= 1996 Andhra Pradesh cyclone =

The 1996 Andhra Pradesh cyclone (also known as Cyclone 07B) , was a small but powerful storm that left heavy damage in the Indian state of Andhra Pradesh . It formed on November 4 in the eastern Bay of Bengal . Moving westward , it quickly organized and developed a well @-@ defined eye . On November 6 , the cyclone struck about 50 km (30 mi) south of Kakinada , Andhra Pradesh at peak intensity . The India Meteorological Department estimated peak winds of 145 km / h (90 mph) , while the American @-@ based Joint Typhoon Warning Center (JTWC) assessed peak winds of 215 km / h (130 mph) . Soon after landfall , the cyclone weakened and dissipated by November 7 .

Ahead of the storm , about 225 @,@ 000 families evacuated , although many towns lacked proper storm shelters . When the cyclone made landfall , it produced strong winds up to 100 km (60 mi) inland , dropped 210 millimetres (8 @.@ 3 in) of rainfall across a 40 km (25 mi) region , and flooded over 250 villages along a 60 km (37 mi) portion of the coast . About 70 % of the overall damage was in East Godavari district , where two villages were entirely destroyed . The storm destroyed 241 @,@ 802 ha (597 @,@ 510 acres) of crops and killed millions of cattle and chicken . Across Andhra Pradesh , the storm damaged 647 @,@ 554 houses , including over 10 @,@ 000 that were destroyed . Overall damage totaled ? 21 @.@ 5 billion (equivalent to ? 82 billion or US $ 1 @.@ 2 billion in 2016) , comparable to a cyclone in 1977 that also hit Andhra Pradesh . There were 1 @,@ 077 confirmed deaths with many others missing , although many of the dead were washed into the sea and were unlikely to be found . After the storm , the government and local Red Cross chapters helped residents recover from the damage , while the World Bank provided money to better prepare Andhra Pradesh for future storms .

= = Meteorological history = =

On October 30 , a Pacific tropical depression crossed the Kra Isthmus into the Bay of Bengal , dissipating the next day over Myanmar . A new area of convection , or thunderstorms , developed over the Andaman Sea on November 1 The system was located within the monsoon trough , and a weak flow steered it slowly westward across the Bay of Bengal , bringing it briefly over southwestern Myanmar . After the convection organized more , the Joint Typhoon Warning Center (JTWC) issued a tropical cyclone formation alert at 07 : 30 UTC on November 3 . At 12 : 00 UTC that day , the agency initiated advisories on the system , designating it Tropical Cyclone 07B about 645 km (400 mi) west of Yangon , Myanmar . The India Meteorological Department (IMD) ? the official Regional Specialized Meteorological Center for the basin ? did not classify the system until November 4 ; at 15 : 00 UTC , the agency designated it as a depression .

Located beneath the axis of an upper @-@ level ridge , the depression was able to intensify and organize more , with prominent outflow developing . On November 5 , the IMD upgraded the system to a deep depression and later to a cyclonic storm . At 06 : 00 UTC on the same day , the JTWC upgraded the storm to the equivalent of a minimal hurricane , estimating 1 minute winds of 120 km / h (75 mph) . It continued westward toward eastern India at a slow pace , later turning more to the west @-@ northwest . Early on November 6 , the storm began rapidly intensifying , and the IMD upgraded the storm to a severe cyclonic storm and later a very severe cyclonic storm . At 04 : 00 UTC that day , an irregular eye formed in the middle of the central dense overcast , which quickly became more circular and distinct . At 06 : 00 UTC on November 6 , the JTWC estimated peak 1 minute winds of 215 km / h (130 mph) , the equivalent of a Category 4 on the Saffir @-@ Simpson scale , and a minimum barometric pressure of 922 mbar (27 @.@ 2 inHg) . The IMD assessed a much lower intensity , estimating 3 minute winds of 145 km / h (90 mph) based on a Dvorak rating of 4 @.@ 5 .

While approaching land , the eye contracted from a peak width of 64 km (40 mi) to 17 km (11 mi) . At 16 : 00 UTC on November 6 , the cyclone made landfall about 50 km (30 mi) south of Kakinada , Andhra Pradesh along the east coast of India . The estimated landfall pressure was 978 mbar (28 @.@ 9 inHg) . It was a smaller @-@ than @-@ normal cyclone , only 450 km (280 mi)

in diameter . The storm rapidly weakened after moving ashore , deteriorating into a deep depression early on November 7 . The JTWC issued their last advisory at 06 : 00 UTC that day , and the IMD downgraded the system to a remnant low pressure area over Telangana at 12 : 00 UTC .

= = Preparations and impact = =

The IMD issued warnings related to the cyclone that were distributed to the public by television , telegraph , news outlets , and other government departments . The All India Radio broadcast warnings beginning on November 5 , the day before landfall . Train service was disrupted throughout Andhra Pradesh , stranding thousands of travelers . India 's Oil and Natural Gas Corporation suspended operations during the storm . The storm caused local Diwali festivities to be canceled . It ultimately struck about 50 km (30 mi) north of where it was expected , in a region farther away from state shelters . About 225 @,@ 000 families evacuated due to the storm . However , about 30 % of the towns in the region lacked a storm shelter , and the existing shelters were generally in poor shape . Some residents avoided the shelters due to their state of disrepair , or stayed in their homes for fear they would be robbed . In addition , storm emergency plans enacted after a cyclone in 1977 that struck Andhra Pradesh had not been used since 1986 . Roads and shelters built following a cyclone in 1990 fared the storm better than older structures .

The powerful cyclone brought intense winds , heavy rainfall , and high waves to Andhra Pradesh in eastern India . Hurricane @-@ force winds ? at least 120 km / h (75 mi) ? penetrated 100 km (60 mi) inland . Peak gusts were estimated at 200 km / h (124 mph) , based on anemometers that were blown away in Yanam . The highest recorded sustained wind was 111 km / h (69 mph) by a ship at the Kakinada Port , only 50 km (30 mi) from the landfall location . The storm dropped heavy rainfall near the coast , peaking at 390 mm (15 in) in Amalapuram . Rainfall rates of over 210 millimetres (8 @.@ 3 in) occurred over 3 hours in a 40 km (25 mi) stretch of land . Along a 60 km (37 mi) portion of the coast , 3 @.@ 7 m (12 ft) waves accompanied a 2 m (6 @.@ 6 ft) storm surge , spreading 5 km (3 mi) inland . The storm struck just three weeks after another storm killed 350 people . Storm damage extended 130 km (80 mi) inland . Widespread areas of crop fields were inundated with floodwaters , washing away tons of rice , coconuts , and bananas . The winds knocked down about 5 million coconut trees . It was estimated that the storm destroyed 174 @,@ 000 ha (430 @,@ 000 acres) of rice paddy , along with 67 @,@ 802 ha (167 @,@ 540 acres) of other crops . About 13 @,@ 500 livestock and 1 million chickens were killed by the storm ; many of them rotted on arable fields after the waters receded .

Heavy rainfall and high tides flooded more than 250 villages , and the cyclone affected 1 @,@ 380 villages throughout Andhra Pradesh . Many canals and drains were breached by the floods . The storm washed four cargo ships ashore and sank or destroyed 6 @,@ 464 boats . About 70 % of the overall damage was in East Godavari district , where Kakinada was among the hardest hit villages . Two nearby villages ? Bhairvapada and Bulusutippa ? were entirely destroyed . The villages did not receive advanced warning , and Bhairvapada did not have a functioning cyclone shelter . There , 90 % of the boats were damaged or destroyed . In Amalapuram , also in East Godavari , roughly two of every three houses were destroyed . The cyclone also destroyed 55 electrical towers , including a 100 m (330 ft) tall telecommunications tower , as well as nearly 17 @,@ 000 power lines in West Godavari . About 1 @,@ 300 km (810 mi) of roads were damaged or washed out , including 210 km (130 mi) of National Highway 5 . Flooding also washed out several railroads , while damaged water drainage systems spewed sewage onto the streets . Many hospitals in the region were washed away or flooded . Across Andhra Pradesh , the storm damaged 647 @,@ 554 houses , with about 200 @,@ 000 sustaining roof damage , and over 10 @,@ 000 that were destroyed . Over 100 @,@ 000 people were left homeless . In the hardest hit areas , only houses made of brick and cement withstood the high winds , and huts made of mud and thatch were decimated . Overall damage was officially estimated at RS $ 21 @.@ 5 billion (US $ 602 million) . However , the World Bank indicated damage reached as high as US $ 1 @.@ 5 billion . Officials likened damage to the 1977 cyclone that also struck Andhra Pradesh .

After the storm , there were 1 @,@ 000 fishermen missing at sea , despite warnings not to leave

port . After being presumed lost , 162 boats returned to port four days after the storm , and additional fishermen returned over the succeeding days . However , there were 569 fishermen killed or left missing due to lost boats at sea . Many of these fishermen had departed days before the storm , and those that survived had transistors in their boats . Lacking advanced warning , many shrimp farmers in remote villages were swept away by waves . Hundreds of dead bodies were discovered along the shore ; after they were identified , the corpses were cremated instead of bringing the bodies into local villages . Most of the fatalities on land were the result of buildings collapsing on people who stayed inside . A ferry crossing the Godavari River sank amid rough waves , killing all 42 people on board . Overall , the cyclone killed at least 978 people in Andhra Pradesh , with 1 @,@ 375 people listed as missing in January 1997 . However , the Red Cross did not expect to find all of the missing bodies , as some were likely washed into the Bay of Bengal . A later report to the Food and Agriculture Organization indicated there were 1 @,@ 077 confirmed deaths , with an unconfirmed death toll as high as 2 @,@ 760 .

= = Aftermath = =

Following the storm 's heavy damage , homeless residents resided in temporary camps . Later , the Indian government set up 742 relief centers housing 177 @,@ 000 people , utilizing schools and office buildings . However , residents did not stay for extended periods of time in the shelters , as rebuilding began within three days of the storm 's landfall . Many of the displaced people returned to their homes after the storm receded . Workers restored water service and distributed potable water to those in need . Workers used cranes to remove trees from highways . Roads and communication links were quickly restored , as was the power supply . Later , damaged houses were reconstructed with tiled roofs while destroyed houses were rebuilt on concrete slabs , both to withstand stronger winds .

The Andhra Pradesh government coordinated with the Indian Red Cross Society to provide relief goods to the affected citizens , such as 75 kg (165 lb) of rice per family . The Red Cross sent 10 trucks carrying blankets , food , and cooking supplies from Delhi to Andhra Pradesh , to be distributed by the Andhra Pradesh Red Cross . India 's military enacted search and rescue missions in the days following the storm . Six helicopters worked continuously to airlift food , water , and medicine to storm victims , although residents fought over the aid in poor areas . Helicopters also surveyed the storm damage , as many affected small villages were not linked by roads . About 935 medical teams were established following the storm , and chlorinated drinking tablets were distributed to purify water , in an attempt to prevent a cholera outbreak . Cholera spreads through stagnant contaminated water , and there were eight reports of storm victims contracting the disease . In the months after the storm , foreign governments and international organizations donated about US $ 500 @,@ 000 .

The World Bank considered the cyclone as having a significant effect on Andhra Pradesh 's economy . Andhra Pradesh 's chief minister N. Chandrababu Naidu estimated that the state would take as long as 30 years to recover from the storm . The government provided RS $ 1 @,@ 500 (US $ 420) to every family whose hut collapsed during the storm , and RS $ 100 @,@ 000 (US $ 2 @,@ 857) to the family of every person killed by the storm . However , there were also reports of people stealing bodies to receive the payment . The federal government provided about US $ 12 million to the state , as well as tax deductions for monetary donations . Former Union Minister Rangaiah Naidu opined that the state government overinflated the damage estimates to qualify for additional aid , in part due to the government spending annual disaster subsidies for salaries . The World Bank credited the government 's experience with disasters as saving lives , although the response to the disaster was largely in repairing damage , rather than mitigating against future storms . The storm also demonstrated the region 's outdated infrastructure .

Following the heavy damage from the cyclone and other recent disasters , the World Bank enacted a plan for Andhra Pradesh in April 1997 , consisting of repairing damaged infrastructure , an updated disaster plan , and technical assistance to the state government . Shelters and roads would be improved to higher standards . This plan ultimately cost about US $ 175 million and was

completed in July 2003 , three years longer than expected but at a lower cost due to the Indian rupee losing some of its value . Power lines were improved to withstand winds of 200 km / h (120 mph) , while drains were enlarged and a coastal plant system was created to lessen flooding . An additional 82 public shelters were constructed . However , the plan failed to yield a long term disaster policy for the state .