= Cyclone Dina =

Intense Tropical Cyclone Dina was a cyclone that caused record flooding across parts of Réunion . Originating from a tropical disturbance on 15 January 2002 near the Chagos Archipelago , the precursor to Dina quickly developed within a region favoring tropical cyclogenesis . By January 17 , the system had developed enough organized convection as it moved southwestward to be declared a tropical depression . Rapid intensification occurred shortly thereafter , with the system attaining winds in excess of 120 km / h (75 mph) on January 18 . Dina achieved its peak intensity on January 20 as an intense tropical cyclone winds of 215 km / h (130 mph) . Hours after reaching hits strength , the storm bypassed Rodrigues Island about 150 km (93 mi) to its north . On January 21 , the storm brushed Mauritius and Réunion as an intense tropical cyclone before turning southward . Once on a southward course , steady weakening ensued and the system eventually transitioned into an extratropical cyclone on January 25 . The remnants of the storm accelerated southeastward and were last noted on January 28 before being absorbed into a polar trough .

Across Mauritius and Réunion , torrential rains and destructive winds from the cyclone resulted in extensive to " catastrophic " damage . The entire island of Mauritius lost power during the storm and widespread structural damage took place . Agricultural and property damage amounted to US $ 47 million and US $ 50 million respectively in the republic . Nine fatalities were attribute to the storm in Mauritius : five off the coast of Rodrigues Island and four on the main island . More extensive damage was seen on Réunion where up to 2 @,@ 102 mm (82 @.@ 8 in) of rain fell over three days . Record to near @-@ record flooding destroyed many homes , washed out roads , and caused catastrophic agricultural damage . Destructive winds , measured up to 280 km / h (170 mph) also crippled communications . In all , six people died on the island and losses were estimated at ? 200 million (US $ 190 million) .

= = Meteorological history = =

On January 15 , a tropical disturbance began organizing near the Chagos Archipelago in the South Indian Ocean convergence zone , which is an extended area of convection connected to the monsoon . The thunderstorms gradually organized , associated with a weak circulation and located within an area of moderate wind shear . A distinct low pressure area developed on January 16 , about 750 km (470 mi) east of Diego Garcia . The thunderstorms were primarily located along the western periphery due to continued shear , and ordinarily would prevent significant development . The system moved to the southwest along the north side of a ridge , and despite the shear it developed into a tropical disturbance late on January 16 . Subsequently , the system rapidly organized , developing rainbands as the convection increased .

At 0000 UTC on January 17 , Météo @-@ France (MFR) upgraded the disturbance to a tropical depression , and six hours later upgraded the system further to Tropical Storm Dina . Shortly thereafter , the Joint Typhoon Warning Center (JTWC) issued a tropical cyclone formation alert , and later that day initiated advisories about 425 km (265 mi) south of Diego Garcia . Dina quickly intensified , and its T @-@ numbers using the Dvorak technique increased by 0 @.@ 5 every six hours during the storm 's development phase . An eye began developing late on January 17 , and at 1200 UTC on January 18 , MFR upgraded Dina to a tropical cyclone , or the equivalent of a Category 1 hurricane on the Saffir @-@ Simpson Hurricane Scale . This was only 36 hours after it was first classified as a tropical disturbance , which is much less than the five days most tropical cyclones take . About three hours earlier , the JTWC had also upgraded the storm to tropical cyclone status .

The small eye of Dina , only 20 km (12 mi) in diameter , quickly became well @-@ defined , although it became obscured by the central dense overcast on visible satellite imagery . On January 19 , the cyclone slowed as it turned to the west @-@ southwest , after the ridge to its south intensified . The intensification rate briefly slowed , before Dina rapidly intensified late on January 19 , becoming an intense tropical cyclone early the next day . Surrounded by an eyewall of deep convection , Dina intensified to reach its peak intensity on January 20 . Based on satellite intensity

estimates between 235 and 259 km / h (146 and 161 mph) , the JTWC estimated peak one @-@ minute sustained winds of 240 km / h (150 mph) , about 205 km (127 mi) north @-@ northeast of Rodrigues Island . At around the same time , MFR estimated peak ten @-@ minute winds of 215 km / h (130 mph) . While at its peak , Dina had a very symmetrical structure , and gusts were estimated to have reached 300 km / h (190 mph) .

On January 20 while near peak intensity , Dina slowed its movement further and moved more toward the west . After previously being in the projected track of the cyclone , Rodrigues Island was bypassed by the cyclone passing about 150 km (93 mi) to its north . After passing by the island , Dina underwent an eyewall replacement cycle , which resulted in an outer eyewall forming and replacing the previous , smaller one . This resulted in the cyclone weakening slightly , although it retained much of its intensity while tracking toward Mauritius and Réunion . Late on January 21 , Dina passed about 65 km (40 mi) north of Cape Malheureux in Mauritius , with 10 @-@ minute winds estimated at 185 km / h (115 mph) ; however , the strongest winds remained offshore . At the time , the storm 's eye became asymmetric with a diameter of 85 km (53 mi) . Late the next day , Dina also passed about 65 km (40 mi) off the north coast of Réunion , and although the island was in the forecast track , the cyclone accelerated to the west in the final hours and spared the island from the strongest winds . This abrupt shift in tract took place as the cyclone interacted with the high terrain of Réunion . Additionally , Doppler weather radar showed the highest reflectivity values to be 40 to 60 km (25 to 37 mi) from the center . On January 23 , Dina weakened below intense tropical cyclone status while it accelerated to the southwest ; the change in movement was due to the ridge moving further to the southeast . Increased wind shear due to an approaching trough contributed to the weakening , and by late on January 23 the eye dissipated . The next day , Dina weakened into a tropical storm , after the convection diminished around the center . Late on January 24 , the JTWC discontinued advisories , and about 24 hours later , MFR classified Dina as an extratropical cyclone . The system accelerated to the southeast and was absorbed by a polar trough on January 28 .

= = Preparations , impact , and aftermath = =

= = = Mauritius = = =

Less than a day prior to Cyclone Dina 's arrival in Mauritius , officials in the nation closed schools , government offices , businesses , and ports . A state of alert was issued for the entire country , meaning that those at greatest risk should seek shelter . All flights to and from the nation were canceled " until further notice . " Across the island , 259 people sought refuge in shelters . According to NASA , there was potential for a 12 @.@ 2 m (40 ft) storm surge as the cyclone moved over the region .

The first island to be affected by the storm was Rodrigues . There gusts reached 122 km / h (76 mph) . Rainfall was light on the island , reaching 94 mm (3 @.@ 7 in) at Roche Bon Dieu . The cyclone killed five fishermen offshore Rodrigues . Numerous areas across Mauritius recorded hurricane @-@ force winds . On the republic 's main island , gusts reached 230 km / h (140 mph) at Le Morne Brabant . A station near the capital city of Port Louis reported a gust of 206 km / h (128 mph) . Torrential rainfall affected much of Mauritius during Dina 's passage , with a maximum of 745 @.@ 2 mm (29 @.@ 34 in) falling in Pierrefonds . This was more than the average monthly rainfall , and most of the precipitation fell in about 24 hours . A barometric pressure of 935 @.@ 9 mbar (hPa ; 27 @.@ 64 inHg) was recorded in Vacoas @-@ Phoenix . Flooding and mudslides greatly disrupted the public water system , with most people losing running water .

Power and communications across Rodrigues and the island of Mauritius were crippled by the storm , with the entirety of the former and 90 percent of the latter losing electricity . For approximately ten hours , the country was cut off from the outside world , with all communications disrupted . About 50 @,@ 000 of the nation 's 280 @,@ 000 telecommunication lines sustained serious damage , resulting in prolonged power outages . Repair crews estimated that it would take

until January 27 , nearly a week after the storm 's passage , for power to be fully restored . Widespread areas also lost water on Mauritius . Schools across the region sustained significant damage and as a precautionary measure , all classes were canceled until January 29 . Agriculture sustained considerable losses as a result of the storm . Approximately 15 metric tons of flour and 20 metric tons of rice were damaged and preliminary estimates for sugarcane losses across the island reached US $ 47 million . Property damage from the storm amounted to US $ 50 million , and there were four deaths on the island ; three were caused by traffic accidents , and the other was a man who died while making storm preparations .

In the wake of the storm , a special mobile force was dispatched by officials to assist in relief operations . Red Cross distribution centers were set up on Mauritius and served food and clothing to more than 500 by January 25 . Despite the severity of damage , government officials declined to appeal for international aid . Although no requests for aid were made , the Government of Norway provided US $ 10 @,@ 000 worth of funds to the nation . Owing to the effects of Cyclone Dina and several other meteorological factors , the economy of Mauritius suffered significantly in 2002 as a whole . Annual growth dropped to about 1 @.@ 9 percent from approximately 5 percent in 2001 . The sugarcane industry suffered greatly from the storm , experiencing a 19 @.@ 3 percent decrease .

= = = Réunion = = =

Due to the storm 's close passage to the island , much of Réunion experienced hurricane @-@ force winds . The strongest observed gust was 280 km / h (170 mph) on Maïdo ; however , based on the destruction of Meteo @-@ France 's Doppler weather radar , winds could have exceeded 300 km / h (190 mph) . Plaine des Cafres reported gusts of over 150 km / h (93 mph) for at least 15 hours . These winds caused extensive damage , crippling communications , devastating infrastructure , and left more than 160 @,@ 000 families , about 70 percent of the island 's population , without power . Some areas were without power for nine days . Additionally , about 25 percent of the island was left without running water . Damaged transmitters interrupted radio and television broadcasts for several days . In Saint @-@ Denis , two people were seriously injured after a wall collapsed on them . Although winds were strong , the majority of damage was limited to broken windows , removed sheet metal , broken gutters , and removed siding . The most severe damage took place in exposed areas at higher elevations or where tunneling of the wind occurred .

Heavy rains produced by Dina triggered flash flooding and many landslides , further crippling travel and forcing at least 2 @,@ 500 people to seek refuge in public shelters . Some areas recorded more than 400 mm (16 in) in a 24 ? hour span , notably the Bellecombe resting place (a volcano lodge) which measured 953 mm (37 @.@ 5 in) in 24 hours as well as a two @-@ day total of 1 @,@ 360 mm (54 in) . The heaviest rainfall was measured in La Plaine des Chicots at 2 @,@ 102 mm (82 @.@ 8 in) . With the ground already saturated from previous rain events , the torrential rains caused numerous rivers across the island to burst their banks . The Ravine des Cabris reached an all @-@ time record flood while three other rivers reached their second @-@ highest levels , behind the flood event caused by Cyclone Firinga in 1989 . Heavy rains occurred in the typically dry western portion of the island , which resulted in significant flooding . Many ecosystems suffered from these floods with water quality greatly degraded and flow disrupted . However , in post @-@ storm surveys in July 2002 , it was found that the impact was not catastrophic and the ecosystems would eventually recover . Significant runoff also prompted fears of algae blooms that would damage coral reefs . Numerous roads were damaged or washed out by the floods , leaving approximately ? 42 @.@ 9 million (US $ 37 @.@ 6 million) in losses . In Lengevin village within the Saint @-@ Joseph department , 35 families were forced to evacuate . Many landslides took place in addition to flooding , further hampering travel and isolating hundreds of residents .

Catastrophic agricultural damage occurred across the island , with losses reaching an estimated ? 76 million (US $ 66 @.@ 7 million) . The entire fruit and vegetable crop was lost during the storm while the vanilla and geranium crops sustained heavy damage . Additionally , about 15 ? 20 percent of the sugarcane crop was destroyed . Horticulture sustained about 50 percent losses ; however ,

much of this resulted from lost work hours . Poultry farms suffered about 70 percent losses , from lost animals and destroyed buildings . Along the coast , large waves measured up to 12 @.@ 47 m (40 @.@ 9 ft) caused moderate damage . Additionally , an estimated storm surge of 6 to 9 m (20 to 30 ft) impacted the island . Some buildings were flooded , roads washed out , and other roads were left covered in debris .

 In all , about 15 @,@ 000 damage claims were filed across Réunion , with a total of 3 @,@ 251 homes damaged and about 850 condemned or destroyed . Property damage from the storm amounted to ? 95 million (US $ 83 @.@ 4 million) . Collectively , losses on the island were estimated at ? 200 million (US $ 190 million) . Although there were no fatalities directly related to the storm , six people died in various events indirectly caused by Dina .

 In the wake of Cyclone Dina 's devastation on January 23 , then French Prime Minister Lionel Jospin ordered a relief team of 200 personnel to be dispatched to the island . He also expressed " deep personal sympathy " to the residents of Réunion . The following day , the Catholic Relief Services released immediate funds of ? 16 @,@ 000 (US $ 14 @,@ 000) . An estimated 50 @,@ 000 tonnes of debris was cleaned up across the island , the majority of which was in the Northwest Department , and cost waste management crews approximately ? 4 @.@ 5 million (US $ 4 million) to process . Initially , the national disaster program was slow to react , with funding first being available on February 5 . The first payments were made starting a month later . In the five months following the storm , the Government of France provided about ? 10 @.@ 6 million (US $ 12 million) in aid to farmers , accounting for an overestimation of about 20 percent in needs . Based on meteorological statistics regarding wind speed and rainfall , Cyclone Dina was regarded as a 1 @-@ in @-@ 30 ? 50 year event in Réunion .