= Cyclone Kesiny =

Tropical Cyclone Kesiny was the first recorded tropical cyclone ? the equivalent of a minimal hurricane ? to make landfall in the month of May 2002 in the south @-@ west Indian Ocean . The final named storm of the busy 2001 ? 02 South @-@ West Indian Ocean cyclone season , Kesiny formed on May 2 from a trough near the equator . Its formation was the result of an increase in the Madden ? Julian oscillation , which also contributed to a twin storm in the north Indian Ocean that hit Oman , and another set of storms in northeast and southeast Indian Ocean . Kesiny initially moved to the southeast , but later turned to the southwest due to a strengthening ridge . On May 6 , it intensified into a tropical cyclone , but later weakened and was not expected to re @-@ strengthen . However , Kesiny developed an eye and re @-@ intensified into a tropical cyclone on May 9 , reaching peak winds of 130 km / h (81 mph) before striking Madagascar about 60 km (37 mi) southeast of Antsiranana . It weakened while crossing the country , and after turning to the south it struck the country again before dissipating on May 11 .

Across Madagascar , Cyclone Kesiny dropped heavy rainfall , reaching 891 mm (35 @.@ 1 in) in three days at Toamasina , the second largest city in the country . The rains caused mudslides and flooding in the eastern portion of the country , wrecking the rice and maize crops and leaving 5 @,@ 000 people homeless . At least 33 bridges were destroyed , and many roads were damaged . A total of 33 people were killed , and 1 @,@ 200 people were injured . The cyclone struck in the midst of a political crisis , in which the top two candidates of the Malagasy presidential election in 2001 declared themselves the winner ; the incumbent , who lost , declared Toamasina as the capital city , and the political instability disrupted relief efforts .

= = Meteorological history = =

In late April 2002 , an area of convection , or thunderstorms , persisted to the west @-@ southwest of Diego Garcia in the south @-@ central Indian Ocean , associated with a trough near the equator . The system had a broad circulation , and initially moved slowly to the east @-@ southeast . It developed due to an increase in the Madden ? Julian oscillation (MJO) , which moved eastward across the Indian Ocean . The same system spawned a disturbance in the northern Indian Ocean that later struck Oman as a tropical cyclone . Such simultaneous systems in opposite hemispheres occasionally occur in the spring or autumn ; in May 2002 , the powerful MJO pulse produced two such sets of storms , later producing a set in the eastern Indian Ocean that became a deep depression that struck Myanmar and Tropical Storm Errol to the southwest of Indonesia . On April 30 , Météo @-@ France (MFR) classified the system as a zone of disturbed weather . It slowly organized , prompting the Joint Typhoon Warning Center (JTWC) to issue a tropical cyclone formation alert late on May 2 , around the time that MFR classified it as Tropical Disturbance 14 . The thunderstorms became more concentrated around an increasingly well @-@ defined center , and with minimal wind shear , the system strengthened into Tropical Depression 14 on May 3 . That day , the JTWC initiated advisories on Tropical Cyclone 23S .

Developing rainbands and a central dense overcast , the depression intensified into Tropical Storm Kesiny early on May 4 . Gradual intensification continued , although initially the convection remained dislocated to the west of the center . The circulation later moved beneath the thunderstorms , and a strengthening ridge turned Kesiny toward the west @-@ southwest . Late on May 5 , a ragged eye began forming within the convection , which was indicative of a strengthening storm . That day , MFR upgraded Kesiny to a severe tropical storm . Early on May 6 , the JTWC upgraded the storm to the equivalent of a minimal hurricane , with maximum 1 minute sustained winds of 120 km / h (75 mph) . Around that time the outflow became pronounced to the north and south , although a decrease in outflow caused Kesiny to weaken . By May 7 , the circulation was exposed from the convection , and little re @-@ intensification was expected . By that time , the storm was located about 650 km (400 mi) east of the northern tip of Madagascar .

Despite predictions for no further intensification , Kesiny redeveloped convection late on May 8 that organized into a central dense overcast . By early on May 9 , another eye had developed , and the

storm quickly intensified into a tropical cyclone , according to MFR . This occurred despite little change in atmospheric conditions , although outflow had improved . Later on May 9 , Kesiny struck northeastern Madagascar about 60 km (37 mi) southeast of Antsiranana , with peak winds of 130 km / h (81 mph) . This made it the first known tropical cyclone on record to make landfall in the month in the basin . While crossing northern Madagascar , the eye quickly dissipated , and the winds decreased . Although re @-@ intensification was expected over the Mozambique Channel , Kesiny remained weak while turning toward the south . On May 10 , the storm weakened to a tropical depression , and subsequently it made a second landfall about 75 km (47 mi) northeast of Mahajanga . Kesiny dissipated on May 11 while inland .

= = Impact and aftermath = =

While moving through Madagascar , the cyclone produced strong winds , with gusts up to 181 km / h (112 mph) reported . Kesiny dropped heavy rainfall , particularly to the southeast of the center in the outer rainbands . In Toamasina , the second largest city in the country , 484 mm (19 @.@ 1 in) of precipitation fell in 24 hours , and 891 mm (35 @.@ 1 in) fell in three days . In northern Madagascar , rainfall totals were around 200 mm (7 @.@ 9 in) , although they occurred outside the typical rainy season . The three @-@ day total of 136 mm (5 @.@ 4 in) in Antsiranana was eight times the average May precipitation , and occurred at the start of harvesting for rice and maize . As a result , over 50 % of each of the crops were destroyed by Kesiny , amounting to thousands of hectares of destroyed crop fields . The rains caused 63 landslides in the area around Toamasina , destroying 16 bridges . The rains caused widespread flooding and mudslides , including in Toamasina . Flooding contaminated water wells , and many areas lost power for at least five days . In Nosy Be , an island offshore northwestern Madagascar , Kesiny capsized a few boats , and killed two people after a house collapsed . About 165 @,@ 000 residents in Toamasina lost both power and water . In Fenoarivo Atsinanana , seven people died , and the cyclone damaged or destroyed 17 bridges . Throughout the country , Kesiny killed at least 33 people , many of whom due to drownings , and 5 @,@ 000 people were left homeless . Overall , about 500 @,@ 000 people were directly affected , and 1 @,@ 200 people were injured .

Cyclone Kesiny struck Madagascar during a period of political strife after the Malagasy presidential election in 2001 . In the election , incumbent president Didier Ratsiraka lost to Marc Ravalomanana , but rejected the results ; after the election , Ratsiraka declared the city of Toamasina as the new capital of the country . The political crisis caused difficulties after the storm in distributing food , and Ratsiraka 's operational center in the city was damaged . During the storm , Toamasina experienced severe flooding , forcing hundreds of residents to evacuate their homes . Emergency volunteers provided water and food to the affected residents . Workers from the World Health Organization and Médecins Sans Frontières (Doctors Without Borders) provided medical assistance to residents in Toamasina during the storm . Damaged roads contributed to economic contraction , after trucks were unable to use roads and bridges in the eastern portion of the country . By October , the political crisis had ended , and the government repaired most of the damaged infrastructure . The cost of repairing the roads and bridges was about $ 2 @.@ 5 million (2002 USD) , which was paid by a $ 50 million credit from the World Bank Group . Due to poor harvest related to the storm in some areas , the World Food Programme provided 18 @,@ 000 tonnes of food to 394 @,@ 250 residents , beginning in November 2002 at the request of the Malagasy government . After the storm , the government of Norway donated kr1.2 million (2002 Norwegian krone , 172 @,@ 000 USD) for storm relief , and the government of Switzerland provided about $ 33 @,@ 000 (USD) .