= Typhoon Rammasun (2002) =

Typhoon Rammasun , known in the Philippines as Typhoon Florita , was the first of four typhoons to contribute to heavy rainfall and deadly flooding in the Philippines in July 2002 . The fifth tropical cyclone of the 2002 Pacific typhoon season , Rammasun developed around the same time as Typhoon Chataan , only further to the west . The storm tracked northwestward toward Taiwan , and on July 2 it attained its peak intensity with winds of 160 km / h (100 mph) . Rammasun turned northward , passing east of Taiwan and China . In Taiwan , the outer rainbands dropped rainfall that alleviated drought conditions . In China , the rainfall occurred after previously wet conditions , resulting in additional flooding , although damage was less than expected ; there was about $ 85 million in crop and fishery damage in one province .

After affecting Taiwan and China , Rammasun began weakening due to an approaching trough , which turned the typhoon northeastward . It passed over the Japanese island of Miyako @-@ jima and also produced strong winds in Okinawa . About 10 @,@ 000 houses lost power on the island , and high surf killed two sailors . On the Japanese mainland , there was light crop damage and one serious injury . After weakening to a tropical storm , Rammasun passed just west of the South Korean island of Cheju @-@ do , killing one person from high waves . The storm crossed the country , killing three others and leaving $ 9 @.@ 5 million in damage . High rains also affected North Korea and Primorsky Krai in the Russian Far East .

= = Meteorological history = =

Toward the end of June , the monsoon trough extended across the western North Pacific Ocean just north of the equator , spawning two tropical disturbances . The easternmost one eventually developed into Typhoon Chataan , and the western disturbance persisted to the east of Palau with an associated area of convection . The system gradually organized , developing a weak circulation after wind shear steadily decreased . Early on June 28 , the Japan Meteorological Agency (JMA) classified the system as a tropical depression near Yap in the Federated States of Micronesia (FSM) . At the same time , the Philippine Atmospheric , Geophysical and Astronomical Services Administration (PAGASA) declared the system as Tropical Depression Florita , and a few hours later the Joint Typhoon Warning Center (JTWC) initiated advisories on Tropical Depression 09W .

After forming , the depression tracked northwestward , influenced by a ridge to the northeast , although it briefly turned to the northeast due to an increase in westerly winds ; however , its northwest motion quickly resumed . A trough over the Philippine Sea increased outflow over the depression , and the convection became better organized . Early on June 29 , the JMA upgraded the depression to Tropical Storm Rammasun . While moving northwestward , the circulation initially remained broad and disorganized , located east of the cycling convection . However , Rammasun steadily intensified , and an eye developed on July 1 . That day , the JMA and the JTWC upgraded the storm to a typhoon about 930 km (575 mi) east of Luzon in the Philippines . The typhoon continued strengthening , developing concentric eyewalls with well @-@ defined rainbands . At 1500 UTC on July 2 , the JMA estimated peak 10 minute sustained winds of 160 km / h (100 mph) . Early on July 3 , the JTWC estimated 1 minute sustained winds of 205 km / h (125 mph) about 350 km (220 mi) south @-@ southeast of Okinawa , or 510 km (315 mi) southeast of Taiwan .

While at peak intensity , Rammasun turned northward , steered around the subtropical ridge to its east , and early on July 3 it struck the Japanese island of Miyako @-@ jima . A stationary trough over China weakened the convection on the western periphery of the typhoon , and the eye gradually became less organized . On July 4 , Rammasun began weakening , and by 0000 UTC on July 5 it was located about 280 km (175 mi) east @-@ northeast of Shanghai as a minimal typhoon . Shortly thereafter , Rammasun weakened to tropical stom status . An approaching trough caused the storm to accelerate to the northeast , which weakened the convection and left the circulation exposed . Around 2200 UTC on July 5 , Rammasun made landfall in South Korea , near Seosan or about 70 km (45 mi) northwest of the country ? s capital of Seoul . The JTWC estimated that the landfall intensity was around 65 km / h (40 mph) . The storm quickly crossed the country , and

although the JTWC considered Rammasun dissipated early on July 6 over the country , the JMA continued tracking the storm toward the northeast , declaring the storm extratropical at 1200 UTC that day . Early on July 8 , the JMA reported that the remnants of Rammasun dissipated to the south of Vladivostok .

= = Preparations and impact = =

As Rammasun moved away from the Philippines , it enhanced the monsoon and produced rainfall and flooding . Several landslides were reported , and more than 3 @,@ 000 people had to evacuate . Subsequent storms also enhanced the monsoon , and combined with the effects from Typhoon Chataan , Severe Tropical Storm Nakri , and Typhoon Halong , there were 85 deaths , with 45 people injured in the Philippines . The combined damage in the country totaled $ 10 @.@ 3 million (? 522 million 2002 PHP) .

Before the typhoon affected Taiwan , residents in Taipei prepared sand bags , and President Chen Shui @-@ bian ordered the military to be on standby to assist in the storm 's aftermath . Taiwan 's Central Weather Bureau issued an offshore typhoon warning on July 2 , prompting officials to cancel ferry service and restrict water activities in Kenting National Park . After an extended drought that resulted in water restrictions for two months , the typhoon dropped rainfall across the country . In Miaoli County , Rammasun dropped 681 mm (26 @.@ 8 in) of rainfall , the highest total on the island . The rains caused landslides in two villages , although damage was minor . On July 4 , the water restrictions were removed island @-@ wide , with the exception of Taipei ; the city 's restriction was removed a day later after determining that the Feitsui Dam and the Shihmen Dam reached levels approaching their full capacity .

In contrast to the previously dry conditions on Taiwan , eastern China was experiencing above @-@ normal rainfall , and many reservoirs were near capacity when Rammasun was approaching the region . While paralleling the eastern coast of China , Rammasun dropped heavy rainfall that reached 225 mm (8 @.@ 9 in) in Ningbo , and wind gusts peaked at 165 km / h (102 mph) in eastern Zhejiang . Officials canceled 200 flights either departing or arriving from Shanghai Pudong International Airport . High winds destroyed a migrant worker village in Shanghai , killing five people . The winds damaged a building that was under construction , injuring 44 people . A woman was killed in Chongming when winds knocked a wall onto her . Rammasun downed trees and caused power outages in the region , and storm flooding forced over 2 @,@ 700 people to evacuate . High winds left about $ 85 million in agriculture and aquaculture damage in Zhejiang ; however , damage was less than expected due to the storm remaining offshore .

Striking the Japanese island of Miyako @-@ jima , the typhoon produced peak wind gusts of 169 km / h (105 mph) while in the eyewall , with sustained winds of 93 km / h (58 mph) . Similarly strong winds were reported near Okinawa , reaching 90 km / h (56 mph) . High seas from the typhoon killed two United States Navy sailors . In Okinawa , Rammasun left about 10 @,@ 000 houses without power . Two people were injured in the country , one of them severely . A station in Miyazaki Prefecture on the Japanese island of Kyushu reported the highest rainfall associated with Rammasun , with a total of 290 mm (11 in) . One house in the country was damaged due to the typhoon , and there was at least one report of a landslide . Crop damage in the country totaled $ 4 @.@ 4 million (¥ 896 million 2002 JPY) . The threat of the storm prompted officials to cancel 61 airplane flights .

Typhoon Rammasun passed a short distance west of Cheju @-@ do , an island offshore South Korea , dropping more than 300 mm (12 in) of rainfall . High surf killed one person on the island , and officials restricted access to Hallasan mountain and all parks . Seven boats were damaged , and many roads on the island were flooded . Before Rammasun struck the South Korean mainland , airline officials canceled 167 flights . There were three deaths on the mainland , including one boy who drowned in floodwaters . Damage in the country totaled $ 9 @.@ 5 million , much of it property damage ; there was also damage to the rice crop . Rainfall extended into neighboring North Korea , damaging rice and maize . Later , Rammasun brought the average monthly rainfall in only two days in portions of Primorsky Krai , causing flooding along roads and riverways .