## Disaster Management – hoping for the best, preparing for the worst

## By Neeraj Mahajan

"I got quite annoyed after the Haiti earthquake. A baby was taken from the wreckage and people said it was a miracle. It would have been a miracle had God stopped the earthquake. More wonderful was that a load of evolved monkeys got together to save the life of a child that wasn't theirs" -Terry Pratchett

## THE MOST DESTRUCTIVE EARTHQUAKES IN HISTORY

Throughout history there have been many destructive earthquakes<sup>1</sup> behind many million deaths, either directly or due to the resulting tsunamis, landslides, fires, and famines. These earthquakes, have left a lasting impact both short term and for years to come in the affected areas because of factors like population density, building construction practices, and access to emergency services. This is why they have been classified as the most destructive earthquakes by the United States Geological Survey (USGS), National Oceanic and Atmospheric Administration (NOAA), and other scientific organizations. Here is a list of five most destructive earthquakes—studied by people in the field of seismology and disaster management:

- 1. The Shaanxi earthquake (magnitude 8) on 23 January 1556 in Shaanxi province of China was one of the deadliest earthquakes in recorded history. More than 830,000 people were killed if not immediately due to the tremor and resultant aftershocks but later because their own homes collapsed on top of them. Many people were buried alive. Entire towns and villages were raised to the ground. The aftershocks continued for several weeks, causing further damage and loss of life. It led to changes in the way that buildings were constructed, and also development of seismic monitoring systems to predict and prepare for future earthquakes.
- 2. Valdivia Earthquake (magnitude 9.5) one of the largest earthquake in history<sup>2</sup> occurred approximately 160 km off the coast of Chile on May 22, 1960. Its tremors lasted for approximately 10 minute. The earthquake, killed approximately 1,655 people, 3,000 injured, and left two million people homeless. It triggered a massive tsunami that inundated places as far away as New Zealand, Japan, and the Philippines. In Hawaii the tsunami virtually erased the coastal town of Hilo from the map.
- 3. The Indian Ocean earthquake (magnitude 9.1–9.3) on December 26, 2004 was one of the most powerful earthquakes ever recorded. It triggered a series of devastating tsunamis also called the Boxing Day tsunami, in several countries bordering the Indian Ocean, including Indonesia, Thailand, Sri Lanka, India, and Somalia. The tsunamis caused extensive damage, and loss of life-- estimated 230,000 people were killed or missing or presumed dead.
- 4. The Tangshan earthquake (magnitude 7.6) at 3:42 am on July 28, 1976, in Tangshan, Hebei province, China is rated to be the deadliest of the 20th century<sup>3</sup>. It lasted for 23 seconds and its impact was felt over an area of 1,300 square kilometers. The earthquake destroyed almost all buildings in the city, including homes, schools, hospitals, and factories. The earthquake also caused numerous landslides, which buried many people alive. The official death toll was 242,000, but the actual death toll might have been much higher, up to 655,000. Since then the government and people in the city of Tangshan, have started constructing earthquake-resistant buildings to prevent

similar damage in future. It is considered one of the deadliest earthquakes in modern history, along with the 2010 Haiti earthquake and the 2004 Indian Ocean earthquake and tsunami.

- 5. **The Haiti earthquake (2010)** a magnitude 7.0 quake caused widespread damage and destruction, killing almost over 230,000 people and more than 1.5 million were left homeless. Many buildings, including government offices and schools, were destroyed or severely damaged.
- 6. Sichuan Earthquake (2008) a magnitude of 7.9 earthquake struck the Sichuan province of China and left around 87,000 people dead, and many more injured and displaced.

## EARHQUAKES NEVER COME ALONE

Earthquakes never come alone<sup>4</sup>, they are always accompanied by power failure due to uprooted electricity poles, and trees, broken glass, damaged or collapsed buildings, roads, bridges, or cyclones, tornados, tsunamis and landslides due to aftershocks.

- Earthquakes can lead to landslides particularly in areas with steep slopes and unstable soil or rock formations. The shaking from an earthquake can loosen the soil or rock, causing them to slide downhill and potentially causing damage to structures or blocking roads and waterways.
- Earthquakes can upset the ocean floor and trigger Tsunamis- A large movement on the seafloor due to an earthquake can invariably lead to a tsunami that can travel across the ocean and cause extensive damage in the coastal areas.
- Aftershocks or small tremors invariable accompany larger earthquakes and can cause additional damage to buildings and structures, and also trigger landslides, tsunamis and other hazards. Aftershocks are smaller earthquakes that happen after a larger earthquake because the Earth's crust adjusts to the energy released during the main earthquake. Aftershocks can have unpredictable strength and frequency making it difficult to assess the damage they can cause to people, buildings and infrastructure.
- Persistent shaking and rumbling of the earth due to aftershocks can also have a traumatic psychological impact on people and lead to stress and anxiety. This can be particularly challenging for people who have already experienced significant damage or loss as a result of the main earthquake. It is hence important for people in the earthquake affected areas to be prepared for aftershocks and take appropriate safety precautions, such as seeking shelter in a sturdy building.

#### NOBODY, ANYWHERE IS SAFE

Earthquakes are nature's ways to tell humans to behave themselves or face the consequence. Earthquakes can make their presence felt on land, in the air as well as over and underwater.

Seismic waves generated by the earthquake can cause the ground to shake and vibrate, which can in turn cause air to move and generate infrasound waves. These waves in the atmosphere can sometimes be detected by instruments and can help scientists to study the cause and effect of earthquakes.

#### **ON GROUND**

Earthquakes can damage the land and leave behind significant changes<sup>4</sup> due to:

- **Ground shaking:** the violent shaking due to an earthquake can causing buildings, roads, and bridges to collapse and lead to significant damage in addition to landslides and rock fall on slopes and hills.
- Soil liquefaction: When seismic waves pass through loose or saturated soil, it can cause the ground to behave like a liquid. This can result in the sinking or settling of buildings, roads, and other structures, and can cause widespread damage in coastal areas with soft sediment.
- **Fault displacement**: Earthquakes can cause significant displacement along fault lines, which can lead to changes in the landscape. For example, the 1906 San Francisco earthquake caused the San Andreas Fault to move up to 28 feet, resulting in significant changes to the topography of the area.
- **Ground fractures:** Earthquakes can cause the ground to fracture and form fissures or cracks which can affect water resources, such as aquifers and wells.
- **Tsunamis:** Large earthquakes that occur beneath the ocean floor can trigger tsunamis, which can cause significant damage to coastal areas. Tsunamis can inundate low-lying areas, erode coastlines, and cause widespread flooding.

## **DEADLIEST EARTHQUAKES ON LAND<sup>5</sup> INCLUDE:**

- 1. Shaanxi earthquake, China (1556): This earthquake is considered the deadliest earthquake in history, with an estimated death toll of over 800,000 people.
- 2. Tangshan earthquake, China (1976): This earthquake struck the city of Tangshan in northeastern China and resulted in the deaths of at least 242,000 people.
- 3. Aleppo earthquake, Syria (1138): This earthquake shattered the city of Aleppo and its surroundings, killing an estimated 230,000 people.
- 4. Sumatra earthquake, Indonesia (2004): The earthquake resulted in a tsunami that caused significant loss of life on land and killed about 227,898 people in 14 countries.
- 5. Haiti earthquake (2010): This earthquake, with a magnitude of 7.0, struck the capital city of Port-au-Prince and surrounding areas, killing an estimated 222,570 people.
- 6. Sichuan earthquake, China (2008): This earthquake, with a magnitude of 7.9, struck the Sichuan province of China and resulted in the deaths of at least 87,587 people.
- 7. Kanto earthquake, Japan (1923): This earthquake struck the Kanto region of Japan and resulted in the deaths of at least 105,000 people.
- 8. Gujarat earthquake, India (2001): This earthquake, with a magnitude of 7.7, struck the state of Gujarat in western India and resulted in the deaths of at least 20,000 people.
- 9. Nepal earthquake (April 2015): A magnitude 7.8 earthquake struck Nepal, causing widespread damage and killing over 8,000 people.

## **RECENT EXAMPLES OF POWERFUL EARTHQUAKES (ON LAND) INCLUDE:**

- 1. Sulawesi earthquake (January 2021): A magnitude 6.2 earthquake struck the Indonesian island of Sulawesi, killing at least 105 people and injuring hundreds more.
- 2. Haiti earthquake (August 2021): A magnitude 7.2 earthquake struck Haiti's southern peninsula, killing over 2,200 people and injuring thousands more.
- 3. Aegean Sea earthquake (October 2020): A magnitude 7.0 earthquake struck in the Aegean Sea, causing significant damage and casualties in Turkey and Greece.
- 4. Ridgecrest earthquakes (July 2019): earthquakes with magnitudes of 6.4 and 7.1 struck the Ridgecrest area of California, causing damage to buildings and roads, and resulted in injuries but no fatalities.
- 5. Lombok earthquakes (July-August 2018): A series of magnitude 7.0 earthquakes struck the Indonesian island of Lombok, killing and injuring thousands of people.
- 6. Mexico City earthquake (September 2017): A magnitude 7.1 earthquake struck Mexico City, causing significant damage to buildings and killing over 350 people.

## UNDERGROUND EARTHQUAKES

Earthquakes can also cause changes in the behavior of groundwater and underground aquifers. The shaking of earth due to an earthquake can cause the ground to shift and change the flow of water through the soil and rocks. This can cause changes in water levels in wells and other underground water sources.

## EXAMPLES OF UNDERGROUND EARTHQUAKES AND THEIR IMPACT:

- 1. Haiti earthquake (August 2021): A magnitude 7.2 earthquake struck Haiti on August 14, 2021. More than 2,200 people were killed, injured or displaced. The earthquake was caused by movement along the Enriquillo-Plantain Garden fault zone, which runs through the southern part of Haiti.
- 2. Aegean Sea earthquake (October 2020): A magnitude 7.0 earthquake struck Turkey and Greece on October 30, 2020. The earthquake was caused by movement along the North Anatolian fault zone, which runs through Turkey and Greece.
- 3. Ridgecrest earthquakes (July 2019): A series of earthquakes, including a magnitude 6.4 and a magnitude 7.1 earthquake, struck California in July 2019. The earthquakes were caused by movement along the Little Lake fault zone, which runs through eastern California.
- 4. Lombok earthquakes (August 2018): A series of earthquakes, including a magnitude 6.9 earthquake, struck the island of Lombok in Indonesia in August 2018. The earthquakes were caused by movement along the Flores thrust fault, which runs beneath the island of Lombok.

These are just a few of the many earthquakes that occur each year all over the world and leave behind death and devastation, particularly in places where the response and recovery efforts are poor because of lack of infrastructure and resources.

## **UNDERWATER EARTHQUAKES**

Underwater earthquakes also called subsea earthquakes, can disturb the seafloor and lead to tsunamis. The violent up or down movement of the seafloor due to an earthquake can create a giant wave that travel across the ocean leading to tsunamis that damage coastal areas-even far away from the place where the main earthquake occurred. A large number of earthquakes occur under the ocean floor because most of the Earth's surface is covered by water. Underwater earthquakes occur due to energy released by the movement of tectonic plates below the ocean floor - covered by tectonic plates, which move and grind against each other leading to more earthquakes. The most active areas for underwater earthquakes are the mid-ocean ridges, where one plate is being forced beneath another leading to frequent earthquakes.

Underwater earthquakes can trigger other phenomena like tsunamis which can cause significant damage and loss of life along coastal areas. To predict and mitigate the effects of underwater earthquakes one should understand the difference between Tsunamis and hurricane - two different natural phenomena.

A tsunami is a series of ocean waves caused by underwater disturbances like earthquakes, or volcanic eruptions. They can create powerful shockwaves that can cause a series of waves that can travel across entire oceans. Tsunamis can cause significant damage and loss of life along the coastlines.

On the other hand, a hurricane cyclone is a rotating storm system characterized by strong winds, heavy rainfall, and storm surges. These storms form over warm ocean waters, and they can travel long distances, causing widespread damage along coastal areas. Hurricane cyclones are classified according to their wind speeds.

While both tsunamis and hurricane cyclones can cause damage along coastal areas, they are caused by different mechanisms and require different types of preparation and response. Tsunamis require early warning systems and evacuation plans, while hurricane require preparation for strong winds, heavy rainfall, and storm surge flooding.

## **EXAMPLES OF UNDERWATER EARTHQUAKES:**

- 1. Valdivia earthquake (1960): strongest earthquake ever recorded. The earthquake (magnitude 9.5) off the coast of Chile, triggered a tsunami that caused widespread damage in faraway -Hawaii and Japan
- 2. Indian Ocean earthquake and tsunami (2004): Another deadliest earthquakes in history, this earthquake (magnitude 9+) occurred off the west coast of Sumatra, Indonesia and triggered a devastating tsunami that killed over 230,000 people in 14 countries.

- 3. Haiti earthquake (2010): An earthquake (magnitude 7) just off the coast of Haiti caused a tsunami that killed over 200,000 people and caused significant property damage.
- 4. **Tōhoku earthquake and tsunami (2011):** The (magnitude 9) earthquake activated a tsunami off the coast of Japan that killed over 15,000 people and caused extensive damage to property.
- 5. Sulawesi earthquake and tsunami (2018): An earthquake (magnitude 7.5) triggered a tsunami off the coast of Sulawesi, Indonesia and left over 4,000 people dead.

## **INFLUENCE OF EARTHQUAKE ON ATMOSPHERE**

Earthquakes have indirect and limited influence on the air. The rapid and forceful movement of ground due to an earthquake can cause buildings and other structures to shake, vibrate or collapse. The debris and dust particles suspended in the air – lead to pollution. Another indirect influence of earthquakes is release of carbon dioxide, methane and other gases.

Landslides and other such phenomenon triggered by the earthquakes can also release dust and other particles into the air which can lead to localized air pollution which may get transmitted to other farflung areas due to strong winds. On the whole earthquakes can have some influence on the air, but their impact is generally indirect and limited compared to other manifestations like volcanoes or wildfires. Strong earthquakes can cause short-term changes in atmospheric pressure, which can affect weather patterns and in some cases lead to thunderstorms or tornadoes. For instance:

- An earthquake in Haiti in 2010 generated large amounts of dust and debris, which resulted in increased air pollution levels in the immediate vicinity.
- An earthquake- in Nepal in 2015 led to the formation and release of a huge dust cloud into the atmosphere, which had an impact on the air quality in the region howsoever small and localized.

## MORE THAN 50,000 EARTHQUAKES OCCUR IN THE WORLD - EVERY YEAR:

Earthquakes are among the most powerful and destructive forces on earth. About 50,000 earthquakes occur all over the world every year<sup>6</sup> and lead to incalculable amount of deaths and damage to property.

Japan<sup>7</sup> is precariously placed on the Ring of Fire - the most active earthquake zone on earth. The worst earthquake in Tokyo, Japan, killed 142,807 people in 1923. China accounts for almost half of all earthquake deaths in the last 50 years and substantial loss of property. One of the most brutal earthquakes in China a 7.5-magnitude quake in Tangshan killed 242,769 people in 1976. Iran straddled on the Eurasian and Arabian tectonic plates accounts for many and frequent quakes. A magnitude-7.3 earthquake in 2017 killed more than 400 people. Tehran – the capital of Iran at the base of Mount Damavand the country's highest peak is most vulnerable to quakes.

Both Philippines and Indonesia lie in the Ring of Fire while India – too is prone to earthquakes. There are many buildings in Delhi NCR which can crumble easily and crush people inside. Mexico is another such most seismically active countries on the planet. Mexico City was hit by an 8.1 magnitude quake in 1985, in which about 9,500 people died. Likewise, Nepal and Pakistan too are prone to quakes. An earthquake

in Muzaffarabad the capital of PoK– left behind more than 76,000 people dead in 2005. Even after the earthquake more than 978 aftershocks with a magnitude of 4.0 continued to occur daily.

## MOST ACTIVE AND HEAVILY EARTHQUAKE PRONE ZONES IN THE WORLD:

Some of the perennially active earthquake prone zones in the world<sup>8</sup> include:

- Pacific Ring of Fire also referred to as the Circum-Pacific Belt: The Ring of Fire is a 40,000 kilometer long belt around the Pacific Ocean where majority of Earth's volcanoes and earthquakes take place. It is home to countries like Japan, Indonesia, the Philippines, and South America. *More than 75% of Earth's volcanoes (more than 450) and 90 % of earthquakes— occur in the Ring of Fire.*
- Alpide belt: Turkey resides on the Albide Belt the second most seismically active zones after the
  Pacific Ring of Fire. The Alpide belt also called mid Continental seismic belt extends from Java to
  Sumatra, Himalayas, Mediterranean, Atlantic and Southeast Asia including countries like Iran,
  Pakistan, and Indonesia. The belt alone accounts for almost 17 percent of the world's largest
  earthquakes and 15 percent of the world's total energy released due to earthquakes.
- Himalayan region: the Himalayan mountain range includes India, Nepal, and Bhutan which lie in seismic zone V and IV which makes them highly susceptible to earthquakes. Some of the most devastating earthquakes in this belt include Assam (1897), Kangra (1905), Bihar-Nepal (1934), Shillong (1950), Bihar-Nepal (1988), Uttarkashi (1991), Chamoli (1999), and Kashmir (2005).
- Mediterranean region: covers three continents Europe, Africa, and Asia and includes Greece, Italy, and Algeria which are prone to earthquakes, volcanoes, landslides, tsunamis, floods, tornadoes, avalanches, fires, hurricanes, and thunderstorms.
- The New Madrid Seismic Zone (NMSZ) around the Mississippi River Valley includes parts of eight states- Illinois, Indiana, Missouri, Arkansas, Kentucky, Tennessee, Mississippi, and Alabama in the United States known for frequent earthquakes. The NMSZ named after the town of New Madrid Missouri, witnessed a series of devastating earthquakes in 1811-1812-- the largest ever recorded in the continental United States. These earthquakes caused such extensive damage that their impact was felt as far away as the East Coast. Even today, the NMSZ resides in a highly active seismic zone with hundreds of small earthquakes occurring each year. Scientists predict that the NMSZ may witness a large and destructive earthquake with a magnitude 6.0 to 7.7 or higher in future.
- The mid-Atlantic Ridge: is an underwater mountain range in the middle of Atlantic Ocean where earthquakes are relatively common because of movement of tectonic plates away from each other. Most earthquakes along the ridge are relatively small and do not pose a significant danger but can be detected by seismographs. These earthquakes sometimes trigger tsunamis that can affect nearby coastlines.

## PAST EXPERIENCE IN TURKEY- EXPECT THE UNEXPECTED:

• **1999 Marmara Earthquake** – An earthquake in Turkey– left behind over 18,000 people killed, 43,000 injured and destroyed 113,000 buildings. Tens of thousands of people were left homeless in

the earthquake on August 17, 1999. The earthquake lasted for 37 seconds, and is remembered as one of the deadliest natural disasters in modern Turkish history<sup>9</sup>.

- **2011 Van Earthquake**<sup>10</sup> On October 23, 2011, an earthquake of magnitude 7.2 struck the eastern province of Van, Turkey, killing over 600 people and injuring 4,000. Again extensive was caused to buildings and tens of thousands of people were left homeless.
- 2013 Soma mine disaster On May 13, 2013, an explosion in a coal mine in Soma, Turkey -- one of the worst mining accidents in Turkish history<sup>11</sup> -- killed over 300 people and injured hundreds. The disaster sparked widespread protests against the government and mining companies.
- **2018** Ankara train crash On December 13, 2018, a high-speed train collided with a locomotive in Ankara, Turkey, killing 9 people and injuring many others. It led to widespread criticism of the government's handling of the railway system but finally the blame was passed on to the faulty railways signaling systems<sup>12</sup>

## THE RECENT EARTHQUAKE IN TURKEY- RECAP:

Three earthquakes<sup>13</sup> in quick succession –measuring 7.8, 7.6, and 6.0 on the Richter scale -- classified as the fifth-deadliest of the 21st century, woke up the people of Turkey and Syria sleeping at home and left more than 5000 people dead or wounded and permanently at least 5,775 buildings which collapsed trapping people underneath.

This was followed up by some 120 aftershocks in less than 24 hours causing widespread damage to life and property. Many neighborhoods simply vanished and thousands of people were rendered homeless in the fourth-costliest earthquakes on record.

The impact of the quake was felt as far away as Cyprus (456 km), Lebanon (874 km), Israel (1,381 km), and Egypt (1,411 km).

The United Nations called it one of the most powerful earthquakes in the last 100 years. There was widespread damage in an area of about 350,000 sq km -around twelve times the size of Belgium.

President of Turkey Recep Tayyip Erdoğan described it as the "biggest disaster". Many foreign embassies and missions in Ankara the Turkish capital lowered their flags to express their solidarity and respect.

Reacting to Turkey's call for help, more than 141,000 people from 94 countries joined the rescue effort. The Indian officers and men from NDRF were among the first to land and Turkey and lend a helping hand.

## THE AFTERMATH

Aylin Pulat, a medical student studying in Mugla, more than 1,000 km away from her family home in Adiyaman a city in southeastern Turkey, couldn't find her parents, and family members after the earthquake. There was no news about their fate, so she had to take a four-hour bus trip, two-hour flight and a more than two-hour drive just to find out if they were alive. In the end –she wasn't sure whether

to jump with joy or shed tears in pain because of the good and bad news she received. The good news was that her parents and siblings were safe but about 20 other relatives were dead.

Less than a month ago Abdul Karim lived like a king and had a loving and caring family, relatives, and friends, as well as a house to live, a decent source of income – today he is a nobody with no one or nothing to call his own and nowhere to go.

In Jindayris a small town in north-western Syria, about 813 people were found alive but – injured, and some 517 dead bodies were dug out of the rubble. More than 200 buildings were completely destroyed. The rescuers also managed to pull out a newborn baby girl in stable condition from the rubble but her entire family -- father, mother, and other relatives could not be saved. Her mother who was pregnant gave birth to her - before she died -- soon after the disaster.

Luckily for her, the search and rescue teams working nearby heard her voice and found her still attached to her dead mother's body with the umbilical cord. The rescuers cut the cord, cleaned the baby covered with dust and took her to the hospital with cuts and wounds all over all her body. The doctors found her to be suffering from hypothermia because of the harsh cold so they put her in an incubator.

Elsewhere the rescuers dug out a Syrian mother and newborn baby from an earthquake-hit building for the second time in a row in Jindayris. The lady was seven months pregnant when the earthquake caused a part of her house to collapse.

She suffered minor injuries which were attended to and she gave birth to a boy before being moved back to her partially destroyed house which fully collapsed -- three days later.

## EARTHQUAKES HAPPEN EVERY DAY, EVERY WEEK IN TURKEY

Turkey lies in one of the most earthquake prone zones in the world<sup>14</sup>. Here are a few statistics:

- Every day Turkey experiences about 1,000 tremors— some of which are too small to be felt by human.
- Every week there are several earthquakes of magnitude 2.0 to 5.0. in Turkey
- Every month there are a few large earthquakes with magnitudes above 5.0 in Turkey
- Every year minor, moderate or major earthquakes cause destruction and loss of life in Turkey

Turkey has a long history of some of the most devastating earthquakes in history. These include a 7.4 magnitude earthquake in 1999 killed over 17,000 people and injured tens of thousands more.

Here is a list of some of the biggest earthquakes<sup>15</sup> ever recorded in Turkey.

## Earthquakes of 7.5 magnitude

Date	Number of people killed

December 13, 115 CE	More than 2.5 lakh
February 23, 1653	2500
May 7, 1930	2500
November 26, 1943	5,000
February 1, 1944	4,000
November 24, 1976	4,000

## Earthquakes of 7.4 magnitude

Date	Number of people killed
July 2, 1840	10,000

## Earthquakes of 7.3 magnitude

Date	Number of people killed
April 3, 1881	7866
October 10, 1883	120
August 9, 1953	216

## Earthquakes of 7.2 magnitude

Date	Number of people killed
September 10, 1509	10,000
April 3, 1872	1800
March 18, 1953	265
November 12, 1999	894
March 28, 1970	1086
October 23, 2011	604

## Earthquakes of 7.1 magnitude

Date	Number of people killed
May 22, 1766	4,000
September 20, 1899	1470
April 25, 1957	67
May 26, 1957	52

## Earthquakes of 7.0 magnitude

Date	Number of people killed
July 13, 1688	10,000
July 10, 1894	1300
October 6, 1964	23
December 29, 1942	3,000
October 30, 2020	117

## WHY IS TURKEY PRONE TO EARTHQUAKES?

Turkey is located at the junction of four tectonic plates<sup>16</sup> which makes it one of the world's most active earthquake prone zones. These tectonic plate are almost always in motion, pushing and colliding with each other – and releasing energy in the process, which makes the ground to vibrate. This vibration pushes the adjoining piece of ground and causes it to vibrate, and thus the energy travels out from the earthquake hypocenter in a wave. This movement of tectonic plates and collision between them is the cause behind most earthquakes.

The place where an earthquake originates is called the epicenter. The intensity of an earthquake is measured by the Richter scale – on a grid of 1 to 10. An earthquake of magnitude 2.5 or less is barely felt but can be recorded by a seismograph. Earthquakes of magnitude 2.5 to 5.4 only cause minor damage and may cause windows to rattle. Earthquakes of magnitude 5.5 to 6.0 are considered major and can cause slight damage to buildings and other structures, while earthquakes of higher magnitude can cause widespread harm and destruction to life and property.

Turkey's tryst with disaster management began during the regime of Ottoman Sultan Bayezid II after the Istanbul Earthquake<sup>17</sup> on September 10, 1509 led to 13,000 deaths while 109 mosques and 1,047 other

buildings raised to the ground and to rebuild the destroyed homes a royal edict called upon each household to donate 20 gold. The edict also prohibited the construction of houses on land reclaimed from the sea, and promoted the construction of houses with wooden frames, probably to reduce loss to property in the future. But it seems that instead of learning lessons from the past failures – the present government in Turkey is hell bent to make more mistakes.

## FLAWS IN TURKISH GOVERNMENT'S HANDLING OF DISASTERS:

According to a market intelligence report generated by the International Trade Administration, U.S. Department of Commerce, Turkey is the 113th most among 180 most disaster prone countries<sup>18</sup> both in terms of exposure, and vulnerability. Turkey ranks third in the world in terms of earthquake-related casualties and eighth regarding the total number of people affected, the report suggests.

Turkey ranks third in the world in terms of earthquake-related casualties and eighth with regard to the total number of people affected. Every year at least one 5 magnitude earthquake knocks on Turkey's doors. This is all the more reason why Turkey needs proper planning, coordination among the various agencies and implementation of disaster management.

Though the Turkish government claims to have over the years, taken steps to improve earthquake preparedness by strengthening building codes and retrofitting older buildings to make them earthquake-resistant – the ground realities present a different picture.

# According to the Istanbul office of the Union of Architects and Engineers of Turkey –at least 2 million buildings in the city are perilously "unsafe."<sup>19</sup>

There have been several flaws in the Turkish government's handling of earthquakes and other disasters – leading to criticism and wide spread unrest among the people who fear that the worse is yet to come and Turkey may witness more powerful earthquakes if the predictions made by experts come true. The Turkish government failed to prevent loss to life or property of its citizens and mismanaged the post-disaster scenario due to earth quakes which occur frequently in Turkey. Here are some of the most notable flaws:

Playing politics instead of disaster management: The Turkish government seems to be keen on managing the political repercussions rather than the relief and rehabilitation work after the disaster<sup>20</sup>. They are not alone almost every political party wants to use the earthquake as a football and play politics with it. Erdogan is trying his best to ward off mounting criticism by saying, "This is a time for unity, solidarity. In a period like this, I cannot stomach people conducting negative campaigns for political interest" on the other hand one of his main rival Kemal Kilicdaroglu, the leader of Turkey's main opposition party has been quoted as saying, "If there is one person responsible for this (mess), it is Erdogan." Their hidden agenda is to somehow find an issue to influence the elections to the 600 member Grand National Assembly (Parliament) of Turkey due soon. Erdogan played his cards by declaring emergency in the 10 worst affected provinces for a period of three months where the elections were originally scheduled to take place on 18 June 2023. Erdogan's PR managers are trying their best to carve out a clean image and maintain that natural disasters are not easy to manage. Initially Erdogan himself tried to claim that the two earthquakes were acts of fate but now has shifted its focus by arguing that the two earthquakes were exceptionally severe and that no disaster mitigation efforts could prevent the inevitable

devastation. The Turkish government has suddenly started arresting contractors for constructing building violating the building code. But the Turkish people are not fools. Most of them can see through the game to shift the blame.

- Political patronage to the builders: A majority of the deaths in 1999 earthquake occurred because
  many builders were using sub-standard building materials and flouting buildings codes after bribing
  government inspectors. Erdogan then the leader of the newly established Justice and Development
  Party (AKP) had strongly opposed the violations and campaigned to put an end to these practices.
  But all that was only so till he came to power. During his regime the situation went from bad to
  worse because he failed to take necessary steps to prepare Turkey to face the future. All that while
  Turkey experiences hundreds of tremors higher than 4 on the Richter scale every year.
- AFAD is a toothless paper Tiger: The Turkish Disaster and Emergency Management Authority (AFAD) is a toothless paper Tiger –riddled with corruption, mismanagement, nepotism. To an outsider it may seem to be a big achievement as the President of Republic of Türkiye himself now heads the Disaster and Emergency Management which was previously under the Prime Minister. This is not so as the AFAD was formed when Erdogan was Prime Minister and is now still under him as President of Turkey. Erdogan the current president of Turkey since 2014, was previously Prime Minister of Turkey from 2003 to 2014. The AFAD was formed when the Turkish Parliament passed Law No.5902 in 2009. A few years later, after Turkey adopted a presidential system of governance in April 2017, the Disaster and Emergency Management Authority was re-formed under the Ministry of Interior under a new Presidential Decree No. 4 published in the Official Gazette on July 15, 2018. Almost half the staff working in AFAD do not any experience or training in Disaster and Emergency Management, while the other half are sons, daughters and spouse of important government officials.
- Crumbling structure of disaster management: Turkish disaster management policies dates back to the Erzincan earthquake in 1939 that claimed nearly 33.000 lives and left at least 100.000 injured. The 1999 Marmara earthquake was another landmark which spelt out the need for improvement in disaster management and coordination apparatus. It clearly demonstrated the compelling need for disaster management reforms and a single government institution to coordinate and exercise legal authority in the event of disaster and emergencies.
- **Fudging of facts:** The Turkish ruling Justice and Development Party (AKP) is reportedly manipulating the number of deaths due to the recent earthquakes to undermine the severity of the disaster and thus cover up the delay and ineffective response to the tragedy.
- Inadequate infrastructure: the Turkish government is facing criticism for not ensuring that people constructed earthquake-resistant buildings to withstand earthquakes and prevent loss of life. Many of the buildings in Turkey particularly in areas like Istanbul are pretty much unsafe and can collapse anytime even when there is no earthquake. Most of them do not adhere to any building codes and safety regulations. In the recent times there have been many cases where buildings fell down on their own in Turkey for a variety of reasons including age, substandard construction materials, and erratic maintenance. In many cases builders are understood to have managed to bribe central and local government officials to ignore specifications for earthquake prevention. Many builders have

added more than sanctioned floors in high-rise buildings to maximize profits. This is the cause behind structural vulnerability of Turkey's urban landscape in the event of an earthquake.

- Inadequate preparedness to deal with emergencies -- the Turkish government is being criticized for inadequate planning, and preparedness to deal with emergencies and disasters including earthquakes as well as insufficient training of personnel. According to reports many more lives could have been saved if the Turkish government had responded properly in the critical 48-hour timeframe.
- Slow and sluggish response: the Turkish government is find it difficult to explain the slip ups and slow response in providing aid and assistance to affected communities. This left many people without adequate food, shelter, clothing and medical services after the earthquakes. This is one of the many reasons why Turkish nationals are allegedly angry and literally hate their government.
- Corruption and mismanagement: There have been reports of corruption, mismanagement, and waste of funds by the Erdogan's government officials in Turkey leading to several controversies like unfair and syphoning of funds meant for relief and rehabilitation of earthquake victims. The Turkish government is understood to have imposed an "earthquake tax" and a "special communication tax" in the aftermath of the quake in 1999 that killed more than 17,000 people and managed to collect about \$4.6bn for disaster prevention and emergency services. But is now finding it difficult to explain how the money was spent and facing intense criticism both within and outside Turkey for inept handling of the post disaster scenario.
- Lack of communication and transparency: There have been complaints about a lack of communication and transparency during and after earthquakes, including delay in releasing information and not providing clear updates on relief efforts.

On the whole there is a crying need for the Turkish government to take significant steps to address these flaws and improve its disaster response capabilities and ensure the safety and well-being of its citizens due to earthquakes and other disasters in future.

## POST DISASTERS - WHAT CAN GOVERNMENTS DO?

Governments have an important role to play in ensuring the safety of their citizens in the event of disasters<sup>21</sup>. One of the missing links in Turkey was disconnect between policy and approach towards better earthquake preparedness and response. The governments filed to ensure that its people were safe. Obviously it had not learnt the lessons from some of the most significant earthquakes in history including the İzmit earthquake (1999) that resulted in more than 17,000 deaths. Even 12 year later in the 2011 Van earthquake many people lost their lives and buildings collapsed. As always people blamed the government for not enforcing building codes strictly enough. The government was also criticized for its slow, ineffective and inadequate efforts – due to lack of equipment, resources, and emergency shelters, leaving many people homeless. The same old sob story is being repeated this time. There is still a lot of work to be done to ensure that the buildings are 'safe' and people are prepared to cope with earthquakes. Here are a few scopes for improvement:

• Early Warning Systems: There is a saying – a stitch in time saves nine. Early warning systems can provide advance notice of impending disasters, allowing people to evacuate or take other protective

measures. Governments can invest in early warning systems using technology such as sensors, satellites, and weather forecasting to provide timely alerts.

- **Disaster Preparedness Plans:** Governments can develop disaster preparedness plans and prioritize the actions to be taken before, during, and after a disaster. There is a need for more investment in disaster response infrastructure, such as emergency shelters and medical facilities. Additionally, more training and resources for emergency responders could help improve the government's response to earthquakes. These plans should identify potential risks, outline evacuation procedures, and establish emergency response protocols.
- Build Resilient Infrastructure: Governments can invest in building resilient infrastructure, such as
  roads, bridges, and buildings that can withstand the impact of disasters. Turkey already has strict
  norms for constructing new earthquake-resistant buildings. But there is a need to enforce them so
  that new buildings being constructed are actually earthquake-resistant. There many old buildings in
  Turkey that were built before the earthquake-resistant codes were introduced. Retrofitting these
  buildings to make them earthquake-resistant can be expensive, hence there is a need for
  government support and incentives to encourage building owners to make the necessary upgrades.
- Public awareness campaign: Governments can educate the public and suggest actions and help them stay safe. This can be done by developing educational materials for the general public and using mass media to disseminate information. There is also a need for more outreach and education efforts to ensure that people are face earthquakes instead of closing their eyes and trying to ignore their existence.
- Assess the damage: Immediately after the disaster happens governments should conduct a detailed assessment of the damage caused to understand the scale of the problem and develop an effective plan for recovery and rehabilitation.
- Mobilize resources: Governments should mobilize all the resources at their disposal to tackle the disaster. This could include deploying the armed forces, setting up emergency funds, and coordinating with international aid agencies.
- Communication and information dissemination: In any crisis situation communication and information dissemination have a big role to play to mitigate the effect of the disaster and prevent the rumor machinery to spread fake news. Hence governments must ensure that accurate and timely information is disseminated to the public. This could include updates on rescue and relief efforts, guidelines for safety and hygiene, and information on available resources.
- Planning for long-term recovery: Governments must develop a comprehensive plan for long-term recovery and rehabilitation. This should involve rebuilding damaged infrastructure, restoring essential services, and providing support to affected communities to rebuild their livelihoods.
- Emergency Assistance: In the aftermath of a disaster, the first priority of governments should be to rescue those affected and provide immediate relief. This could include setting up temporary shelters, providing food and water, and deploying medical teams to offer medical assistance.

- **Coordinate Disaster Response Efforts:** In the post disaster setting it is the foremost duty of the governments to coordinate the disaster efforts with different agencies, and divert the fund, assistance and efforts to the point where they are need instead of wasting them. By doing so the governments can ensure that their people are better equipped to face the disaster, and impact of the disaster on human life and property is minimized.
- Address the needs and reassure the victims: Governments must pay special attention to the needs of vulnerable communities, including the elderly, children, and people with disabilities. They should ensure that these communities have access to essential services and support to rebuild their lives.
- Learn from the disaster: With every crisis comes and opportunity to learn from it to ensure that things that did not go right, don't go wrong again. Such learnings can help to reduce the risk of future disasters.

## HOW TO BUILD EARTHQUAKE RESISTANT BUILDINGS

The design and construction of 'safe,' earthquake-proof buildings<sup>22</sup> requires special expertise and skills. Here are some ways to protect or construct earthquake-resistant buildings:

- Strong foundations: The foundation should be strong, deep and anchored securely to the ground to withstand the force of earthquakes. Shaking of a building due to an earthquake can cause the soil underneath to liquefy, leading to settling or shifting of the foundation of the building. This can cause cracks in the walls and floors of the building, and can sometimes lead to collapse.
- Structural Changes: Buildings with strong structure can absorb the force of earthquakes. Reinforced concrete, steel or timber are commonly used materials for earthquake-resistant buildings. Earthquakes lead to significant structural damage and fix the damage caused, depending on the magnitude, duration, and proximity to the epicenter. In older buildings constructed before earthquake-resistant designs or materials were readily available the risk of structural damage is quite high. However, even modern buildings that have been designed to withstand earthquakes can sustain damage in the event of a particularly strong earthquake.
- Reinforced walls, columns, and beams: walls made out of reinforced concrete, steel frames, and seismic isolators can absorb the vibrations caused by earthquakes and withstand the force of earthquakes. Vertical and horizontal reinforcement, as well as the use of mortar and grout prevent the walls from cracking and collapsing. Earthquakes can cause buildings to sway or move and thus reduce the risk of damage. Damaged load-bearing walls, columns, and beams can compromise the integrity of buildings and lead to collapse.
- **Ductility:** Buildings that have ductile designs can bend and flex during an earthquake without breaking. This is achieved by designing buildings and using materials that can withstand, absorb and distribute the force of earthquakes.
- **Bracing:** Structural bracing can help in stabilizing a building during an earthquake. Diagonal bracing can be installed to prevent the building from collapsing.
- **Proper connections:** Proper connections can ensure that the building remains intact. Strong connections can help to prevent the building from collapsing during an earthquake.

• **Regular maintenance:** Regular inspection and maintenance of buildings is required to ensure that they are safe and not likely to collapse. Regular inspection can help identify any signs of structural weaknesses that can make them fall down –partially or fully.

## **ROLE OF TECHNOLOGY IN DISASTER MANAGEMENT**

Technology can play a critical role in post-earthquake disaster management<sup>23</sup> by enabling more efficient and effective response and recovery efforts. Technology can enable better communication, faster response, and more efficient distribution of aid resources. Some ways technology can help include:

- Communication and Coordination: Technology can improve communication and coordination among responders, aid agencies, and affected communities. Social media platforms and mobile messaging apps can be used to share information and updates with affected individuals, while web-based platforms can help coordinate the efforts of various response and recovery organizations.
- **Damage Assessment:** Technology can assist in the rapid and accurate assessment of damage to buildings, infrastructure, and other critical assets. Drones and other unmanned aerial vehicles can capture images of affected areas to provide a detailed assessment of the damage, while remote sensing technologies can help monitor and analyze the disaster area from space.
- Emergency Response: Technology can aid in emergency response efforts by providing real-time information on the location and status of affected individuals. GPS tracking devices and mobile apps can be used to monitor the movement and location of people in need of assistance, while wearable technologies can provide information on the health and wellbeing of affected individuals.
- Search and Rescue: Technology can assist in search and rescue efforts by enabling responders to quickly locate and rescue people trapped in collapsed buildings. Robotics and other remote-controlled devices can be used to explore dangerous or inaccessible areas, while sensors and other monitoring technologies can detect the presence of trapped individuals.
- **Relief Distribution:** Technology can help aid agencies and governments to more efficiently distribute relief supplies to affected individuals. Drones and other unmanned aerial vehicles can be used to deliver medical supplies, food, and other essential goods to remote or hard-to-reach areas, while blockchain technology can help ensure the fair and transparent distribution of aid resources.

## IS INDIA VULNERABLE TO DISASTERS?

India is vulnerable to disasters, both natural and man-made, due to its geographical location, climate, and topography. India is prone to several types of natural disasters, including floods, cyclones, earthquakes, landslides, droughts, and wildfires. In addition to natural disasters, India is also prone to man-made disasters like industrial accidents, terrorist attacks, and cyber-attacks.

- Floods are a common occurrence in India, particularly during the monsoon season from June to September. Floods can cause significant damage to infrastructure, crops, and homes, and lead to large scale displacement of people.
- Cyclones are a regular feature in India, particularly along the east coast where they cause extensive damage to homes, infrastructure, and crops, besides storm surges and coastal flooding.
- **Earthquakes** are a routine natural hazard in India, particularly in the Himalayan region. The Gujarat earthquake in 2001 killed over 20,000 people.

## DISASTER PRONE ZONES IN INDIA

India is highly vulnerable to natural disasters due to its diverse geography and climate. As much as 59% of India's land mass is prone to earthquakes of different intensities<sup>24</sup>. Some of the disaster-prone danger zones in India<sup>25</sup> are:

- Himalayan Region: The Himalayan region in the north is highly vulnerable to earthquakes, landslides, and flash floods. The region is also home to several active and potentially dangerous volcanoes.
- **Coastal Areas:** India's long coastline is highly vulnerable to cyclones, storm surges, and coastal flooding. The east coast, in particular, is highly prone to cyclones, with the states of Odisha, Andhra Pradesh, and Tamil Nadu being the most vulnerable.
- Flood-Prone Areas: India's vast river systems and monsoon climate make many regions highly vulnerable to floods. The states of Assam, Bihar, Uttar Pradesh, and West Bengal are particularly prone to flooding
- **Drought-Prone Areas:** Several regions in India, particularly in the western and southern parts of the country, are highly vulnerable to droughts due to low rainfall and water scarcity.
- Forest and Hilly Areas: Forest and hilly areas are highly vulnerable to forest fires, landslides, and flash floods. The states of Uttarakhand and Himachal Pradesh, in particular, are highly prone to such disasters.
- Urban Areas: India's rapidly growing urban areas are highly vulnerable to various types of disasters, including building collapses, fires, and terrorist attacks.

It is important to note that these are not the only disaster-prone danger zones in India, and several other regions of the country are also vulnerable to natural and man-made disasters. It is crucial for the government and other stakeholders to prioritize disaster risk reduction measures and build resilience in these regions to minimize the impact of future disasters.

## HISTORY OF DISASTER MANAGEMENT IN INDIA

India has a long history of disasters. About 60% of the landmass is prone to earthquakes of various intensities; over 40 million hectares is prone to floods; about 8% of the total area is prone to cyclones and 68% of the area is susceptible to drought<sup>26</sup>. One of the first major disaster that India faced in the recorded history was a severe famine that came to be called Great Famine or Madras famine<sup>27</sup> of 1896-1897. The list of factors behind the famine include drought, poor agricultural practices, and a lack of government intervention. A drought in 1895 severely affected the crop yields. Monsoon rains failed in the following year, worsening the situation. This led to widespread crop failure, and millions of people were left without food.

The colonial British government which failed to respond in time and provided insufficient and relief aid because to the belief that it is not the government's job to intervene and provide relief to the starving population. Some private charitable organizations stepped in and tried to mitigate the effects of the disaster but their efforts proved to be inadequate and inefficient.

The result was that around 5.5 million people in Madras (now Tamil Nadu), Andhra Pradesh, and Karnataka literally starved to death. Many of them were forced to sell off whatever valuables they possessed – land, jewelers, livestock and other such possessions just to buy food and survive. The famine also cast its spell on the local economy and many farmers were unable to recover from a loss long-time to come to come because of the damage to their crops.

The famine of 1896 was a turning point in Indian history, and brought to fore the need for superior governance and disaster management. This led to the establishment of the Famine Commission, which recommended a number of steps to mitigate the loss and provide employment to people during drought or famine. The government also established the Indian Famine Code, which laid down guidelines for the management of future famines in the country.

Many years later the need for effective disaster management because more obvious in the aftermath of the earthquake in Bhuj in 2001. To fulfill the need and create a legal and institutional framework for disaster management in the country, government of India established the Disaster Management Act in 2005. The Disaster Management Act, 2005, also provided the legal framework for disaster management in India and paved the way for the establishment of State Disaster Management Authorities (SDMAs), District Disaster Management Authorities (DDMAs), and local-level Disaster Management Committees (DMCs).

Prior to the enactment of the Disaster Management Act the state's response to handling disasters are focused primarily on relief and rehabilitation after disasters occurred. Almost little or no attention was paid to readiness, mitigation, and prevention- hence disasters invariable were accompanied by massive loss of life and property.

However after the enactment of the Disaster Management Act, the National Disaster Management Authority (NDMA), State Disaster Management Authority (SDMA), and District Disaster Management Authority (DDMA) were formed to ensure more systematic and coordinated efforts for disaster management and relief distribution. The NDMA's role included develop policies, plans, and guidelines for disaster management in the country, while the SDMA and DDMA focused on managing disasters at the state and district levels.

Since then, India has made shown tremendous progress in disaster management and developed early warning systems, emergency response teams, and disaster-resilient infrastructure. The government has paid attention to streamlining the disaster management framework, with the help of public awareness campaigns to educate people about disaster preparedness, and enhancing the capacity of knowledge, training and capacity of response agencies. The whole idea behind this is to help them deal with disasters effectively. Since then, India has faced a number of natural and man-made disasters, which have led to significant improvement in the disaster management framework.

Some of the disasters which have provided first-hand knowledge on how to combat and manage disasters include the following:

- Assam-Tibet earthquake (1950) claimed over 1,500 lives and caused widespread damage. This incident led to the formation of the National Civil Defence Organization (NCDO) in 1962 to coordinate disaster management efforts.
- **Bhopal Gas Tragedy (1984)** this disaster claimed over 3,000 lives and affected many more thousands of people. It led to the establishment of the National Disaster Management Division (NDMD) in 1985 to specifically address industrial disasters.
- Super Cyclone in Odisha (1999) claimed over 10,000 lives and caused widespread damage. It lead
  to the establishment of the National Disaster Management Authority (NDMA) in 2005, which is
  today responsible for all kinds of planning, coordinating, and implementing of disaster management
  policies and initiatives in India.

In addition to the above the Indian Ocean earthquake and tsunami (2004), Uttarakhand floods (2013), COVID-19 pandemic (2020) were some of the other landmark events which had many lessons to be learnt and helped India give shape and substance to its disaster management efforts. Above all these events highlighted the importance of disaster management in India and the need for continuous improvement and innovation in policies and frameworks for disaster management.

## **DISASTERS: LESSONS TO BE LEARNT**

## INDIAN OCEAN EARTHQUAKE AND TSUNAMI (2004):

- Importance of early warning systems: The tsunami caused by the earthquake in 2004 was a reminder of the importance of early warning systems. Countries around the Indian Ocean basin have since developed early warning systems to alert people to the possibility of a tsunami.
- Need for coordination: The disaster also highlighted the importance of coordination among different countries and agencies in the aftermath of a disaster. Countries came together to provide aid and assistance to the affected areas, which helped to minimize the loss of life.
- Importance of disaster preparedness: The tsunami also highlighted the importance of disaster preparedness. Governments in the region have since invested in disaster preparedness and risk reduction measures, including building sea walls and improving evacuation procedures.

## UTTARAKHAND FLOODS (2013):

- Importance of effective disaster response: The floods in Uttarakhand highlighted the importance of an effective disaster response. The government was criticized for its slow response to the disaster, which led to the loss of many lives.
- Need for better infrastructure: The floods also highlighted the need for better infrastructure in disaster-prone areas. Many of the buildings and infrastructure in the affected areas were not built to withstand the force of the floodwaters.
- Importance of disaster risk reduction: The floods also highlighted the importance of disaster risk reduction measures. The government has since taken steps to improve disaster preparedness and risk reduction in the region, including the establishment of early warning systems and the construction of flood shelters.

## COVID-19 PANDEMIC (2020):

- Importance of preparedness: The COVID-19 pandemic highlighted the importance of preparedness for pandemics and other health emergencies. Governments and healthcare systems need to be prepared to respond quickly and effectively to such crises.
- **Need for a coordinated response:** The pandemic also highlighted the need for a coordinated response across different sectors and countries. International cooperation and collaboration were crucial in responding to the pandemic.
- Importance of community engagement: The pandemic highlighted the importance of community engagement and awareness. Governments and healthcare systems need to engage with communities to educate them about the risks of pandemics and the measures they can take to protect themselves and others.

## CONCLUSION

Turkey's geographical location makes it particularly vulnerable to earthquakes. The country has experienced devastating earthquakes in the past and may continue to do so recurrently in future as well. This is all the more reason why the lessons learned from the past are assimilated into the future disaster management efforts.

No doubt Turkey has made progress and established several agencies for disaster management but there is still room for improvement. There are a number of challenges for disaster management in Turkey primarily related to inadequate funding, limited public awareness /preparedness, insufficient capacity-building and training programs for the disaster response personnel.

Many things have happened but there is still a lot more to be done before the country can call itself fully prepared to handle future disasters and claim to be capable enough protect the lives of its citizens and foreign tourists who may at least think twice before planning a vacation in Turkey. It will require a sustained and coordinated effort from the government, civil society, and the private sector to address the challenges and build a more resilient Turkey. But one thing is sure it would take several years to fully recover and rebuild Turkey.

India too has had a fair shade of catastrophes, calamities, and man-made disasters like road accidents, terrorist attacks and industrial mishaps – where precious lives – have unfortunately been lost. There is so much to be done - to ensure that it can effectively handle future disasters and the danger lurking round the corner cannot hurt India and Indians.

"In the aftermath of a disaster, communities can come together to rebuild and recover, but we must also work to prevent future disasters from happening." - Cory Booker

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