

= Tropical Storm Cindy (1993) =

Tropical Storm Cindy was a weak but unusually wet Atlantic tropical cyclone that caused disastrous floods and mudslides across Martinique in August 1993 . Forming east of the island , Cindy became the annual hurricane season 's third named storm on August 14 . Due to unfavorable atmospheric conditions , the storm remained disorganized throughout its journey across the northeastern Caribbean Sea . After attaining maximum sustained winds of 45 mph (75 km / h) , Cindy began to weaken from interaction with the high terrain of Hispaniola . It made landfall in the Dominican Republic as a tropical depression on August 16 , and dissipated over the territory the following day .

Despite its poor cloud and wind structure , Cindy dropped torrential rain over portions of the northeastern Caribbean . The island of Martinique received a record 12 inches (305 mm) of rain over a 24 @-@ hour period , affecting many northern villages and communes . Le Prêcheur in particular was devastated by an extensive debris flow , which washed away entire structures . The disaster left two people dead and hundreds homeless on the island , and wrought \$ 19 million (1993 USD) in damage . En route to Hispaniola , Cindy affected the Virgin Islands and Puerto Rico with rough surf and moderate rain . Heavy downpours and flooding killed two people in the Dominican Republic , though the exact extent of the damage there is unknown .

= = Meteorological history = =

The origins of Tropical Storm Cindy can be traced to a tropical wave that departed the western coast of Africa on August 8 , 1993 . Over the following days , the wave tracked steadily west @-@ northwestward across the tropical Atlantic while retaining a distinct cloud pattern on satellite images . Although initial data from a reconnaissance aircraft mission on August 13 indicated that the system lacked a defined wind circulation , a second mission at 1200 UTC the next day revealed an improvement in its structure at the lower levels of the atmosphere . The National Hurricane Center (NHC) thus classified the system as a tropical depression ? a tropical cyclone with sustained winds of less than 39 mph (62 km / h) ? and initiated public advisories on it soon thereafter .

Steered by a mid- to low @-@ level wind flow , the depression decreased in forward speed and continued west @-@ northwest toward Martinique . Satellite images showed the development of a central dense overcast , and reconnaissance soon revealed that wind speeds near the center had increased to gale force . Based on this , the NHC upgraded the depression to Tropical Storm Cindy at 1800 UTC on August 14 , at which time the cyclone was located over Martinique with winds of 40 mph (65 km) . Although Cindy briefly developed a favorable outflow , its upper @-@ level structure debilitated after it moved away from the Lesser Antilles , preventing further development . Over the course of August 15 , Cindy 's cloud pattern remained disorganized due to unfavorable wind shear ; the center of circulation became ill defined , with the strongest thunderstorms confined to the eastern portion of the cyclone . Despite the unfavorable conditions , the storm managed to strengthen marginally on August 16 , attaining its peak intensity with winds of 45 mph (75 km / h) and a minimum pressure of 1007 mbar (hPa ; 29 @.@ 74 inHg) , roughly 85 mi (140 km) southeast of Santo Domingo .

Shortly after peaking in strength , Cindy began to interact with the mountains of nearby Hispaniola . The high terrain disrupted its circulation , causing it to weaken to a tropical depression around 2100 UTC on August 16 . The depression made landfall near Barahona , Dominican Republic , with winds of 35 mph (55 km / h) . It became increasingly disorganized over land , prompting the NHC to declassify it as a tropical cyclone on August 17 . The remnants proceeded inland near the border with Haiti and emerged into the Atlantic , where they spread across the Bahamas before eventually dissipating the next day .

= = Preparations = =

When Cindy became a tropical cyclone on August 14 , tropical storm warnings were issued for the Lesser Antilles from Martinique northward to the Virgin Islands . A tropical storm watch was posted

for Puerto Rico at the time . The warnings , excluding those for the Virgin Islands , were discontinued on August 15 . As Cindy drifted further north later that day , the watch for Puerto Rico was upgraded to a tropical storm warning . Officials issued flash flood warnings for parts of the island , and about 600 people living in flood @-@ prone areas sought shelter ahead of the storm . Ferry service between Fajardo and the offshore islands of Culebra and Vieques was suspended , leaving about 400 passengers stranded for a day . A price freeze was placed on emergency supplies such as wood , nails , batteries , kerosene , and lanterns .

Also on August 15 , a tropical storm warning was issued for the Dominican Republic , from Samaná to Cabo Engaño along the northern coast and westward to Isla Beata off the southwestern coast . Thousands of residents stocked up on bottled water , canned goods , and gas , though stores in and around the capital remained closed for the day . The Santo Domingo International Airport suspended all flight operations on the morning of August 16 . The tropical storm warning for the island was discontinued when Cindy made landfall as no more than a weak tropical depression . In Cuba , a storm alert was issued for eastern provinces as forecasters warned of possible heavy rainfall .

= = Impact = =

= = = Lesser Antilles = = =

On August 14 , Cindy passed over Martinique with rough winds and particularly violent rain . The greatest quantities fell to the northeast of a line between Sainte @-@ Marie and Fort @-@ de @-@ France , with day totals of more than 4 in (100 mm) recorded at every weather station in that region . The highest 1- and 24 @-@ hour rainfall rates were observed in Le Prêcheur , totaling 5 @-@ 79 in (147 mm) and 12 @-@ 0 in (305 mm) , respectively . These amounts were well above the September average of 9 @-@ 29 in (236 mm) , making Cindy one of the most extreme rain events in the island 's history . A maximum gust of 40 mph (65 km / h) was recorded during the storm , though sustained winds onshore did not reach tropical storm force .

Initially , Cindy 's brisk winds downed banana trees and power lines across northern Martinique . After hours of continued rain , several rivers ? such as the Rivière des Pères , Rivière Claire and Rivière Sèche ? quickly swelled and overflowed . Heavy flooding and mudslides swept through northern villages , submerging homes and destroying roads and bridges . News footage on national television showed " cars [being] swept away to sea and buried in mud " . The Prêcheur River , which normally flows at 18 ft³ / s (0 @-@ 5 m³ / s) , burst its banks upon attaining an exceptional discharge rate of nearly 25 @-@ 000 ft³ / s (700 m³ / s) . Large amounts of volcanic matter from the riverbed congealed into a massive debris flow that struck the small commune of Le Prêcheur . Reaching heights of up to 10 ft (3 m) , the debris completely covered houses and roads and wreaked an estimated ? 15 million (1993 value ; \$ 2 @-@ 7 million in 1993 USD) in structural damage . Flash floods following the overflow of the Grande Rivière surged through the adjacent village of the same name , devastating property and drowning one person . Despite recent improvements to its flood defenses , the Rivière Roxelane rapidly topped its banks and inundated much of Saint @-@ Pierre . Farther south , a combination of torrential rainfall and poor storm drains resulted in widespread flood damage to private property and an aquafarm in Le Morne @-@ Vert .

In all , Cindy killed 2 people , injured 11 , and destroyed more than 150 homes across Martinique . Monetary losses reached ? 107 million (\$ 19 million) , with road damage pinned at ? 68 million (\$ 12 million) . After the storm 's passage , thousands of people on the island sought refuge in emergency shelters , and about 3 @-@ 000 residents became homeless . La Capricieuse , a French Navy ship stationed in French Guiana , delivered disaster relief supplies to Fort @-@ de @-@ France ; the goods included 250 packages with clothing items , distributed by the Lions Club Association of Saint Barthélemy . Unseasonable sea conditions in Cindy 's wake temporarily hindered local fishers from selling their catch to trading vessels in Petite Martinique . Due to the severity of the flooding in Martinique , waterways and harbors were dredged and river banks and

dykes were reinforced to prevent recurrence .

Minimal effects were felt elsewhere in the Lesser Antilles . In Guadeloupe , the storm dropped rain across southern Basse @-@ Terre Island through August 14 ? 15 ; a peak total of 9 @.@ 02 in (229 mm) was recorded at the summit of La Grande Soufrière . Wind gusts at Raizet Airport reached 38 mph (61 km / h) , just below tropical storm force . Moderate breeze embedded with gusts to 28 mph (44 km / h) brushed Dominica , and 1 @.@ 25 in (32 mm) of rain fell at Canefield Airport within 24 hours of Cindy 's passage . Further south , a weather station in Saint Lucia recorded 1 @.@ 88 in (48 mm) of precipitation , as well as light winds . As Cindy passed south of the Virgin Islands , unsettled seas and minor beach erosion affected the islands ' southern shores , with swells of 4 to 5 ft (1 @.@ 2 to 1 @.@ 5 m) reported at Saint Croix . Onshore , the island experienced wind gusts to 35 mph (55 km / h) and 1 @.@ 48 in (38 mm) of rainfall .

= = = Greater Antilles = = =

On August 16 , Cindy made its closest point of approach to Puerto Rico , although its center remained well south of the island . Impact from the storm was thus limited to intermittent downpours and 8 ft (2 @.@ 4 m) waves along the southern coast . The rough seas caused some minor erosion to beach facilities . According to a report from the United States Geological Survey (USGS) , a maximum of 5 @.@ 54 in (141 mm) of rain fell near Río Cerrillos in Ponce , though the highest measurement from the Weather Prediction Center (WPC) was 4 @.@ 60 in (117 mm) at Puerto Real in Cabo Rojo . Many other locations received rainfall amounts of 2 @.@ 0 ? 4 @.@ 5 in (50 ? 115 mm) , which flooded some roads and low @-@ lying areas .

Cindy brought considerable rainfall to southern and eastern parts of the Dominican Republic , with totals of 4 ? 10 in (100 ? 255 mm) . Upon the storm 's landfall in the country , winds reached 35 mph (55 km / h) in Barahona . The rain filled rivers and caused scattered street flooding , affecting hundreds of houses . In Villa Altagracia , one fatality occurred when a child drowned in flood waters ; the final death toll for the country stood at two . There were no reports of damage elsewhere after Cindy 's rapid demise over Hispaniola , though it is likely that the remnants produced localized showers in Haiti .