri Lanka – 6 Dead, Thousands Displaced as Heavy Rain Continues

Source: floodlist.com, 9 December, 2019

The ongoing flood situation in Sri Lanka has worsened, with over 167,000 people now affected across 21 districts in the country.

Heavy rain in Sri Lanka brought by the North-East Monsoon began in late November. Three people died in a landslide triggered by heavy rain in Central Province on 30 November, 2019.

As of 01 December, around 4,000 people were affected, mostly in Batticaloa and Ampara in Eastern Province and Mannar in Northern Province.



Heavy Rain in Philippines – December 2019

According to figures from the country's Disaster Management Center (DMC), as of 07 December, 167,436 people (49,535 families) have now been affected, with 13,208 people from 4,081 families evacuated to the 110 locations set up to assist those displaced. Most of these locations are in the Mullative, Kilinochchi, Jaffna, Vavuniya, Anuradhapura, Batticaloa and Badulla districts.

Many of those evacuated have been able to return to their homes over the last 2 days and the current number of displaced stands at 7,106, with most of those (4,039) in Kilinochchi in Northern Province.

Disaster Management Center (DMC) reported that as a result of heavy rainfall, strong winds and landslides, 29 houses have been destroyed and 1,172 houses damaged, mostly in the Uva and Central provinces.

8.2 Philippines – Thousands Displaced by Floods in North

Source: floodlist.com, December, 2019

Disaster officials in the Philippines say that over 75,000 people have been displaced by flooding and landslides after heavy rain in northern parts of Luzon Island.

Parts of Cagayan Valley (Region II) and Cordillera Administrative Region (CAR) in the Philippines were flooded after heavy rain enhanced by the Northeast Monsoon and in the wake of Typhoon Kammuri (known locally as Tisoy) from 05 December, 2019. The Cagayan River at Buntun, Cagayan Province, reached 12.09 metres on 05 December, above critical stage (10 to 12 metres). Cagayan Governor Manuel Mamba declared a state of calamity for the province on 06 December. The country's National Disaster Risk Reduction and Management Council (NDRRMC) said the worst hit areas were Cagayan, Isabela, Quirino in Cagayan Valley Region and Apayao and Kalinga in CAR. Flooding was reported in 113 locations, with 31 roads and 29 bridges closed.



Floods in Cagayan, Philippines, December 2019. Photo: Cagayan Provincial Information Office

As of 09 December, around 75,000 people have been displaced and 18 homes destroyed, including 12 in Apayao, 5 in Cagayan and 1 in Kalinga. Seventy school buildings were also damaged. Local media reported 4 fatalities in Isabela.

8.3 Indonesia – Thousands Displaced After Massive Floods Hit Jakarta

Source: floodlist.com, January, 2020

Massive flooding in Jakarta Metropolitan Area in Indonesia has left 21 people dead and thousands displaced

Indonesia's National Disaster Mitigation Agency (BNPB) reported flooding in 268 locations across the metro area, which includes Jakarta, Bogor, Depok, Tangerang and Bekasi. Flood water was 2.5 metres deep in some areas. The heavy rain also triggered landslides in the Bogor and Depok.

Unusually heavy rain fell from 31 December, 2019 to 01 January, 2020. Halim Perdanakusuma Airport in East Jakarta recorded 377mm of rain in 24 hours, according to Indonesia's Meteorology, Climatology and Geophysics Agency (BMKG).



Thousands have been displaced after massive flooding in Jakarta, Indonesia, 01 January 2020.
Photo; BNPB

Several rivers across the Metropolitan Area broke their banks. The Angke River at Angke Hulu, Tangerang City, jumped to 3.4 metres, above the danger level of 3m. Although levels dropped temporarily, as of 02 January the river was once again above the danger mark.

The Ciliwung at Jembatan Merah in Jakarta was also above the danger mark as of 02 January, standing at 2.65 metres where the danger level is 2 metres.

Flooding forced authorities to cut off electricity and water supply. Transport networks were severely disrupted and Halim Perdanakusumah Airport was temporarily closed after the runway flooded.

ASEAN Coordinating Centre for Humanitarian Assistance on Disaster Management (AHA Centre), which is based in Jakarta, reported on 02 January that an estimated 62,000 people have been displaced by flooding, with authorities providing 269 evacuation centres.

8.4 Dozens killed by floods and landslides in DRC and Kenya

Source: theguardian.com, 23 November 2019



People gather around a road that was destroyed by heavy rain near Kapenguria, West Pokot county, north-west Kenya, on Saturday. Photograph: EPA

Dozens of people have been killed across central and eastern Africa after heavy rains triggered landslides and caused rivers to burst their banks.

Twenty-five people were reported to have been killed in the Democratic Republic of the Congo's northwestern province of Équateur, Congolese media reports have said, while almost 40 people have died in Kenya and Tanzania.

A spokesman for the Catholic charity Caritas-Congo said that "local authorities have recorded 10 deaths in the [DRC] province of North Ubangi".

More than 180,000 people were in need of humanitarian assistance in the same northern region, which has also been hit by rains and floods in the past month. Tens of thousands of people were also affected in the neighboring province of South Ubangi, through which the Oubangui river runs between DRC and the Central African Republic.

On the other side of the Congo river at least 50,000 people were affected by the downpours, prompting the Congo- Brazzaville government to declare a state of emergency.

On Thursday, newspaper Les Dépêches de Brazzaville reported three people had died, while on Friday residents reported a dozen deaths in the DRC's southwestern Kasai province. Heavy rains and landslides have also killed dozens across the wider east African region during weeks of downpours, with 29 buried by landslides in Kenya and 10 people drowned in a river in Tanzania, officials have said. Those killed in Kenya were in their homes when they were hit in the early hours of Saturday during torrential rain in the Pokot region, 220 miles north- west of the capital Nairobi.

8.5 At least 265 dead in floods, landslides as rains batter East Africa

Source: phys.org, 5 December, 2019



Rescue boats evacuate families after their houses were flooded in Kenya in December 5, 2019

Two months of relentless rains have submerged villages and farms and sent rivers of mud crashing into houses across East Africa, with at least 265 killed, according to an AFP tally, as meteorologists warn of more to come. The extreme downpours have affected close to two million people and washed away tens of thousands of livestock in Kenya, Somalia, Burundi, Tanzania, South Sudan, Uganda, Djibouti and Ethiopia.

With a tropical storm headed for Somalia and more rain forecast across the region in the coming weeks, fears are rising over waterborne diseases and the prospect of hunger as crops are destroyed.

In Burundi, 38 people died on Wednesday night after heavy rains triggered landslides that swept through hillside communities in the northwest of the country, according to a provisional police toll on Thursday.

"It happened in the night, when everyone was at home, and landslides hit three very steep hills and buried everything in their path," a witness told AFP.

"Whole families were buried alive in their homes or in the fields. It was terrifying."

Kenya has been hard hit with 132 killed and 17,000 displaced, schools, roads, and health centres flooded, and water systems clogged across the country, government spokesman Cyrus Oguna said in a statement on Tuesday.

The "weather forecast has indicated that the current rains are not expected to cease until the end of December 2019," the statement said.

In South Sudan, the UN refugee agency UNHCR said nearly a million people have been affected by floodwaters which submerged whole towns, compounding an already dire humanitarian situation after six years of war.

Flooding has also affected 570,000 people in Somalia, according to the UN Office for the Coordination of Humanitarian Affairs (OCHA).

The European humanitarian agency ECHO meanwhile warned of a tropical storm due to hit northeastern Somalia on Friday, bringing the threat of more flash floods.

'Multiple landslides'

In Tanzania, 55 people have died, according to an AFP tally of police figures, including 30 in flash floods in the northeast in October, 15 whose car was swept away by floodwaters in the town of Tanga, and 10 who drowned last month in northern Mwanza. In Uganda, eight people have died and over 80,000 have been displaced by flooding and mudslides this week, Disaster Preparedness Minister Musa Ecweru said in a statement.

Days of heavy rainfall on Mount Elgon on Tuesday caused "multiple landslides in Bududa district killing four people, injuring five and displacing over 6,000 people".

In Sironko district, also on Mount Elgon, "two adults and two children were killed" and over 4,000 people affected.

8.6 Scores dead as heavy rains bring landslides and evacuations in Brazil

Source: [theguardian.com, 27 January, 2020](https://www.theguardian.com/2020/jan/27/brazil-landslides)

Storms have submerged entire neighborhoods and sent homes tumbling down hillsides, causing more than 30,000 to flee

The storms have caused floods and landslides, submerging entire neighborhoods and sending homes tumbling down hillsides in the states of Minas Gerais, Espírito Santo and Rio de Janeiro.



Damages after a landslide in Vila Bernadete, and the overflowing Das Velhas River in Sabara, Belo Horizonte, Minas Gerais state, Brazil, on Sunday. photograph: Douglas Magno/AFP via Getty Images

Rains subsided by Monday, but were expected to resume later this week in some areas. Flooded roads created violent rapids, sweeping up victims, cars and other debris. Those evacuated were being housed in makeshift shelters in churches, schools and fire stations. Local authorities have asked for donations of clothes, sheets and mattresses for the victims.

In Minas Gerais, 15,000 people were evacuated and in Espírito Santo nearly 10,000 more, according to local rescue efforts. In Rio, at least 6,000 were evacuated, according to local news media, citing figures from various municipalities. Rio state authorities didn't immediately respond to a request for official data. Local authorities warned that the Belo Horizonte metropolitan area, home to nearly 6 million people, could see up to 100 millimeters (4in) of rain in the next three days. The city had 171 millimeters (6.7in) over one 24-hour period from Thursday to Friday, the highest rainfall in 110 years. More than 120 municipalities in Minas Gerais state have declared a state of emergency.

8.7 Storms in France, Greece and Italy leave 'biblical destruction'

Source: theguardian.com, 25 November, 2019

Nine people die as weekend of heavy rain brings landslides, floods and collapsed overpass

Nine people have died as violent storms swept through parts of France, Greece and Italy over the weekend, causing flash floods, landslides and the collapse of an overpass.

Greek media described the storms as leaving a trail of "biblical destruction" in some areas of the country while the overpass collapse in northern Italy brought back a chilling reminder of Genoa's Morandi bridge giving way during a thunderstorm in August 2018, killing 43 people.



A collapsed road in Piedmont. Two people are dead and two others are missing after a wave of storms in northern Italy

Flash floods in France's Côte d'Azur claimed the lives of four people, while two others are believed to still be missing. Three of the victims were found in cars that were swept away in floods in the Var region, and the fourth was among a group being rescued by the fire brigade when the dinghy carrying them to safety capsized.



A tractor in a flooded area after heavy rain in Roquebrune-sur-Argens, France

One of the worst affected towns was Roquebrune-sur-Argens in the Var, where the Argens River rose seven metres. The French meteorological office said three months' worth of rain had fallen in less than 48 hours.

8.8 UK weather: More rain forecast after flash floods across Britain

Source: bbc.com, 2 October, 2019

More rain and winds are expected in parts of the country later this week as the remnants of ex-Hurricane Lorenzo arrive in the UK. The storm - the most powerful hurricane ever recorded in the far east Atlantic - will have lost most of its power by the time it arrives on Thursday. It comes after torrential rain brought flash flooding and led to some places being evacuated on Tuesday. On the Isle of Man a major incident was declared with people trapped indoors.



Two cars are trapped by water near a church in Colston Bassett

Elsewhere, some areas in the Midlands, Wales and southern England were hit by a week's rain in just an hour, as thunderstorms swept across the UK. Roads and railways were closed and some flights from London's Heathrow Airport were delayed on Tuesday evening due to the bad weather. Dozens of flood warnings and alerts remain in place across England. Louise Lear, from BBC Weather, said temperatures would turn colder on Wednesday before an area of low

pressure - carrying gale-force gusts and the remnants of former Hurricane Lorenzo - approached Northern Ireland on Thursday.



Local residents make their way through floodwater in Cossington, Leicester

The low pressure would move eastwards and south during Thursday and into Friday, bringing "a spell of wet and windy weather", she said.

The Met Office said Northern Ireland, western Scotland, Wales and south-west England will most likely be affected.

8.9 Peru – Disaster Authorities Respond to Floods and Landslides

Source: floodlist.com, 31 December, 2019

Disaster authorities in Peru are responding to incidents of flooding and landslides caused by heavy rain over the last 7 days.

On 28 December heavy rain in Junín department triggered a landslide in Ahuac district, destroying 19 homes and damaging over 30 others. At least person was injured but there were no reports of fatalities.

Flooding was reported in the the department of Cajamarca. Two homes were destroyed, 17 damaged and around 60 people affected by floods in Cajabamba province on 29 December. Around the same time flooding in Gregorio Pita district in San Marcos province destroyed 2 houses and left 6 people homeless.



Peru – Flood situation in December 2019

Heavy rainfall overnight 29 to 30 December caused a landslide in Pataz district in La Libertad Department damaging 3 homes.

Peru's Civil Defence (Instituto Nacional de Defensa Civil – Indeci) has activated contingency plans in Piura Department after flooding and heavy rain on 29 December 2019. Indeci reported that flooding in the districts of Piura, Catacaos, Cura Mori, Castilla, La Arena, Tambo Grande and Veintiseis de Octubre. Teams working with motorised pumping equipment have been deployed to the area. Roads have been blocked and some houses damaged, although authorities are yet to fully assess the damage.

Disaster authorities pre-emptively declared a state of emergency in several districts in Huánuco, Junín, La Libertad, Pasco and San Martín Departments on 24 December.

8.10 Ecuador – Deadly Floods and Landslides in Morona-Santiago Province

Source: floodlist.com, 12 December, 2019

Heavy rainfall in south east Ecuador has caused flooding and landslides in Morona-Santiago Province. According to Ecuador's National Risk and Emergency Management Service (SNGRE), the worst affected area is the canton of Limón Indanza Canton after heavy rain from 08 December, 2019.

Houses were destroyed by landslides or swept away by flash flooding, according to local media reports. At least one person died when a landslide buried a home. More are feared missing and search operations are ongoing, according to SNGRE. Drinking water supply was interrupted for several days.



Aftermath of a landslide in Limon Indanza Canton, Morona Santiago Province, Ecuador

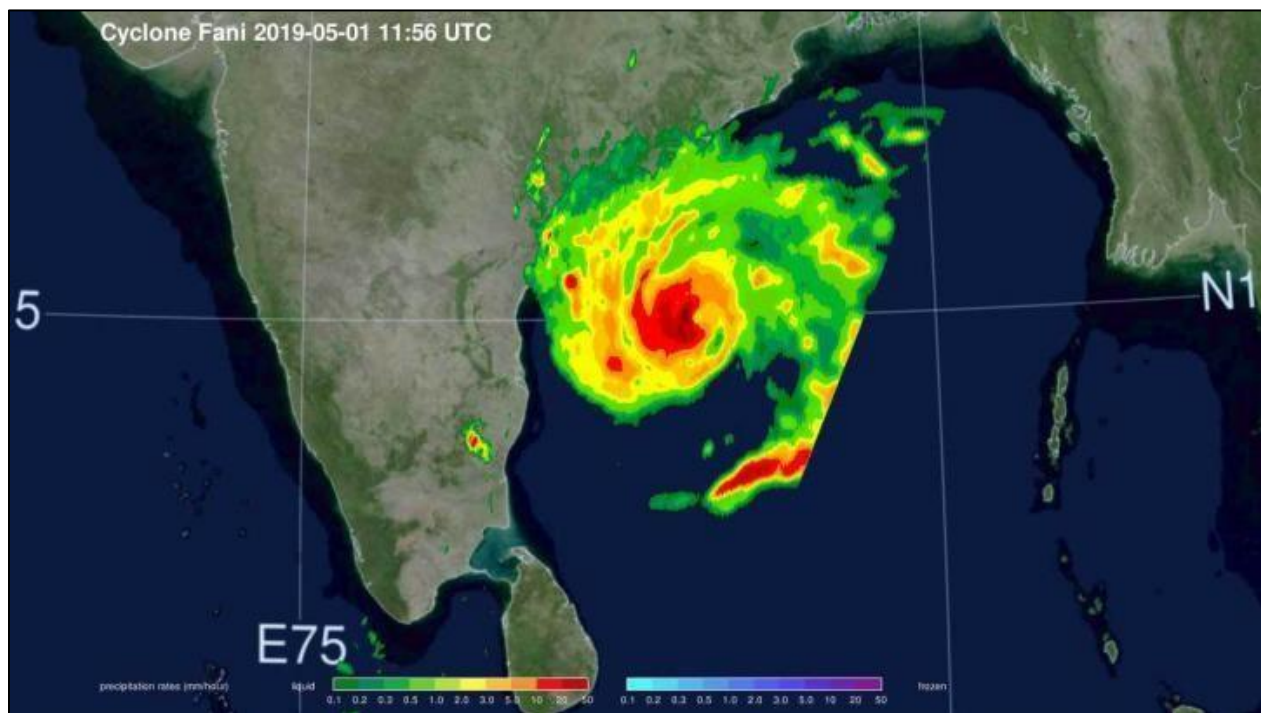
At least 9 people died in landslides in Limón Indanza Canton, Morona-Santiago Province in November last year.

9. Cyclone

9.1 India's Cyclone Fani Recovery Offers the World Lessons in Disaster Preparedness

Source: floodlist.com, 14 May, 2019

Fani, a rare summer cyclone in the Bay of Bengal, hit eastern India on May 3. It is one of the strongest cyclones to have hit India in the last 20 years, according to the Indian government's meteorological department. Storm surges and powerful winds reaching 125mph blew off roofs, damaged power lines and uprooted countless trees. But the worst- affected state, Odisha, has been successful in keeping the loss of life and numbers of affected people to a minimum.



The GPM core observatory satellite passed over Tropical Cyclone Fani on May 1, 2019 as it was strengthening and nearing landfall in northeastern India. This image shows the powerful storms circling the center that were producing rainfall at a rate greater than 50 mm/2 inches per hour

This is the result of a very effective strategy of disaster preparation and quick responding. The United Nations office for Disaster Risk Reduction (UNISDR) and other organisations have hailed government and volunteer efforts that have ensured the levels of destruction have been kept to a

minimum. According to official estimates, 64 people lost their lives due to the devastating cyclone Fani. But considering the power of the cyclone, it is remarkable that more lives have not been lost.

9.2 Why the Indian Ocean Is Spawning Strong and Deadly Tropical Cyclones

Source: floodlist.com, 14 May, 2019

The Indian Ocean has made its mark on the global news cycle this year. In March, tropical cyclone Idai made headlines as one of the most severe storms to have made landfall in Mozambique. Current estimates indicate that more than 1,000 people died. This makes it the most deadly tropical cyclone ever to have made landfall on the southern African subcontinent.

Until Idai, tropical cyclone Eline, which struck in 2000, was the most devastating tropical cyclone to make landfall in Mozambique.

After Idai, Eline was the strongest – though not the deadliest – cyclone to have hit the southern east African coast.



Beira, Mozambique: Homes damaged by Cyclone Idai, March 2019. Photo: European Union 201

This ranking as the strongest was soon after challenged by tropical cyclone Kenneth, a category 4 tropical cyclone that made landfall over the border of Mozambique and Tanzania six weeks after Idai.

Kenneth, in many regards, took the region by surprise. The storm was the northernmost tropical cyclone to make landfall on Mozambique, and the first to make landfall on Tanzania. It occurred very late in the season. Most cyclones in the region occur from January to March. It was also unusual for the Mozambique Channel to experience two severe tropical cyclones that made landfall within one season.

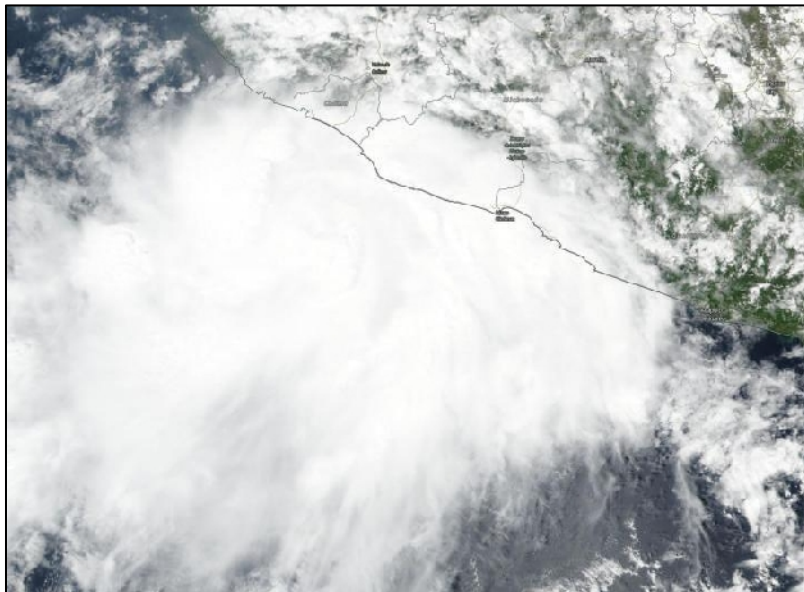
9.3 Mexico – Hurricane Lorena Causes Flooding in Jalisco

Source: floodlist.com, 20 September, 2019

Mexico's National Meteorological Service (SMN) said that Tropical Cyclone Lorena made landfall near Playa Pérula, Jalisco, on 19 September, 2019. As of 20 September the hurricane was moving towards the Baja California Peninsula.

Jalisco State

Media reported that around 200 people were evacuated and over 50 houses and some roads were flooded in Jalisco State. Civil Protection said they rescued two men who were trapped in their home after flooding from the Villa Purificación river in the town of Agua Caliente in La Huerta. Civil Protection also carried out flood rescues in Chamela.



NASA-NOAA's Suomi NPP satellite passed over Tropical Storm Lorena on Sept. 18, 2019 and revealed powerful storms around the low-level center. Strong storms were also lashing the coast of western Mexico, bringing heavy rainfall

Baja California Peninsula

The National Hurricane Center (NHC) in the USA said a Hurricane Warning is in effect for the Baja California peninsula from La Paz to Puerto Cortes.

NHC warned that Lorena is expected to produce rainfall accumulations of 3 to 6 inches, with maximum amounts around 8 inches, across the far southern Baja California Sur. This rainfall may result in flashflooding.

The center also warned that swells generated by Lorena will affect portions of the southwestern coast of Mexico and the southern Baja California peninsula during the next few days. These swells are likely to cause life-threatening surf and rip current condition

9.4 Bahamas – 5 Dead as Hurricane Dorian Causes “Unprecedented Devastation”

Source: floodlist.com, 3 September, 2019

Hurricane Dorian continues to batter the Bahamas with strong winds and massive storm surge after passing over the Abaco Islands on 01 and 02 September, 2019. At least 5 people have died on the Abaco islands, which have seen “unprecedented devastation” according to the Bahamas Prime Minister. US Coast Guard team are already on the ground in Abaco and have rescued a number of individuals, and taken 7 critical patients from the Marsh Harbour Clinic in Abaco to Nassau for further medical care. Initial reports from Abaco suggest that the devastation is “unprecedented and extensive”, adding, “there has been an extraordinary amount of flooding and damage to infrastructure.” It also reported that flooding on other islands of the Bahamas, including Grand Bahama.



Hurricane Dorian from space. Dorian over the Bahamas, September 2019

Although the slow-moving hurricane had weakened slightly, parts of the Bahamas were still reeling from powerful winds and storm surge as of late 02 September. Winds of 145 mph / 233 kmh were reported on Grand Bahama Island, making Dorian a Category 4 hurricane. Authorities warned residents to remain in indoors until the all clear is given.

9.5 Warnings of tornadoes and more rain after devastating floods; crocodiles and snakes seen on streets

Source: straitstimes.com, 2 February, 2019

SYDNEY (AFP, DPA) - Crocodiles and snakes have been spotted in suburban streets in the north-east Australian city of Townsville, which has been hit by record-breaking rainfall and devastating once-in-a-century floods.

The floods have turned streets into rivers and forced thousands to abandon their homes in north-east Australia, with authorities warning of tornadoes and more rain over the next few days.

Authorities were late Sunday forced to open the floodgates at the nearby Ross River Dam, which had reached over 200 per cent capacity due to relentless downpours, inundating several neighborhoods and threatening up to 20,000 homes.

Australia's tropical north experiences heavy rains during the monsoon season at this time of the year, but the recent downpour has surged far above normal levels.

Thousands of residents in the city of Townsville in Queensland were without power and cut off by flooded roads. More severe weather could whip up tornadoes and destructive winds in the days ahead, Bureau of Meteorology state manager Bruce Gunn told reporters on Sunday.

The Australian Defence Forces filled sandbags, deployed amphibious cargo vehicles and helped pluck flashlight-wielding residents from their rooftops Monday.



A man walks through flooded area in Townsville, Queensland, on Feb 2, 2019.

Thousands of residents in the city were without power and up to 20,000 homes are at risk of being inundated if the rains continue PHOTO: EPA-EFE

Landslides were reported with more possible in the worst-hit areas, the Bureau of Meteorology said Monday (Feb 5), warning of further “intense rainfall” and “significant flash flooding” along the eastern shore. The Bureau of Meteorology said a slow-moving monsoonal trough was sitting above Queensland, with some areas expected to receive more than a year's worth of rain before conditions ease. The region receives an average of some 2,000mm of rain annually but some towns were already on track to pass that. According to the bureau, Townsville has already broken its record for the wettest seven days in a row, with 1,012 mm of rain falling by the end of Saturday compared to the previous record of 886 millimetres in 1998.

9.6 Cyclone Trevor hits Australia's northern coast, bringing torrential rains

Source: [bbc.com](https://www.bbc.com/news/australia-49284444), 23 March, 2019



Satellite imagery shows Cyclone Trevor approaching the northeast state of Queensland on 23 March 2019

A vast cyclone has crashed into Australia's northern coast, bringing torrential rains and winds of up to 250km/h (155 mph).

Cyclone Trevor made landfall as a category four storm and officials have declared a state of emergency in some areas.

Another storm, Cyclone Veronica, is set to strike the country's west coast.

Thousands of Australians have evacuated their homes in preparation for the two potentially devastating cyclones.

Cyclone Trevor: A 'guttural howling roar'

Destructive winds are expected, while heavy rains and large waves threaten to cause severe flooding. It is only the second time in history that two cyclones are predicted to strike the country at the same time. Tropical Cyclone Trevor hit the communities of Numbulwa and Borroloola in the Northern Territory on Saturday morning. It was downgraded to a category three shortly after making landfall but officials have warned that it is still dangerous.

"There's a concern that flash flooding may occur," emergency operations official Michael Hebb told AFP news agency.



Trevor will hit communities along the coast in the Northern Territory, while Veronica is expected to strike between Port Hedland and Karratha in Western Australia

The storm could bring a year's worth of rain in just a couple of days. In the biggest ever evacuation ahead of a cyclone, people living in its the path have moved into tented sites in Darwin and Katherine.

Some of those who were evacuated say they are worried about what they will return to. "We are only new to the area and the house we are in isn't going to sustain the expected winds that are predicted," Emily Crawford, who evacuated to Darwin, told AFP.

Emergency services and the military were called in to rescue residents from the island of Groote Eylandt, off the north coast on Thursday.

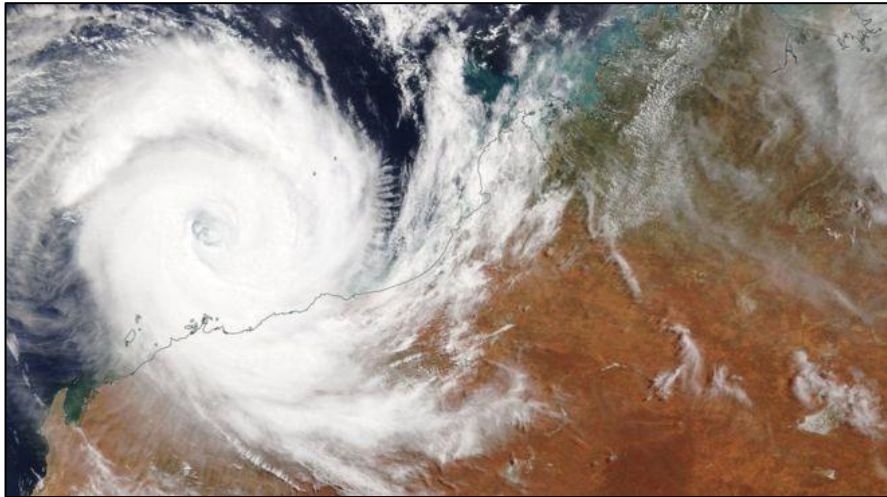
9.7 Cyclone Veronica: Destructive winds and rain lash Australia

Source: [bbc.com](https://www.bbc.com/news/australia-49111111), 25 March, 2019

Cyclone Veronica lingered about 95km (60 miles) off the nation's north-west coast on Monday, officials said.

Despite no longer being expected to make landfall, the category two system is moving slowly and has prompted warnings for locals to remain indoors.

A second cyclone within 48 hours has brought destructive winds and torrential rains to coastal regions of Australia.



Satellite imagery shows Cyclone Veronica just off the north-west coast of Australia on 25 March 2019

Cyclone Trevor, a category four, hit the Northern Territory on Saturday. Heavy rain and large waves whipped up by Cyclone Veronica threaten to cause widespread flooding in Western Australia, according to authorities.

An area stretching from Karratha to Port Hedland was enduring gale-force winds of more than 125km/h, the Bureau of Meteorology said. Similar conditions affected the Northern Territory on Saturday when Cyclone Trevor made landfall between the remote communities of Numbulwar and Borroloola.



Cyclone Veronica is near Port Hedland in Western Australia, after Cyclone Trevor made landfall in the Northern Territory on Saturday

In Western Australia, the strong winds snapped trees and caused minor power outages but there were no immediate reports of injuries.

Many locals had reinforced their homes with sandbags and stocked up on food and water supplies.

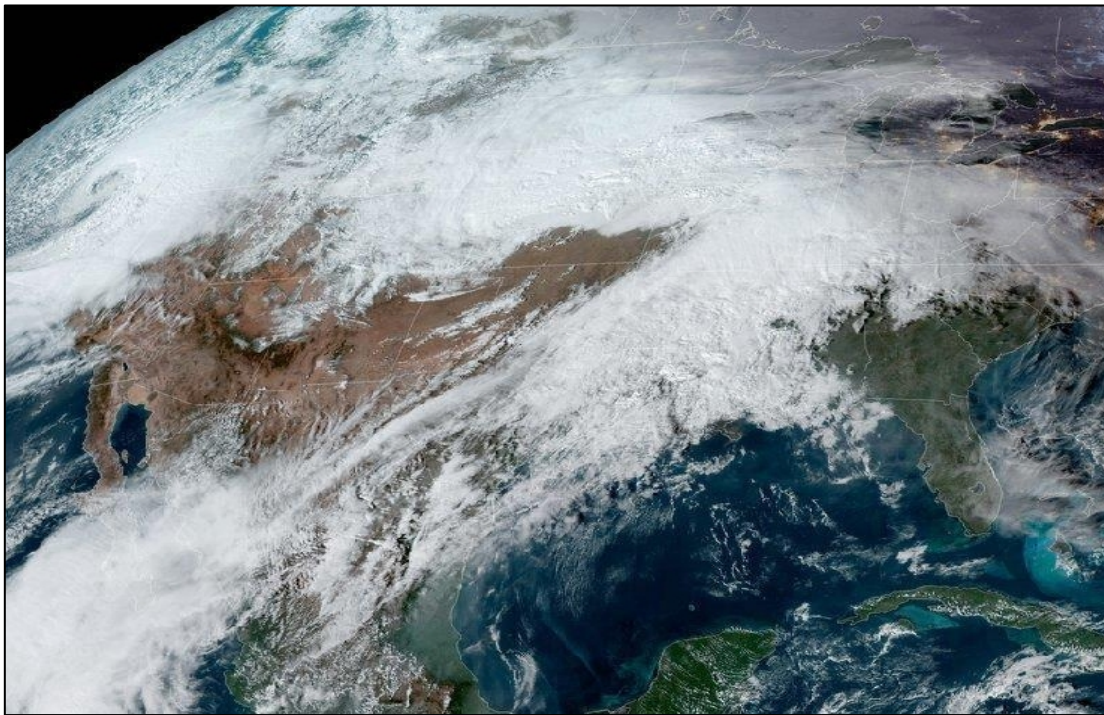
9.8 'Bomb Cyclone' Winter Storm Will Hit U.S. As Thanksgiving Nears, Forecasters Warn

Source: npr.org, 26 November, 2019

Hurricane-force winds, blizzard conditions, heavy snowfall — and a "bomb cyclone" on the West Coast: Those are the dire predictions of weather forecasters, who are warning Thanksgiving travelers to be cautious and prepare for delays as two powerful back-to-back storms hit the western and central U.S. this week. The National Weather Service's U.S. forecast map is draped in alarming shades of pink, purple and red, reflecting winter storm warnings that are in effect from California to Michigan. And the bad weather is expected to last: The winter storm warning posted by the NWS office in Las Vegas will remain in effect from 5 p.m. PT Tuesday through 4 a.m. PT Friday.

The warnings come as Denver and other cities are already coping with heavy snowfall from a winter storm that is hitting the southern and central Plains region.

The NWS office in Cheyenne, Wyo., reported getting more than 12 inches of snow by midday on Tuesday. But elevated areas west of Fort Collins, Colo., reported more than 30 inches.



"Two back to back powerful storms will produce widespread heavy snow" in parts of the western and central U.S., the National Weather Service says

That storm is still developing and is expected to dump up to a foot of snow in a broad region by Thursday as it moves from the Plains to the upper Mississippi Valley, across the upper Great Lakes and into northern Maine, the NWS says. It adds that heavy snow could affect travelers at airports from Denver to Minneapolis-St. Paul.

Despite those high snow totals, the strongest winter storm is in the far West, where the system is coming in from the Pacific Ocean. It will start to hit Oregon and Northern California by Tuesday night, the NWS says. It adds that what could be a record-setting storm system will likely turn into a bomb cyclone — meaning the storm will intensify at an unusually rapid rate.

10. Volcanic Eruption

10.1 Taal volcano spews lava, sends ash clouds into sky

Source: alijazeera.com,14 January,2020

Red-hot lava spewed from a volcano near the Philippine capital of Manila on Monday as tens of thousands of people fled through heavy ash and frightening tremors, and authorities made plans to evacuate hundreds of thousands more for fear of a bigger eruption.



Lava and broad columns of ash grounded hundreds of flights as authorities warned of a possible "explosive eruption 14 January,2020

Clouds of ash from the Taal volcano reached Manila, 65km (40 miles) to the north, on Sunday, forcing the shutdown of the country's main airport, with more than 500 flights cancelled. The airport partially reopened on Monday after the ash fall eased.

There were no immediate reports of any deaths or major damage directly blamed on the eruption.



A family evacuates to safer areas

A truck, however, skidded out of control on an ash-blanketed road, killing the driver and injuring three companions in Laguna province in an accident police said may have been linked to slippery conditions.



A worker in the midst of plants covered with mud and ash from the eruption

The government's disaster-response agency and other officials reported more than 30,000 villagers fled their homes in the hard-hit province of Batangas and nearby Cavite province. Officials expected the number to swell.

10.2 At least 5 killed as New Zealand volcano erupts on tourist island

Source: aljazeera.com, 9 December,2019

New Zealand's most active volcano erupted on Monday killing at least five people with many trapped on the popular tourist spot, White Island, as conditions were too dangerous for search-and-rescue teams. No more survivors were expected to be rescued, authorities said.

"Based on the information we have, we do not believe there are any survivors on the island," police said in a statement.

Plumes of white smoke and debris were shot high into the air, and video emerged of some visitors stuck in a crater before the blast. Search operations were put on hold until conditions became safe



Authorities say about 50 people were near Whakaari, also known as White Island, when it erupted on Monday 9 December, 2019 [Michael Schade/AFP]

Dozens of tourists were exploring the moon-like surface when the eruption occurred. Police Deputy Commissioner John Tims said the number of missing was in the double digits but he couldn't confirm an exact figure.



The volcano spews steam and ash moments after it erupted [Michael Schade via AFP]

Michael Schade, an engineering manager from San Francisco, was one of the tourists who made it off the island minutes before the eruption. He posted dramatic footage of the blast from the boat he was on, with smoke first engulfing the top of the crater and then the entire island.

11. Dust Storms

11.1 A massive dust storm has turned an Australian city red

Source: [cnn.com](https://www.cnn.com), 9 December, 2019



The dust storm was exacerbated by strong winds and high temperatures on 21 Nov, 2019

On Thursday, it looked like Mars in the Australian city of Mildura. A dust storm turned the sky bright orange and covered everything in sight. Photos from the city, in the state of Victoria, look like they have been filtered with a red lens.

The dust hit the city around midday with winds measuring up to 40 kilometers per hour (about 24.8 miles per hour) and temperatures hitting nearly 40 degrees Celsius (104 Fahrenheit), according to CNN affiliate 7News.

The dust storm was exacerbated by the same gale force winds and high temperatures that have contributed to deadly bushfires sweeping across New South Wales and Queensland states, further north of Victoria.



Mildura residents said the dust storm looked like a thick wall

The Victoria Bureau of Meteorology told 7 News that the dust storm wasn't surprising, given it had been a "very dry year through the northern part of the Mallee (district)."

With dust swept up into the air, visibility was low in Mildura, with photos showing cars and roads disappearing into a cloudy red haze. According to the Bureau of Meteorology, visibility at the airport fell from four kilometers (about 2.5 miles) to 500 meters (0.3 miles).

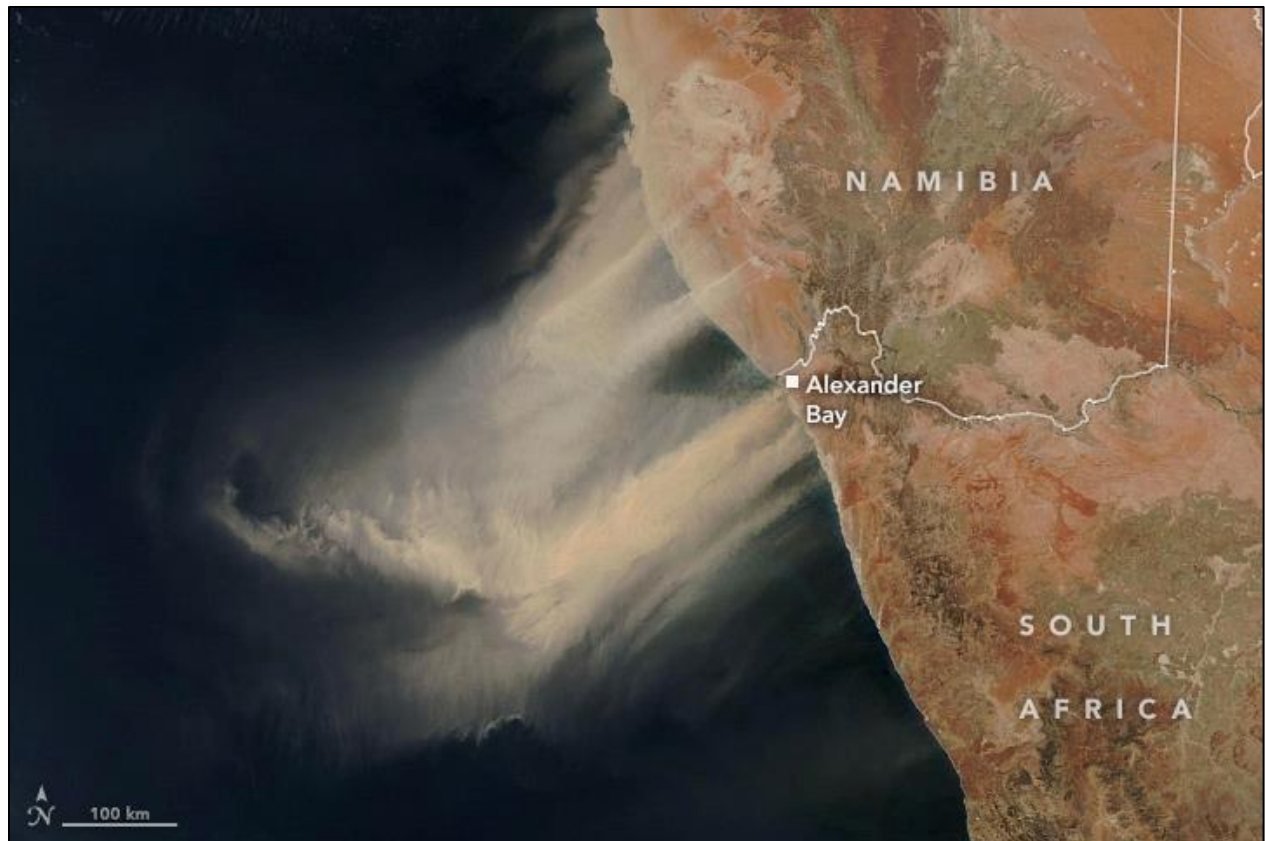
11.2 Dust Storm in Southern Africa

Source: nasa.gov, 25 September,2019

People in coastal towns along the west coast of southern Africa watched skies turn red on September 25, 2019. Fierce wind picked up and carried huge plumes of sand and dust westward toward the Atlantic Ocean.

The plumes were observed that day at 2:25 p.m. South Africa Standard Time (12:25 Universal Time) with the Visible Infrared Imaging Radiometer Suite (VIIRS) on the NOAA- NASA Suomi NPP

satellite. The event covered a wide area north and south of the Orange River, which forms part of the border between Namibia and South Africa.



Dust Storm, Africa, September 25, 2019

The South African Weather Service reported that the winds lofted enough particles into the air to produce moderate to poor visibility. Indeed, photographs from people in Alexander Bay show dark, hazy skies and streets that are barely visible. According to news reports, aircraft were unable to land at nearby airports.

The amount of dust lofted from land in the Southern Hemisphere is negligible compared to that of the Northern Hemisphere. Africa's Sahara Desert, for example, is one of the world's major dust sources. Still, when winds blow over dry areas of the Southern Hemisphere, dust storms can be fierce. A similar scene unfolded in October 2018, when a thick, narrow plume streamed from the same area.

12. WildFires

12.1 Australia bushfires fact check: are this year's fires unprecedented?

Source: theguardian.com, 22 November, 2019

Australia has suffered a devastating early bushfire season with fires across several states burning through hundreds of thousands of hectares and destroying hundreds of properties with the loss of six lives.

New South Wales has been the most severely hit, with more than 1.65m hectares razed, an area significantly larger than suburban Sydney. All six deaths occurred in there and more than 600 homes were destroyed. At one point firefighters were battling a fire front about 6,000km long, equivalent to a return trip between Sydney and Perth.



Firefighters tackle the Gospers Mountain fire outside Sydney. Parts of eastern Australia have had record low rainfall in 2019, contributing to an unusually ferocious early bushfire season.

Photograph: Dean Lewins/EPA

In Queensland, 20 homes have been lost and about 180,000ha burned. In Victoria, where the bushfire season usually starts later, 100km/h winds fanned more than 60 blazes during an unprecedented heatwave on Thursday. The most extreme warning, a code red, was issued for the north-western and central regions. The state's emergency services minister, Lisa Neville, compared it to "the worst conditions you'd see in February or March". Seven districts in South Australia were rated as being at catastrophic risk of fire on Wednesday as temperatures soared into the 40s. A blaze on the Yorke peninsula burned through about 5,000ha, damaging at least 11 properties and injuring 33 people. Western Australia has also experienced early bushfires in several regions, with fears of much worse to come over summer, and there were minor bushfires this week in Tasmania.

12.2 Parts of the Amazon rainforest are on fire — and smoke can be spotted from space

Source: cbsnews.com, 11 August, 2019

On Monday afternoon, the city of Sao Paulo, Brazil, went dark — but it wasn't some strange cosmic event. Powerful winds carried the smoke from forest fires burning nearly 1,700 miles away, reported the BBC. Almost 73,000 fires have been detected by Brazil's space research center INPE, according to Reuters. It's a record number this year, the agency said.



A satellite image from August 11, 2019, shows plumes of smoke above Brazilian states

The smoke has traveled from the fires blazing in the Brazilian states of Rondônia and Amazonas and blackened the sky above the city for about an hour, the BBC added.

The agency posted satellite photos of multiple fires tearing through the Brazilian states of Amazonas, Rondônia, Pará and Mato Grosso dated August 11 and 13 of this year. Smoke appeared to blanket the states in the startling images.

The agency stated fires are rare in the Amazon region for much of the year, as its wet weather keeps blazes at bay; fires do typically increase in July and August with the onset of the dry season. NASA explained "activity" peaks by early September and stops by mid- November.

NOTES



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