= Cyclone Hina =

Severe Tropical Cyclone Hina in March 1997 was the worst tropical cyclone to affect the South Pacific island nation of Tonga since Cyclone Isaac in 1982 . The system was first noted within the monsoon trough on March 11 , 1997 , as a weak shallow depression within the vicinity of Rotuma . Over the next two days , the depression remained near Rotuma with no preferred movement , as it started to develop further within favorable conditions for further development . The system was subsequently named Hina on March 15 , after it had started to move eastwards and had passed to the southeast of Niulakita , Tuvalu . During that day the system moved south @-@ eastwards and impacted Wallis and Futuna , before it passed over Tonga 's southern islands of Tongatapu and ' Eua during March 16 . After impacting Tonga the system moved rapidly towards the south @-@ southeast and weakened below tropical cyclone intensity , before it was last noted on March 21 about 1 @,@ 500 km (930 mi) to the south of the Pitcairn Islands . During the systems post analysis it was determined that the warning centers had underestimated Hina 's intensity as it passed over Tonga , after damage had been greater than expected in the island nation .

Within Tuvalu it was difficult to assess damage done by Hina alone , after Cyclone Gavin impacted the area a week earlier . Storm surge and strong winds from both cyclones caused a severe amount of coastal erosion on all of the country ? s nine atolls , with about 6 @.@ 7 % of land washed into the sea . Hina caused no significant damage on Walls Island , while it caused some damage to crops and destroyed parts of the road on Futuna Island . As Hina affected Tonga , there were no casualties reported as the system affected the island nation , however , Vaiola Hospital reported that they had treated a number of patients for injuries that were caused during the systems aftermath . One indirect death was also reported , after a person suffering a heart attack while evacuating from his home . The cyclone left extensive damage to utilities and agriculture on Tongatapu , where trees were uprooted and more than 12 @,@ 000 tonnes (26 @,@ 000 @,@ 000 lb) of fruit and food crops were destroyed , mostly to banana and coconut trees . After the cyclone the Tongan Government requested and received emergency aid , from the governments of several countries including France , Australia , New Zealand , Japan and the United Kingdom . This was after the government had provided T $ 5 million (US $ 3 @.@ 97 million) , or about 5 % of its national budget to facilitate the immediate start of emergency relief and repairs to essential services .

= = Meteorological history = =

During March 11 , 1997 , a shallow tropical depression developed within the monsoon trough near the Fijian Dependency : Rotuma . Over the next two days the depression remained near Rotuma with no preferred movement , as it started to develop further in an area of minimal vertical wind shear and good upper air divergence . During March 13 , as the system moved northwards , the United States Joint Typhoon Warning Center (JTWC) subsequently initiated advisories on the system and designated it as Tropical Cyclone 33P . During that day after having moved to the north , Hina curved to the east and later south @-@ eastwards , before it passed about 55 km (35 mi) to the southeast of Niulakita the southernmost island of Tuvalu during March 14 . Early on March 15 , after the system had passed near Niulakita , the depression developed into a category 1 tropical cyclone on the Australian tropical cyclone intensity scale and was named Hina by the Fiji Meteorological Service (FMS) . After being named the system accelerated towards the south @-@ southeast and an area of increasing vertical wind shear , as it passed near the west coast of Futuna Island . The system also crossed the 180th meridian during that day , which prompted the JTWC to pass the responsibility for warning the United States Government to the Naval Pacific Meteorology and Oceanography Center (NPMOC) .

Early on March 16 , as Hina passed over the southern islands of Tonga , the FMS reported that based on satellite imagery and guidance from other meteorological centers , the system had 10 @-@ minute sustained wind speeds of 85 km / h (55 mph) . Hina subsequently passed over the islands of Tongatapu and ?Eua in southern Tonga at around 08 : 30 UTC and took less than 2 hours to inflict considerable damage on the islands . The system subsequently emerged back into the

South Pacific Ocean , with the FMS estimating that the system had storm force winds of about 95 km / h (60 mph) . Later that day the NPMOC estimated that Hina had peak 1 @-@ minute sustained windspeeds of 110 km / h (70 mph) as it rapidly moved below 25 ° S and out of the FMS 's area of responsibility . Over the next few days the system continued to move towards the south @-@ southeast and gradually weakened , before the NPMOC issued its final advisory during March 18 , as the system was undergoing a transition to become an extratropical cyclone . The system weakened below tropical cyclone intensity during the next day , before it was last noted by the Wellington Tropical Cyclone Warning Center on March 21 , while located about 1 @,@ 500 km (930 mi) to the south of the Pitcairn Islands .

After an analysis of the observed data and the damage in Tonga , the FMS estimated that Hina 's landfall intensity was underestimated . The observed wind data suggested that the system had storm force sustained winds but had peak gusts comparable to hurricane force . Furthermore , the lowest pressure values also indicated that the winds had to be stronger than estimated for it to fit known wind pressure relationships . It was subsequently deduced by the FMS that Hina was a minimal category 3 severe tropical cyclone , with peak 10 @-@ minute sustained wind speeds of 120 km / h (75 mph) when it crossed the Tonga island of Tongatapu at around 08 : 30 UTC (21 : 30 UTC + 13) . The NPMOC also revised their estimate of Hina 's peak 1 @-@ minute sustained wind speeds from 110 km / h (70 mph) to 140 km / h (85 mph) during post analysis , which made the system equivalent to a category one hurricane on the Saffir ? Simpson hurricane wind scale .

= = Preparations and impact = =

Cyclone Hina caused over US $ 15 @.@ 2 million worth of damage and was indirectly responsible for one death as it affected Tuvalu , Wallis and Futuna and Tonga . The system 's worst impact was reported on the Tongatapu and ' Eua , which are the southern most islands of the Kingdom of Tonga . Due to the impact of this storm , the name Hina was retired from the tropical cyclone naming lists .

= = = Tuvalu = = =

On March 12 , the FMS issued gale warnings for the southern islands of Tuvalu and a tropical cyclone alert for the rest of the archipelago . The gale warning was subsequently extended out to cover the whole of the archipelago during the next day , after marginal squally gale force winds were observed to the north of the monsoon trough in association with the system . Over the next two days the warning was kept in force while Tuvalu experienced strong to gale force winds because of a convergence zone located over the islands and Hina which passed about 55 km (35 mi) to the southeast of Niulakita , Tuvalu . Cyclone Hina was the second of three tropical cyclones to affect Tuvalu during the 1996 @-@ 97 cyclone season , after Cyclone Gavin had severely damaged the islands a weak earlier and Cyclone Keli affected the islands during June 1997 .

Cyclone Gavin and Hina 's waves , storm surge and strong winds both caused a severe amount of coastal erosion on all of the country ? s nine atolls with about 6 @.@ 7 % of the land washed into the sea . Both cyclones caused severe coastal erosion and destruction to food crops , mostly to the southern islands of Niulakita and Nukulaelae , while damage in northern and central islands was confined mostly to houses . A damage assessment team noted that it was difficult to assess damage done by Hina alone and estimated the total damage from both cyclones at US $ 2 @.@ 23 million (AU $ 2 @.@ 14 million) . It was later estimated after Cyclone Keli had affected the islands between June 12 ? 16 , 1996 , that the three cyclones had been responsible for about 50 hectares (120 acres) of land disappearing into the sea . Rehabilitation costs from all three cyclones , amounted to US $ 653 thousand (AU $ 1 million) .

= = = Wallis and Futuna = = =

As the system developed into a tropical cyclone during March 14 , gale warnings were issued for the French territory of Wallis and Futuna . The system at this time was located about 220 km (135

mi) to the northwest of Futuna Island and subsequently accelerated , towards the south @-@ southeast and passed near the island during the next day . Cyclone Hina was the second of four tropical cyclones to affect Wallis and Futuna in a ten @-@ month period , after cyclone Gavin had severely damaged food crops ten days earlier and Cyclones Keli and Ron affected the islands during June 1997 and January 1998 . During March 15 as Hina affected the islands , winds of 76 km / h (47 mph) and 115 km / h (71 mph) were recorded at Hihifo on Wallis and Maopoopo on Futuna respectively . Rainfall totals of 220 @.@ 6 millimetres (8 @.@ 69 in) and 182 @.@ 5 mm (7 @.@ 19 in) were also recorded at Maopoopo and in Point Vele respectively . Hina caused no significant damage on Walls Island , while it caused some damage to the remaining crops and destroyed parts of the road on Futuna Island .

= = = Tonga = = =

Hina was the first of three tropical cyclones to affect Tonga during a ten @-@ month period , with Cyclones Keli and Ron affecting the island nation during June 1997 and January 1998 . Late on March 15 , ahead of the system affecting Tonga , gale warnings were issued for the Southern Tongan island groups of Ha?apai , Tongatapu and Vava?u . During the next day , Hina took less than two hours to inflict considerable damage on the Tongan islands and became the worst tropical cyclone to affect Tonga since Cyclone Isaac during 1982 . The two worst @-@ affected Tongan islands were Tongatapu and ' Eua after major damages were reported on both islands . As the system impacted Tonga , the FMS received several reports of one or more tornadoes occurring in Tonga ; however , during a post @-@ disaster survey no evidence was found to prove or disprove this claim . It was noted that several of the badly damaged houses had little or no cyclone protection while over 600 people were left homeless . Damages were greater than had been expected , with an estimated damage total of about T $ 18 @.@ 2 million Tongan Pa 'anga (US $ 15 @.@ 2 million) reported . A post disaster survey attributed the greater damages to higher than expected wind gusts caused by either a low level squall or a jet streak . There were no casualties reported as the system affected the island nation , however , Vaiola Hospital reported that they had treated a number of patients for injuries that were caused during the system 's aftermath . One indirect death was also reported , after a sea captain suffered a heart attack while evacuating from his home . Within the islands severe damage to power lines and telecommunication systems was reported . The system affected the islands after the lowest tide for the day , as a result sea damage was minimal , though some evidence of salt damage to taro plantations was observed .

On the main island of Tongatapu , extensive damages to utilities , vegetation and agriculture in places , with more than 12 @,@ 000 tonnes (26 @,@ 000 @,@ 000 lb) of fruit and food crops including banana trees and coconut palms destroyed . Some of the coconut palms were snapped , which suggested that wind gusts of between 165 ? 185 km / h (105 ? 115 mph) had been experienced on the island . Within Nuku?alofa the capital city of Tonga , there was not a lot of structural damage reported ; however , the villages to the east of the capital were severely affected . The roof and grand stand of Teufaiva Stadium was blown off , while the Parliament house , government buildings and schools were severely damaged . The MV Lofa was driven by fierce winds onto Mounu Reef in Nuku 'alofa Harbour . The Electric and Water boards sustained over T $ 2 @.@ 9 million in damage to its infrastructure , with power lines brought down throughout Tongatapu which caused a complete blackout during March 16 . Some of the uprooted trees knocked down power lines , sometimes causing a domino effect of bringing down additional power poles . As a result of the electric problems , there was a lack of electrical power to power pumps , with the water supply becoming intermittent . On ' Eua Island , Hina was estimated to have caused greater damage then Cyclone Isaac had done fifteen years previously , after the island was completely devastated by the system . The Tongan Government estimated that damage to the wharfs on Lifuka and Foa islands would cost over T $ 10 thousand to repair , while the land bridge between the two islands was closed after Hina 's winds and waves swept boulders on to the bridge .

During the system 's aftermath , insurance companies flew in people to assess the damage , while agricultural authorities on Tongatapu and ' Eua advised landowners to plant fast maturing produce

such as sweet potatoes . The Tongan Government provided T $ 5 million (US $ 3 @.@ 97 million) or about 5 % of its national budget to facilitate the immediate start of emergency relief and repairs to essential services . Tents were supplied by the National Disaster Committee and Ministry of Works to act as temporary shelters for those who were homeless after the system . By March 19 , the Tonga Electric Power Board had restored electricity to several consumers including major government buildings and the Nuku 'alofa Business District . However , several consumers were expected to be without electric until at least June 1997 . On March 25 , the Acting Prime Minister of Tonga convened a meeting of donors , where an official request for international assistance was presented . At the meeting donors were requested to review existing of proposed bilateral programs , to see if they can be adjusted or brought forward to cater for the repairs or rebuilding of schools and other government buildings . The New Zealand Government deployed to Tonga , four electricity line mechanics , a fully equipped truck , along with various supplies including tarpaulins , blankets and electric . New Zealand also offered grants off up to NZ $ 120 thousand to replace village water tanks , and NZ $ 7 thousand towards the clean @-@ up costs .

The Government of the United Kingdom granted T $ 60 thousand (GB £ 30 thousand , US $ 48 thousand) for ten emergency generators , while the Chinese Government pledged T $ 36 thousand (US $ 30 thousand) . The French government provided a cargo plane , to conduct a damage survey of the affected areas and US $ 100 thousand for tents , tarpaulins and blankets and two diesel generators . The Japanese Government provided tents , plastic sheets and other emergency aid materials to the value of T $ 59 thousand . Australia provided T $ 320 thousand for temporary roof repairs and equipment to restore electricity supplies in both Tongatapu and ' Eua . Grants between T $ 22 thousand and T $ 24 thousand were pledged by Germany , Norway and the United Nations Department of Humanitarian Affairs respectively . By early September 1997 , the reconstruction of primary school buildings damaged by the cyclone had been completed after the Tongan Government funded the project . New accommodation for primary school teachers in the Ha 'apai islands and the Niuas was also completed after the Australian and New Zealand Governments funded the projects . MMI insurance provided the Tonga Amateur Sports Association with T $ 384 thousand to cover damages to the Teufaiva Grand Stand .