= Tropical Storm Thelma =

Tropical Storm Thelma , known in the Philippines as Tropical Storm Uring , was one of the deadliest tropical cyclones in Philippine history , killing at least 5 @,@ 081 people . Forming out of a tropical disturbance on November 1 , 1991 , several hundred kilometers north @-@ northeast of Palau , the depression that would become Thelma tracked generally westward . After turning southwestward in response to a cold front , the system intensified into a tropical storm on November 4 as it approached the Philippines . Hours before moving over the Visayas , Thelma attained its peak intensity with estimated ten @-@ minute sustained winds of 75 km / h (45 mph) and a barometric pressure of 992 mbar (hPa ; 29 @.@ 29 inHg) . Despite moving over land , the system weakened only slightly , emerging over the South China Sea on November 6 while retaining gale @-@ force winds . Thelma ultimately succumbed to wind shear and degraded to a tropical depression . On November 8 , the depression made landfall in Southern Vietnam before dissipating hours later .

While passing over the Philippines , Thelma 's interaction with the high terrain of some of the islands resulted in torrential rainfall . Through a process known as orographic lift , much of the Visayas received 150 mm (6 in) of rain ; however , on Leyte Island there was a localized downpour that brought totals to 580 @.@ 5 mm (22 @.@ 85 in) . With the majority of this falling in a three @-@ hour span , an unprecedented flash flood took place on the island . Much of the land had been deforestated or poorly cultivated and was unable to absorb most of the rain , creating a large runoff . This water overwhelmed the Anilao ? Malbasag watershed and rushed downstream . Ormoc City , located past where the Anilao and Malbasag rivers converge , suffered the brunt of the flood . In just three hours , the city was devastated with thousands of homes damaged or destroyed . A total of 4 @,@ 922 people were killed in the city alone , with 2 @,@ 300 perishing along the riverbank .

Outside of Ormoc City , 159 people were killed across Leyte and Negros Occidental . Throughout the country , at least 5 @,@ 081 people lost their lives while another 1 @,@ 941 ? 3 @,@ 084 were missing and presumed dead . This made Thelma the deadliest tropical cyclone in Philippine history , surpassing a storm in 1867 that killed 1 @,@ 800 , until later surpassed by Typhoon Haiyan (Yolanda) in 2013 which killed at least 6 @,@ 300 people . A total of 4 @,@ 446 homes were destroyed while another 22 @,@ 229 were damaged . Total losses amounted to $ 27 @.@ 67 million . Initially , it took over 24 hours for word of the disaster to reach officials due to a crippled communication network around Ormoc City . Within a few days , emergency supply centers were established and aid from various agencies under the United Nations and several countries flowed into the country . A total of $ 5 @.@ 8 million worth of grants and materials was provided collectively in the international relief effort .

= = Meteorological history = =

In late October 1991 , a tropical disturbance developed near the Caroline Islands . Tracking generally west @-@ northwestward , the system gradually became more defined . On October 31 , convection associated with the system quickly increased , prompting the issuance of a Tropical Cyclone Formation Alert from the Joint Typhoon Warning Center (JTWC) . Early on November 1 , the Japan Meteorological Agency (JMA) began monitoring the system as a tropical depression , at which time the system was situated roughly 415 km (260 mi) north @-@ northeast of Palau . Following a satellite @-@ derived surface wind estimate of 45 km / h (30 mph) later that day , the JTWC also began monitoring the low as a tropical depression . Initially , forecast models showed the system continuing on an arcing path out to sea ; however , the system turned westward on November 2 and threatened the Philippines . Due to the cyclone 's proximity to the country , the Philippine Atmospheric , Geophysical and Astronomical Services Administration also monitored the storm and assigned it with the local name Uring . Late on November 3 , the depression turned west @-@ southwestward towards the Visayas in response to an approaching cold front , an event typical of late @-@ season cyclones in the basin . On November 4 , both the JTWC and JMA upgraded the system to a tropical storm , with the latter assigning it the name Thelma .

Hours before striking the Philippines on November 4 , both agencies reported Thelma to have

reached its peak intensity . The JTWC estimated the storm to have attained one @-@ minute sustained winds of 85 km / h (50 mph) while the JMA estimated ten @-@ minute sustained winds at 75 km / h (45 mph) . Additionally , its barometric pressure reached 992 mbar (hPa ; 29 @.@ 29 inHg) . Thelma soon made landfall in Samar before weakening to a minimal tropical storm . Maintaining gale @-@ force winds , the system eventually passed over Palawan Island on November 6 before moving over the South China Sea . Despite being back over water , strong wind shear prevented re @-@ intensification and caused Thelma to weaken to a tropical depression by November 7 . Now moving westward , the depression eventually made its final landfall over the Mekong River Delta in Southern Vietnam on November 8 . Over the next couple of days the system weakened into an area of low pressure as it moved westwards , before it moved into the Andaman Sea during November 10 . Once in the Andaman Sea , the systems remnants contributed to the formation of the Karaikal tropical cyclone during the next day .

= = Impact = =

Tropical Storm Thelma struck the Philippines just five months after the Ultra @-@ Plinian eruption of Mount Pinatubo . The eruption resulted in the deaths of roughly 800 people and left nearly 1 million homeless . The country 's government was reportedly struggling to deal with the scope of the disaster and the addition of Thelma worsened the situation .

Striking the nation as a weak tropical storm , winds from Thelma gusted up to 95 km / h (60 mph) in Tacloban ; these winds caused no known damage . The main destructive force associated with the cyclone was the tremendous rainfall it produced . More than 150 mm (6 in) of rain across much of the Visayas , resulting in widespread flooding . In Tacloban , 140 @.@ 2 mm (5 @.@ 52 in) fell over a 24 ? hour span . The heaviest rain occurred on Leyte Island due to orographic lift , which brought large quantities of moisture into the atmosphere over a relatively small area . Additionally , monsoonal winds to the southwest of Thelma converged over the island , further enhancing the precipitation . Near the city of Ormoc , a Philippine National Oil Company rain gauge measured 580 @.@ 5 mm (22 @.@ 85 in) of precipitation , the highest in relation to the storm . Of this , approximately 500 mm (20 in) fell during a three @-@ hour span around noon local time on November 5 . Initially , residents believed that waterspouts transported tremendous amounts of water to the island , triggering the floods . This notion was quickly dismissed as improbable , however .

The hardest hit region was Leyte , where more than 4 @,@ 000 people lost their lives . A total of 4 @,@ 446 homes were destroyed while another 22 @,@ 229 were damaged . The majority of casualties and damage took place in Ormoc when a flash flood devastated the city . At least 81 people were killed outside Ormoc and another 14 went missing ; 42 lost their lives in Burauen . The entire island of Leyte was left without power and many areas were isolated as roads were washed away . Another 78 people perished and 70 others were left missing in Negros Occidental . Losses from the storm amounted to $ 27 @.@ 67 million ; $ 18 @.@ 94 million in Leyte and $ 8 @.@ 73 million in Negros Occidental . A total of 598 @,@ 454 people were affected while an estimated 43 @,@ 000 people were left homeless by the storm across the Philippines .

= = = Ormoc City tragedy = = =

The greatest tragedy during Tropical Storm Thelma took place in the city of Ormoc after torrential rains overwhelmed the Anilao ? Malbasag watershed , sending flood waters rushing down the deforested mountainside . This water flowed into the Anilao and Malbasag rivers , located north of Ormoc . The watershed , covering an area of 4 @,@ 567 hectares (11 @,@ 285 acres) , is only 3 @.@ 3 percent forested , with the remainder being used for agricultural and private purposes . According to a study in 1990 , roughly 90 percent of the watershed had been converted into coconut and sugarcane plantations . The majority of this land was improperly cultivated since the 1970s , making conditions worse than they normally would have been . The natural structure of the mountains further contributed to the floods , with slopes as steep as 60 percent grade in some areas

. In heavy rain events , this feature leaves the upper two @-@ thirds of the mountain range unstable . In the two hours prior to the heaviest rains , the soil in the watershed became saturated , greatly lessening its effectiveness at absorbing further rains . As a result , the tremendous rains that occurred just prior to the flood , during which rainfall rates reached 167 mm (6 @.@ 6 in) per hour , the land was unable to absorb a majority of the rain . Many landslides ranging from 1 to 3 m (3 @.@ 3 to 9 @.@ 8 ft) deep and 50 to 100 m (160 to 330 ft) wide occurred across the region . Altogether , rains were twice as heavy as the land could handle and the many landslips doubled the volume of fluids . At various points along rivers , temporary dams created by debris , namely trees , allowed a build up of water upstream . In some instances , waters reached a depth of 10 m (33 ft) before the dams collapsed . Normally , it takes water in the Anilao and Malbasag rivers roughly 3 @.@ 6 and 5 @.@ 6 days , respectively , to reach Ormoc City ; however , it only took one hour during the flood .

Ormoc City itself is located in a flood @-@ prone area , with the Anilao and Malbasag rivers converging just north of the city and taking a 90 degree turn towards the bay . In addition to the natural dangers of the river , poorly designed structures on the river made conditions worse . The majority of construction along the river did not take flooding threats into account , and actually increased the threat of these events . Concrete walls and levees were built into the river rather than on the banks , leading to faster debris damming . Lastly , just after the turn was the Cogon Bridge . This structure constricted the river by as much as 50 percent , enhancing the build up of water . The turn became the final trigger in the disaster as it created an " instantaneous backwater effect , " causing massive volumes of water to over @-@ top the riverbank . Around 11 : 00 a.m. local time on November 5 , approximately 22 @,@ 835 km3 (5 @,@ 480 mi3) of water inundated 25 km2 (15 @.@ 5 mi2) of the city . In just 15 minutes , the water rose by 2 @.@ 1 m (7 ft) and further rose to 3 @.@ 7 m (12 ft) within an hour . The flooding lasted for roughly three hours , leaving up to 0 @.@ 6 m (2 @.@ 0 ft) of sediment behind .

The flood struck the city with little to no warning , catching all those in its path off @-@ guard . Numerous low @-@ income families lived along the banks of the river , despite being such a high @-@ risk area . Residential and commercial areas were also set up along reclaimed embankments that restricted river flow . Additionally , squatters were allowed to live along the banks of the Anilao river in an area called Isle Verde . Roughly 2 @,@ 500 people lived on this reclaimed land prior to the flood . The majority of fatalities took place along the banks of the river , with most drowning or being buried in mud or debris . A survivor described the initial event as a gigantic wave crashing over the banks and flooding the city . Isle Verde was virtually wiped out and out of the original 2 @,@ 500 people that lived there , only 200 survived . It became known as the " Isle of Death " to survivors . Residents reported hundreds of bodies floating down rivers in the area . The force of the water and mud was enough to crack the walls of city hall . Nearly 3 @,@ 000 homes were destroyed and more than 11 @,@ 000 others were damaged . In the city alone , officials confirmed that 4 @,@ 922 people were killed and another 1 @,@ 857 ? 3 @,@ 000 were left missing . Additionally , 3 @,@ 020 people were injured . The majority of those missing were likely swept out to sea by the flood and presumed dead . Two days after the storm , several bodies of those swept out to sea washed back ashore . Officials stated that the death toll could have been in the tens of thousands had the flood occurred at night rather than in the middle of the day .

= = Aftermath = =

Initially , it took more than 24 hours for word of the level of devastation to reach officials in Manila as communications across Leyte were largely destroyed . By November 7 , search and rescue operations were underway across Leyte and Negros Occidental . The first shipment of relief supplies , consisting of food rations , rice , sardines , and used clothing , was to be shipped from Cebu later that day . On November 8 , Philippine President Corazon Aquino declared all of Leyte a disaster area . A Philippine Navy vessel set out with heavy earth @-@ moving machinery and the Philippine Air Force deployed aircraft to assist in rescue efforts . Relief efforts in Ormoc City were hampered by a lack of clear roads and fuel . Amateur radio reports stated that an AC @-@ 130 was able to land

at a local airport but materials had to be moved by helicopter from there since roads were blocked . Relief efforts were also hampered by continuing rains and the rough terrain of the affected region . By November 11 , approximately 8 @,@ 300 families had been rescued and another 7 @,@ 521 were evacuated from affected regions .

Supply distribution centers were established in Ormoc , providing residents with food , water , and materials , by November 11 . People were given a can of sardines and 1 kg (2 @.@ 2 lb) of rice at these centers . These centers were only able to operate in daylight though due to a lack of fuel and transportation . Water was supplied in limited quantities from Cebu . Medical and sanitation teams were deployed throughout the province , with many coming from surrounding areas . Residents searched through debris for lumber to construct makeshift coffins while others stacked bodies to be picked up by wheelbarrows or trucks . Officials had difficulty determining how to best deal with mass casualties as bodies lay across the Ormoc region . Many were found in the coastal barangays of Linao , Camp Downes , and Bantigue as well as the Ormoc pier . In order to prevent the spread of disease , mass graves were dug , with 700 bodies buried on November 8 . Dump trucks were used to transport the dead to these sites as quickly as possible . As decomposition set in , residents stated that " [the] putrid smell was unbearable . " Even months after the storm , bodies were occasionally discovered , some found in drainage systems . By November 10 , four navy vessels were searching debris in the waters near Ormoc for bodies ; 16 were recovered that day with more believed to be submerged in the bay . Roads surrounding the city were finally cleared by November 12 ; however , electricity remained out . With the deployment of medical teams from Japan , hospitals in the region returned to full capacity . By November 22 , electricity and water had been 70 percent and 60 percent restored , respectively . The emergency phase of assistance ended on November 29 and coordination of disaster relief was returned to the Philippines . By that time , national aid to Ormoc reached $ 1 @.@ 1 million , with more than half coming from a presidential grant .

On November 7 , despite no official appeal for international aid , the governments of France and the United States provided $ 34 @,@ 783 and $ 25 @,@ 000 in funds . The request for assistance came the following day , with the Philippines requesting food , water , medicine , emergency supplies , and heavy machinery . A team from the United Nations Disaster Relief Organization , specializing with relief coordination and flood management , was also sent . The Red Cross appealed for $ 418 @,@ 000 to support 15 @,@ 000 families for one month . A cash grant of $ 17 @,@ 300 from the United Kingdom was received on November 8 . Two United States Air Force AC @-@ 130s from Subic bay naval base flew to Cebu carrying ready @-@ to @-@ eat meals . International funding reached $ 2 @.@ 5 million on November 12 , with grants of $ 1 @.@ 05 million , $ 1 million , $ 188 @,@ 000 from the Netherlands , Japan , and Australia respectively . Additionally , the United States provided 55 @,@ 000 packages of food rations . This total nearly doubled two days later with grants from the United Nations Development Programme , World Food Programme , World Vision International , Médecins Sans Frontières , Caritas , various branches of the Red Cross , and the governments of Canada and New Zealand . Ultimately , approximately $ 5 @.@ 8 million was provided in international assistance from 13 nations , the United Nations , the Red Cross , and various non @-@ governmental organizations .

Isle Verde , where approximately 2 @,@ 300 people were killed , was declared uninhabitable by officials ; however , residents still returned to the area due to a need for land . Eventually , signs that used to warn people not to stay on the islet were eventually taken down and people were no longer warned not to live there . A resettlement community was constructed months later , with plans to house 912 of the 2 @,@ 668 families that needed to be moved from the area . Those that were not moved were left on Isle Verde despite orders not to stay there . Another resettlement project for 700 families was planned at the cost of $ 1 million .

The sheer magnitude of the flood event in the Anilao ? Malbasag watershed made the region more vulnerable to future flood events . Hillsides became more unstable and the rivers themselves were clogged with debris , raising their water levels and widening their banks . In a post @-@ disaster assessment in October 1992 , it was stated that swift cooperation of all agencies from local to governmental was necessary to prevent tragedies of similar caliber in the future . It was urged that

residents still living along the river banks be relocated to safer areas ; however , by the time of the report , people had already begun repopulating the area . As a way of avoiding similar breaching of the riverbank , it was suggested that the two rivers be dredged and possibly re @-@ channeled . Several points were also brought up about rehabilitating the landscape of the watershed : reforestation , contoured farming , and redesigning of plantations to better retain rainwater . Long @-@ term rehabilitation of the watershed was deemed necessary in addition to repairing infrastructure in Ormoc .

In 1993 , following a request by the Philippine Government , the Japan International Cooperation Agency conducted as study on flood control for Ormoc and other cities across the country . In 1998 , a ? 800 million ($ 20 @.@ 6 million USD) construction project for flood mitigation was approved and later completed in 2001 . That year , Tropical Depression Auring caused flooding of similar magnitude to Thelma ; however , the waters were properly diverted to the sea . A sculpture and monument to the victims , designed by architect Maribeth Ebcas and artist Florence Cinco respectively , called " Gift of Life " was constructed on a 1 @.@ 3 km2 (0 @.@ 8 mi2) plot of land . It was designed to also depict a need to respect nature and be a message of hope for residents in Ormoc .

Due to the catastrophic loss of life caused by the storm , the name Thelma was retired and replaced with Teresa .