WHEN MOTHER NATURE YELLS

by

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Submitted to

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INTRODUCTION

This report is a disaster summary that carefully collates a group of ten specially selected natural disasters that occurred during the periods of December 1st, 2014 and November 27th, 2015, the report doesn't necessarily focus on a particular spatial location but takes a geographically holistic approach in examining these disasters and outlining them based on a worst to least-bad scale from number one to ten progressively. So this report will carefully analyze these disasters that have already occurred, giving a breakdown on the location of the disaster, the type of disaster it is (earthquake, tsunami etc.), the economic damage in terms of monetary measure and infrastructural laceration, the number of people killed and missing as a result of the disaster and finally offer a brief mitigation statement on the appropriate and most effective measure that can be taken to drastically reduce the effect of such disaster in a future time. In this report, a single page would be dedicated to each disaster, where it would briefly, yet aptly summarize the disaster and its effect. The dates of the disasters don't necessarily follow an ordinal sequence but is arranged based on intensity (i.e., effect of the disaster). The basic standard for measuring the disasters and deciding which one comes first, second, third, or eight is based and a number of criteria which ranges from; intensity of the disaster (e.g., magnitude of the disaster if it be an earthquake) and the effect of the disaster on the affected region, to the number of lives claimed by the disaster and the total value of economic claims made by the disaster. Also the psychological effect of the disaster on the people in a particular location it occurred will be considered as a standard for measurement. We must note that most of the information given in this report about the disasters are definitely gotten from other sources seeing that this is actually a report on events that have already occurred and not a proposition of an inductive thought. Although it is properly referenced at the reference sections of the report. My disasters range from earthquakes, to landslides, avalanches, typhoons and tropical storms, and each of these disasters have a very significant effect on regions they terrorized and leaves a long lasting impression in the minds and hearts of the people who inhibit these affected areas. The report comprises of a total of four earthquakes, three landslides, one avalanche, one typhoon and one tropical storm. Incidentally, the first three disasters are all earthquakes, starting from a Nepal earthquake which has all the bragging rights to come first uncontested. The Nepal earthquake is without contention the first and worst of all ten, as it was in simple terms a gruesome event which claimed the lives of more that eight thousand souls and destroyed property worth about $10 billion. The Afghanistan earthquake ranks second and another Nepalese earthquake ranks third. The second Nepal earthquake ranks third; a step higher than the Guatemala landslide despite the fact that the Guatemala landslide clearly claimed more lives and destroyed more properties and homes than the second Nepal earthquake. This is where the parameter of psychological effect as a criterion for measurement and ranking comes into play. It is seen and noted that Nepal previously had a disastrous earthquake which in fact ranks number one in this chart. As the people were still trying to recover from the nightmare of this monster quake, they were struck 17 days later by another comparably severe quake having a magnitude of 7.3, leaving the survivors in a state of shambolic despair and psychological traumatization. It is almost as if the second quake came for people who didn't loose loved ones in the first, ipso facto, this disaster earns the right to stand a step ahead of the Guatemala landslide despite the above stated fact. The Afghanistan avalanche ranks fifth followed by the Colombian landslide which ranks sixth. Typhoon Hagupit in the Philippines ranks seventh and is peculiar because a proper effective warning system was put in place causing people to evacuate before the disaster reached and because of this the casualties were greatly minimized. Chile earthquake ranks eight, and it's interesting because it was a magnitude 8.3 quake but had very little impact commensurate to its magnitude because of a good warning system and proper building codes that are implemented in the region. The Brazil landslide ranks ninth and finally Tropical Storm Bill in the United States ranks last as it only claimed four lives, and a very proper and effective warning system was implemented days before the disaster finally struck so people had ample time to flee the region.

1. **Nepal**

Location: Kathmandu, Nepal
Disaster Type: Earthquake
Date(s): April 25th 2015
Economic Loss: $10 Billion
Death Toll: 8,000 Souls

The Event

On 25 April, a magnitude 7.8 earthquake struck Central Nepal, killing over 8000 people, and injuring thousands more. It struck Nepal on Saturday April 25, 2015, flattening large parts of the capital Kathmandu and causing devastation across the impoverished Himalayan nation. Saturday's catastrophic earthquake in Nepal occurred because of two converging tectonic plates: the India plate and the overriding Eurasia plate to the north, the U.S. Geological Survey said. At the location of Saturday's earthquake, about 50 miles (80km) to the northeast of the Nepalese capital of Kathmandu, the India plate is converging with Eurasia at a rate of about 2 inches per year toward the northeast driving the uplift of the Himalayan mountain range. Five aftershocks measuring between 4 to 5 on the Richter Scale were recorded. Over 255 aftershocks of over 4 magnitudes have been recorded in the country since the April 25 earthquake. The quake had a depth of only 7 miles (11km), which is considered shallow in geological terms. The shallower the quake, the more destructive power it carries. The earthquake was felt as far away as Lahore in Pakistan, which is more than 700 miles (1,127km) away. It was also felt 380 miles (612km) away in Lhasa in Tibet, and 400 (644km) miles away in Dhaka, Bangladesh.

Effect of Event

The death toll from the quake now stands at about 8,000, killing thousands and demolishing more than half a million homes, most of them in rural areas cut off from emergency medical care. The number of injured stands at more than 2,500, seventeen people were reported to have been killed by the quake in India, and one in China. About 240 Nepalese nationals and 89 foreigners have still been missing since the April 25 earthquake. The overall damage is estimated to be at about $10 billion, according to the Nepal government nearly half of its gross domestic product (GDP) of $19.2 billion. According to IHS Global Insights, a research firm, the estimated cost for rebuilding homes, roads and bridges alone could run up to $5 billion. Nepal before the quake was already an improvised county, so the effects of the quake just takes the nation further down the line. So the earthquake caused more damage to the economic state of Nepal.

Mitigation

By retrofitting buildings and preparing communities for earthquake risks, and developing disaster mitigation strategies to cope in time of crisis. Also by training people on safe ways to protect oneself during an earthquake like dropping down on your palms and kneels in order to prevent you from falling but still keeps you mobile and protecting your head and body from falling objects by crawling under a table or desk. All these could go a long way in reducing human casualties.

2. Afghanistan

Location: Badakhshan Province, Afghanistan
Disaster Type: Earthquake
Date(s): October 26th 2015
Economic Loss: < 1% of GDP
Death Toll: ∽336 Souls

The Event

At around 1:30pm local time, the 7.5 magnitude Earthquake emanated from an epicenter about 130 miles (210km) below the surface in Afghanistan's Badakhshan province. The magnitude 7.5 quake was centred in the province of Badakhshan in the Hindu Kush mountain range in Afghanistan's far north. More than two minutes of sustained tremors were felt in the Pakistani capital of Islamabad. The quake also hit the cities of Lahore, Faisalabad and the mountainous region of Chitral. Shockwaves were also felt in New Delhi in northern India and across northern Pakistan. No deaths were reported in India. The quake was 132 miles (213km) deep and centered 158 miles (254km) northeast of Kabul in Badakhshan province. The U.S. Geological Survey initially measured the magnitude at 7.7 and then revised it down to 7.5. The quake occurred on the Indian/Eurasian plate boundary, the same subduction zone that caused the Nepal quake earlier in the year, and the Kashmir quake from 2005 and the epicenter of the earthquake was near the Afghan city of Jarm, which is a rural and sparsely populated area. Many people in this region live in mud brick buildings prone to collapsing. Because the region is mountainous and has poor infrastructure, assessing the aftermath becomes difficult. The quake of magnitude 7.5 was followed by seven aftershocks of intensity ranging as high as 4.8 according to the U.S. Geological Survey said.

Effect of Event

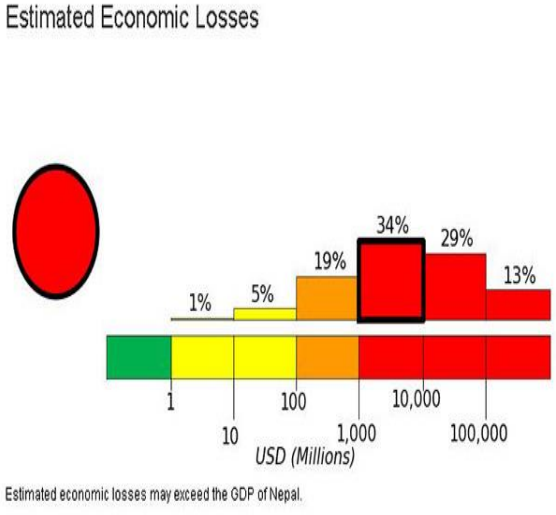
The total death toll stood at about 336 with at least 253 people killed in Pakistan and at least 83 more in Afghanistan, according to official reports from the two countries. More than 2,000 people were injured. Twelve students died while trying to escape from a girls' school in Taloqan, north-east Afghanistan, and six people died in the eastern province of Nangarhar. Hundreds of houses were destroyed as the earthquake toppled buildings and levelled homes. According to Wais Ahmad Barmak, Afghan state minister for disaster management affairs, about 4,000 houses were either severely damaged or destroyed. Afghanistan has been facing a massive financial crisis in recent years. The country has been ravaged by decades of war and has depended on a steady flow of international investment and charitable giving. The US Geological Survey (USGS) estimates that economic losses are less than 1% of the GDP of Afghanistan. The country had a GDP of around US$21 billion last year, according to World Bank data.

Mitigation

By retrofitting buildings with isolation pads which acts as shock absorbers to reduce vibrations. Also by being alert to observe earthquake precursor events for the purpose of preparing before the quake strikes. Educating the masses on safe earthquake practices, i.e., things to do and ways to act when an earthquake is occurring. By implementing proper building codes and standards to guard against the construction of buildings that are vulnerable to earthquake.

3. Nepal

Location: Namche Bazaar, Nepal
Disaster Type: Earthquake
Date(s): May 12th 2015
Economic Loss: About +$1 Billion
Death Toll: At least 65 Souls



Estimated economic losses may exceed the GDP of Nepal.

The Event

Just as the people were still trying to recover from the devastating earthquake of April 25th, another devastating quake hit Nepal. The quake struck at 12:35pm Nepali time (06:50 GMT). The US Geological Survey said that the quake had a magnitude of 7.3 and struck 42 miles (68km) west of the town of Namche Bazaar, close to Mount Everest. It was followed closely by at least six strong aftershocks. Shockwaves were felt as far away as the Indian capital of Delhi, and also in Dhaka the capital of Bangladesh. The quake was also felt in Tibet. India's home ministry said 16 people had been killed in the state of Bihar, and one more in Uttar Pradesh. Officials in China said one person was confirmed dead in Tibet. The quake occurred as the result of thrust faulting on or near the main thrust interface between the subducting India plate and the overriding Eurasia plate to the north. At the location of this earthquake, approximately 80 km to the east-northeast of the Nepalese capital of Kathmandu, the India plate is converging with Eurasia at a rate of 45 mm/year towards the north-northeast, a fraction of which (~18 mm/year) is driving the uplift of the Himalayan mountain range.

Effect of Event

With housing construction standards in Nepal being extremely low due to the poverty of the general population, the impact of the earthquake has been devastating, the death toll had a number of at least 65 people and more than 1,000 people injured. At least 17 people also died in India. It triggered the collapse of buildings, and buildings already damaged in the much bigger quake on April 25. Early estimates suggest the second shock could add $1 billion to cost of rebuilding the country. That would push the total cost of repairs to more than $6 billion, equivalent to about 30% of Nepal's annual economic output. Nestled high in the mountains between India and China, Nepal's economy generates only $20 billion in activity per year, making it one of the smallest in the world. With annual per capita GDP of around $1,000, many families live in poverty and some rely on funding from relatives who live abroad.

Mitigation

Retrofitting of buildings and preparing communities for earthquake risks, and developing disaster mitigation strategies to cope in time of crisis. Also by training people on safe ways to protect oneself during an earthquake like dropping down on your palms and kneels in order to prevent you from falling but still keeping you mobile. Protecting your head and body from falling objects by crawling under a table or desk. Remember, earthquakes don't kill people, buildings do.

4. Guatemala

Location: Santa Catarina Pinula, Guatemala
Disaster Type: Landslide
Date(s): October 1st 2015
Economic Loss: About $500,000
Death Toll: At least 280 Souls

The Event

On 1st October 2015 at 21:30 hours in the Neighbourhood of El Cambray II, Santa Catarina Pinula municipality in Guatemala, a massive landslide devastated an area of approximately 160 lineal meters caused by heavy rains. Loosened by heavy rains, a hillside collapsed on to Santa Catarina Pinula on the south-eastern flank of Guatemala City, burying more than 100 homes under tonnes of earth, rock and trees, and sparking a huge rescue effort. The National Disaster Risk Reduction Coordination Office (CONRED) reports that the area has been declared high risk since 2008. Around 40 families still living in the area have been given official notice that they must leave. The government has promised to build them new homes, hoping to use a plot of land through an expired ownership law, but is still looking at whether to give them financial subsidies.

Effect of Event

After nearly two weeks of digging through the huge mound of earth that buried homes and its inhabitants, searchers recovered about 271 bodies. Every batch of earth turned up by the diggers held more personal belongings, from mattresses and books to toys and Christmas decorations. On 13th October the Government called off the search for around 364 people still unaccounted for and confirmed that the landslide had killed at least 280 people. Some houses were buried under about 50 feet (15 metres) of earth, and even the Guatemalan disaster agency voiced that it doubted any other survivors would be found. Around 100 homes were completely destroyed in the landslide. CONRED say that a further 111 homes in the area are at risk as a result of damage sustained in the landslides. Three evacuation centres were set up to house 433 displaced by the landslide, including many young children.

Mitigation

By the construction of man-made structures on slopes with the goal of lessening the effect of a Landslide. By installing drainage in order to avoid the presence of water within a rocky hillside slope, so by preventing water in the hillside trough open traction cracks and placing drainage in order to reduce water pressure in the surrounding hillside. Also I believe zoning would be a good mitigation practice, by restricting the construction of residential areas or houses around the foot of a hillside slope. They can also introduce the construction of giant metal nets over a slope, although this practice may be on the cost effective side. Another strategy is building giant fences across and around the foot of the hillside to act as a barrier to prevent rock flow onto the other side.

5. Afghanistan

Location: Panjshir Province, Afghanistan
Disaster Type: Avalanche
Date(s): February 24-28th 2015
Economic Loss: -1% of GDP
Death Toll: ~ 268 Souls

The Event

The avalanches began to occur on 24th February after an exceptional dry winter. Snow finally arrived in Kabul and the northern and central provinces. The snowfall triggered a series of avalanches, claiming the lives of almost 300 people. The heavy snowstorms caused a series of avalanches in mountainous northeastern Afghanistan over a two-day period, killing scores of people in Panjshir province. Panjshir is a small mountainous province north of the capital, Kabul. Its residents are generally poor, earning their living as farmers, shepherds or operators of small businesses such as groceries. Dozens of avalanches happened in many parts of the province, but the deaths generally were in three districts: Hesa Awal, Paryan and Dara. Over 80% of the annual precipitation of Afghanistan falls as snow in the mountain ranges of the country. When the snow melts faster in spring and summer, it floods the lower-lying regions and in winter avalanches rush down the slopes on which often, small villages are situated. Slopes have been traditionally used for housing to leave the valley bottom for farming purposes.

Effect of Event

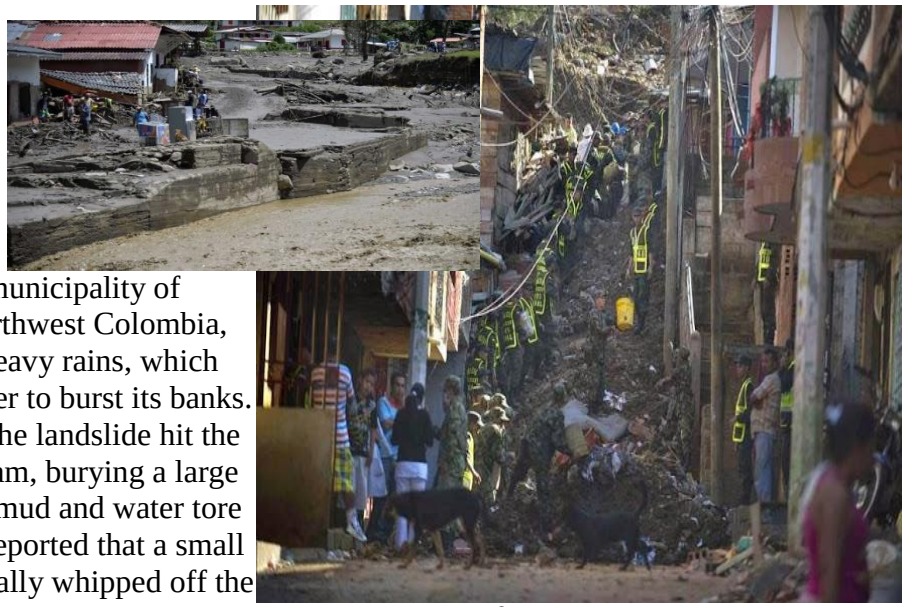
The avalanches buried homes across four north-east provinces, killing those beneath. Avalanches in the valley's Dara district affected up to 600 families, it also claimed the lives of about 268 people, most of them (about 198) in Panjshir province, and injured more than 100 others, about 20 people missing, and about 100 homes destroyed. People were left homeless freezing in the cold, some suffered frost bites and had to undergo amputation. Local residence had to use shovels and bare hands to reach friends and families trapped under the snow and more than 300 animals were buried under the snow as a result of the avalanches.

Mitigation

A risk assessment should be conducted and diversion structures such as dams, retarding structures and starting zone structures design should be constructed to prevent avalanche initiation. Forest management can also be used to mitigate avalanche hazards. Also other practices like zoning avalanche regions by enforcing a no building zone around the risk area and afforestation which acts as a barrier and also holds soil together can be implemented.

The bulk of the deaths came in Panjshir province, north of Kabul, where about 198 people were killed.

6. Colombia



Location: Salgar, Colombia
Disaster Type: Landslide
Date(s): May 18th 2015
Economic Loss: About $40 Million
Death Toll: At least 80 Souls

The Event

The landslide took place inside the municipality of Salgar, department of Antioquia, northwest Colombia, in the early hours of Monday after heavy rains, which lasted all night, causing a nearby river to burst its banks. Most residents were sleeping when the landslide hit the Municipality of Salgar around 3:00 am, burying a large area in mud and debris. The rush of mud and water tore down everything in its path. It was reported that a small town of Santa Margarita was practically whipped off the map. The town is one of four towns that make up Salgar, a municipality of 17,000 people in the department of Antioquia. Residents shoveled out piles of mud in the afternoon, trying to salvage what belongings they could, as dump trucks arrived to begin hauling away the mess. The landslide was triggered by heavy rain. Heavy rain reportedly caused the river Liboriana to burst its banks setting off the landslide. It is considered the country's worst landslide since 2005. Colombia's rugged topography is in a seismically active area at the northern edge of the Andes, combined with shoddy construction practices, has made the country one of Latin America's most disaster-prone.

Effect of Event

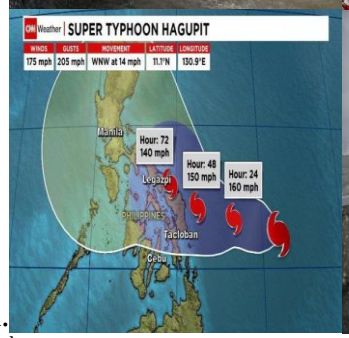
A death toll of more than 80 people is recorded as mud rushed into homes and bridges and at least 37 people were recorded injured. The flooding destroyed the town's aqueduct and even areas in less hazardous zones experienced flooding. As a cautionary measure, electricity and other public services were suspended after several utility poles were knocked down. Authorities called on volunteers to send water, food supplies and blankets to cope with what they described as a humanitarian emergency. Many families were also displaced in the process and 330 people left homeless. Several children lost their parents and the bodies of those killed needed to be transported to another place (Medellin) to be identified. As giant diggers removed debris the President vowed to rebuild the lost homes and provide shelter and assistance for the estimated 500 people affected by the calamity. The government promised about $6,500 in economic assistance to each of those who suffered damage.

Mitigation

By installing proper drainage system in order to avoid the presence of water within a rocky hillside slope, so by preventing water in the hillside trough open traction cracks and placing drainage in order to reduce water pressure in the surrounding hillside. Afforestation practices could also come in handy here, by planting trees which would help to increase the cohesiveness of soil particles thus making it more resistant to sliding. Building fences would also be a useful strategy against landslide activities.

7. Philippine





Location: Samar Province, Philippine
Disaster Type: Typhoon (Hagupit)
Date(s): December 6th 2014
Economic Loss: $114 Million (USD)
Death Toll: At least 21 Souls

The Event

Hagupit (known locally as Ruby) made its first landfall on Saturday at 9:15pm local time near the town of Dolores on the southeastern Philippine island of Samar; Samar province. The storm downgraded from its super typhoon status and plodded ashore as a category 3. It landed on the 6th of December 2014 with maximum sustained winds of 175 km/h and gusts of up to 210km/h. The storm made a second landfall in the morning of 7th December in Cataingan municipality, Masbate Province. As time went on, it weakened into a tropical storm as it continued to slowly move towards Batangas province, south of Manila, with moderate to heavy rain. The Philippines is no stranger to these violent storms. Typhoon Haiyan struck the country in November 2013, washing away buildings, ripping up vegetation, and killing over 6,000 people. This typhoon formed because the western Pacific Ocean is essentially a standing pool of warm surface waters, and that warmth fuels these kinds of storms. The Philippine military was on alert, and more than 650,000 people fled the area ahead of Hagupit's arrival. BBC reported that more than 150 flights were cancelled, and sea travel services were suspended until conditions improved.

Effect of Event

At least 21 people were killed by the storm, the Red Cross said, with the eastern island of Samar worst hit, but it caused far less damage than feared. Thousands of people headed back home after about a million people were evacuated from vulnerable areas. As of 8th December, an estimated 227,000 families (1 million people) were in 687 evacuation centres across seven affected regions and Metro Manila. Two deaths were reported in Iloilo province and one person was killed by a falling tree in the eastern town of Dolores. The government warned residents in low-lying and mountainous areas to be alert to possible flash floods and landslides, while those on the coast were warned of the risk of big waves associated with storm surges. Soldiers were also deployed to major roads along the typhoon's path to clear debris from roads and prevent looting. The typhoon caused an economic damage of $114 million (USD).

Mitigation

By setting up proper risk management systems; managing the risk rather than having to manage the disaster itself. The masses have to be educated on disasters in order to be disaster-literate. Good policies and even political will to implement action will not complete the agenda for effective disaster prevention because there have to be public cooperation too. Also, early and mandatory evacuation would not be very effective if the people do not understand the need for such efforts. By setting up a well qualified team of scientific experts whose jobs would be to study, observe and analyze trends for the purpose of effective prediction of a storm. When and where a typhoon will strike and how? are all critical knowledge that will allow the community to timely seek safer ground and fully protect their homes and properties. Also another important factor is protecting the environment; making sure the ecosystem is not abused in anyway and also striving to live a quality life economically. An economic stable society has a better chance of survival.

8. Chile

Location: Illapel, Chile
Disaster Type: Earthquake
Date(s): September 6th 2015
Economic Loss: 100 million - $1 billion
Death Toll: 13 Souls

The Event

A very powerful earthquake occurred off the coast of central Chile in Illapel on the evening of September 16th and produced a tsunami over the Pacific basin. The quake is the third most powerful earthquake in five years to strike the South America nation. The September 16th magnitude 8.3 earthquake west of Illapel, Chile, occurred as the result of thrust faulting on the interface between the Nazca and South America plates in Central Chile. At the latitude of this event, the Nazca plate is moving towards the east-northeast at a velocity of 74 mm/yr. with respect to South America, and begins its subduction beneath the continent at the Peru-Chile Trench, 85 km to the west of the September 16th earthquake. The size, location, depth and mechanism of this event are all consistent with its occurrence on the megathrust interface in this region. According to a preliminary assessment from the U.S Geological Survey, the quake's epicenter was about 54 kilometers (34 miles) west of Illapel. It occurred around 7:54 p.m. (6:54 p.m. ET) and had a depth of 33 kilometers (20.5 miles), USGS said. The initial quake lasted three minutes, and was followed by several aftershocks greater than magnitude six, however, it triggered a tsunami alert and coastal evacuations. Large tsunami waves have been observed along the Chilean coast, near the quake's epicenter. In Coquimbo, Chile, a wave was measured at more than 15 feet, according to the U.S. National Tsunami Warning center. Chile's national emergency agency issued a tsunami alert, ordering evacuations in coastal areas from Arica to Puerto Aysen. Chile is in one of the most earthquake-prone regions in the world. The country sits on an arc of volcanoes and fault lines circling the Pacific Ocean known as the "Ring of Fire." The area experiences frequent earthquakes and volcanic eruptions. Since 1973, Chile has had more than a dozen quakes of magnitude 7.0 and above.

Effect of Event

The Chilean government reported 13 deaths and 6 missing. The USGS had said there is a 52% chance of an economic impact of between $100m and $1billion, with an 18% chance of the damage costing greater that $1 billion. There were no reports of serious damage hours after the quake, but officials were still checking the region late into the night. Authorities had issued a tsunami alert for Chile's entire Pacific coast, and the tremor was so strong that people on the other side of the continent, in Buenos Aires, Argentina, reported feeling it. Operations were suspended at two major copper mines. Illapel was reported immediately to be without electricity or drinking water. Two days after the quake, about 90,000 people were still without electricity. On September 21st, officials were reporting over 9,000 people had been left homeless by the quake. Tall buildings swayed and car alarms were set off in Buenos Aires, 1,110km (690m) away, and the earthquake was felt in Sao Paulo, more than 2,600km (1,600m) away.

Mitigation

Retrofitting buildings with isolation pads which acts as shock absorbers to reduce vibrations. Educating the masses on safe earthquake practices, and implementing proper building codes.

9. Brazil

Location: Salvador, Bahia. Brazil
Disaster Type: Landslide
Date(s): April 27th 2015
Economic Loss: Unknown
Death Toll: 16 Souls

The Event

On the 27th of April 2015 a storm that fell in Salvador, the capital of the northeastern state of Bahia in the early hours of the day caused floods and over a hundred landslides across areas of the city. Brazil is vulnerable to such landslides as many irregular housing communities are build in un-zoned land, and construction practices are not always resistant to heavy rains. Areas around Rio de Janeiro are also susceptible to such tragedies, and the entire Região Serrana, the mountains north of the city, was devastated by Brazil's worst ever natural disaster in January 2011, when landslides killed more than 900 people. The downpour started Monday morning, causing more than 100 landslides and rockslides near the city of Salvador in the Bahia region. The officials said that more than 200 millimeters (eight inches) of rain fell in the area for about 24 hours. The amount of rainfall that fell in that 24hour period summed up to about 65% of the total average rainfall for the month of April alone. So the landslide was caused by severe rainfall which led probably to a decrease in the cohesiveness of the soil. Landslides are a common problem after severe weather events, as excess pore water pressure can overcome cohesion in soil and sediments, allowing them to flow like liquids. Approximately 90% of all landslides are caused by heavy rainfall. Salvador has a wet tropical climate with high levels of rainfall all year round, though the wettest months are usually April and May with averages of 309.7 mm and 359.9 mm respectively. Landslides are a common event in the city's poor neighbourhoods where building standards tend to be lower and population densities higher.

Effect of Event

As many as 16 people were killed and several missing in the landslide caused by severe flooding in Bahia, it destroyed as many as 70 houses and left 200 people homeless. The Civil Defense of Salvador recorded 316 instances of destruction caused by the rains and as of 2:45pm on Tuesday, the agency had recorded 265 incidents; including 147 landslides, 17 floods and 21 collapses of buildings and walls, and all centered majorly around poor neighbourhoods. About eighty fire fighters participated in the rescue operations in Salvador which lasted over thirty hours. The victims were buried in a series of landslides after the storm hit the city. The economic loss caused by the landslide is unknown. According to a report done by the city of Salvador, ten locations were designated as critical areas. Families who are in these locations, according to the government, needed to be removed because there is a risk of more landslides.

Mitigation

The economy of the region needs to be improved, because an improved economy will lead to a better standard of living for all. This would help alienate the sub-standard residential areas which are very susceptible to such events. Also zoning would be a good mitigation practice, by restricting the construction of residential areas or houses around the foot of hillside slope. Also the building of giant fences across and around the foot of the hillside to act as a barrier to prevent rock flow onto the other side.

10. United States of America

Location: Matagorda Island, Texas. U.S.A
Disaster Type: Tropical Storm Bill
Date(s): June 16th 2015
Economic Loss: $17.9 Million
Death Toll: 4 Souls

The Event

The Tropical Storm Bill formed from a disturbance that was tracked by the National Hurricane Center from near Honduras on the 13th of June into the Gulf of Mexico a couple of days later. And on the evening of June 15th, Tropical Storm Bill was named after data from a Hurricane Hunter aircraft investigating the system revealed a center of circulation had developed. Tropical Storm Bill made landfall the next morning on Matagorda Island, Texas, at 11:45am June 16th with maximum sustained winds recorded at 60 mph. Bill was then downgraded to a tropical depression at 1am June 17th. After spending three days over land as a tropical depression, Bill finally transitioned into a post-tropical cyclone on the afternoon of June 20th over eastern Kentucky. Although Bill brought coastal flooding and gusty winds to the Texas coast at landfall, its primary impact was rainfall flooding. It was a tropical cyclone that produced widespread rainfall across East Texas and Oklahoma.

Effect of Event

Across the United States, Bill was responsible for 4 deaths and approximately $17.9 million in damage. In the coastal areas, at least a foot of water covered areas along FM 2031 south of Matagorda. Highway 87 was closed early June 16th from Gilchrist to highway 124 on the east edge of the Bolivar Peninsula due to debris on the road. While inland, Bill and its remnants brought rainfall to many states from Texas and Oklahoma to the northeast coast. The remnants of Bill finally exited the northeast on June 21st. At least one location in eight states saw four inches or more rainfall from Bill including Arkansas, Illinois, Indiana, Louisiana, Missouri, Ohio, Oklahoma and Texas. Record river flooding was observed in a few locations from Bill's rainfall. The Washita River at Dickson, Oklahoma, crested at a new record level of 48.7 feet early June 19th, breaking the record set in 1987 by a margin of more than 3 feet. Record flooding was also reported on West Mustang Creek near Ganado, Texas, and on the Lavaca River near Edna, Texas. The James River near Springfield, Missouri, rose to a new record level of 22.2 feet on June 16th; the previous record of 22 feet was set in 1909, ferry services were suspended due to rising tide levels. Bill also produced some severe weather as it moved eastward through the Ohio Valley. And finally, On June 20th, severe storms fired up on Bill's eastern flank as it was declared post-tropical, resulting in numerous reports of damaging wind gusts in the Mid-Atlantic.

Mitigation

The masses have to be educated on disasters in order to be disaster-literate. Good policies and even political will to implement action will not complete the agenda for effective disaster prevention because there have to be public cooperation too. Also by setting up proper risk management systems; managing the risk rather than having to manage the disaster itself. Another strategy is encouraging the practice of afforestation; by planting a lot of tall trees which act as wind breaks to the strong winds, thereby minimizing its effect. Lastly, building sea wall could also help a bit in the case of rising tides.

CONCLUSION

It is interesting to note that most of the disasters in this report have to do with failure or shaking of the earth crust, either through internal movement of plates beneath the earth crust which then causes a shaking that leads to a displacement or merely a displacement of the crust due to either the soil loosing its cohesiveness and failing as a result of addition of excess water through heavy rainfall and flooding, or as a result of the vibration caused by sudden snap of plates beneath the earth. Either way most of the disasters are characterized by that nature, a staggering total of eight out of the ten disasters are characterized by this specific theme of displacement of the earth crust.

The first Nepal earthquake which happens to be first on my list occurred because of two converging tectonic plates, which are the Indian plate and the overriding Eurasia plate to the north. It is also interesting to note that the same plate boundary confrontation caused the Afghanistan earthquake which happens to be second on my list. The Afghanistan quake occurred on the same Indian/Eurasian plate boundary, and incidentally this plate boundary was responsible for the Kashmir quake from 2005. Again, the same plate boundary was the sole perpetrator of the second Nepal earth quake which happens to be ranked third on my list. The second Nepal earth quake occurred as the result of thrust faulting on or near the main thrust interface between the subducting India plate and the overriding Eurasia plate to the north. It is said that this Indian plate is converging with Eurasia at a rate of 45 mm/year towards the north-northeast, a fraction of which (~18 mm/year) is driving the uplift of the Himalayan mountain range. This zone has earned a reputation to be a very geologically active area and has caused at least three catastrophic events this year. And the sad part is that we should expect a lot for from this zone in the coming future and this awakens us to the fact that we have to come up with very effective mitigating measures in order to curb the casualties that would arise from this unavoidable circumstance.

The landslide category of my disasters was solely caused as a result of heavy rainfall which in most cases led to flooding, leading to a loss in the cohesiveness of the soil and thereby causing a slide. The landslide which occurred in Santa Catarina Pinula, Guatemala which is ranked fourth on my list was caused by heavy rains and as a result loosened a hillside land which then collapsed on to Santa Catarina Pinula on the south-eastern flank of Guatemala City, burying more than 100 homes. The Colombian landslide which ranks sixth on my list also occurred after heavy rains, which lasted all night, causing a nearby river to burst its banks. Finally, the Brazil slide which ranks ninth on my list happened after a storm that fell in Salvador, the capital of the northeastern state of Bahia in the early hours of the day and caused floods and over a hundred landslides across areas of the city. The others include the Afghanistan avalanche which ranks fifth on my list, and occurred after heavy snowstorms caused a series of avalanches in mountainous northeastern Afghanistan region. The remaining two were tropical storms; Typhoon Hagupit in the Philippines which ranks seventh, and Tropical Storm Bill in the United States which ranks last. A common characteristic feature of the two storms is that they both had appropriate warning systems which enabled people to evacuate the area before the event finally struck thereby reducing the human casualties a great deal. One thing to note about the other eight that consists of earthquakes, landslides and avalanche is that all of them happened spontaneously, meaning that they did not have appropriate warning and monitoring systems. This goes to show that there is lack in these area; a problem when it comes to monitoring matters that deal with the earth crust or plate movement.

Having said all this, I have come to realize that there is a need to beef up monitoring of crustal activities, we need to know perhaps when a slope is failing, or when a soil is loosing cohesive structure or when plates beneath is beginning to send signals of impending release of stress. All of these may sound a bit far fetched but we need to begin to look into these things more. However, the best we could do for now as we await breakthrough is to suite ourselves to be able to absorb when disaster strikes and these mitigating techniques have been provided above in the various sections of this report.

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