# Tropical Storm Chalane

## Post-Event Report

## Madagascar

**05 January 2021**

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## Summary

The moderate tropical storm Chalane made landfall in Fenoarivo district of Madagascar on the night of Saturday to Sunday, December 27 with maximum wind gusts ranging from 40 km/h to 50 km/h. Chalane subsequently weakened into a tropical depression and continued south-west of Madagascar with a reduced wind speed of about 20 km/h. The storm Chalane emerged in the Mozambique canal on 29 December, where it gradually picked up speed, reaching a speed of 83 km/h, and continued inland in Mozambique. It then moved to Zimbabwe and Botswana before dissipating in the north-central regions.

The preliminary reports indicate that Chalane caused isolated flooding and damage to power utility poles, but no significant damage or loss of life was reported.

The ARC TCE successfully tracked and described Chalane's trajectory and impacts based on cyclonic bulletins produced by the Regional Specialized Meteorological Centre (CMRS)/La Reunion. The post-event estimation from TCE shows that in Madagascar, the economic losses associated with Chalane amount to $1,088 USD. These losses from TCE are direct losses due solely to wind hazard and storm surges (the impact of storm surges is negligible in this case) and do not consider damages due to flooding, nor indirect economic losses.

The economic losses associated to Chalane ($1,088 USD) are less than the attachment point defined in Madagascar's insurance policy. As a result, no payout is due to the Government of Madagascar under the parametric tropical cyclone risk insurance policy.

The ARC expresses its sympathy to the government and people of Madagascar for the impacts on communities and infrastructure caused by the tropical storm Chalane.

## 1. Tropical Storm Chalane

The tropical depression that formed in the Southwestern Indian Ocean intensified on December 24 as the tropical storm Chalane (Figure 1). This moderate tropical storm was located about 860 kilometers east of Madagascar's Antalaha district on the afternoon of 24 December and was moving at an average speed of 75 km/h with gusts peaking at 100 km/h[1].

According to Météo Madagascar, Chalane made landfall in Fenoarivo district on the night of Saturday to Sunday, December 27, with maximum wind gusts between 40 km/h and 50 km/h. The storm Chalane then weakened into a tropical depression and continued southwest of Madagascar with a reduced wind speed of about 20 km/h. The heavy rains that followed caused flooding and isolated damages.

Chalane emerged in the Mozambique canal on 29 December where it gradually picked up speed. In the early hours of 30 December, the tropical storm Chalane made landfall north of Beira in central Mozambique at a speed of about 83 km/h. It then continued inland in Mozambique, before heading to Zimbabwe and Botswana where it dissipated in the north-central regions.

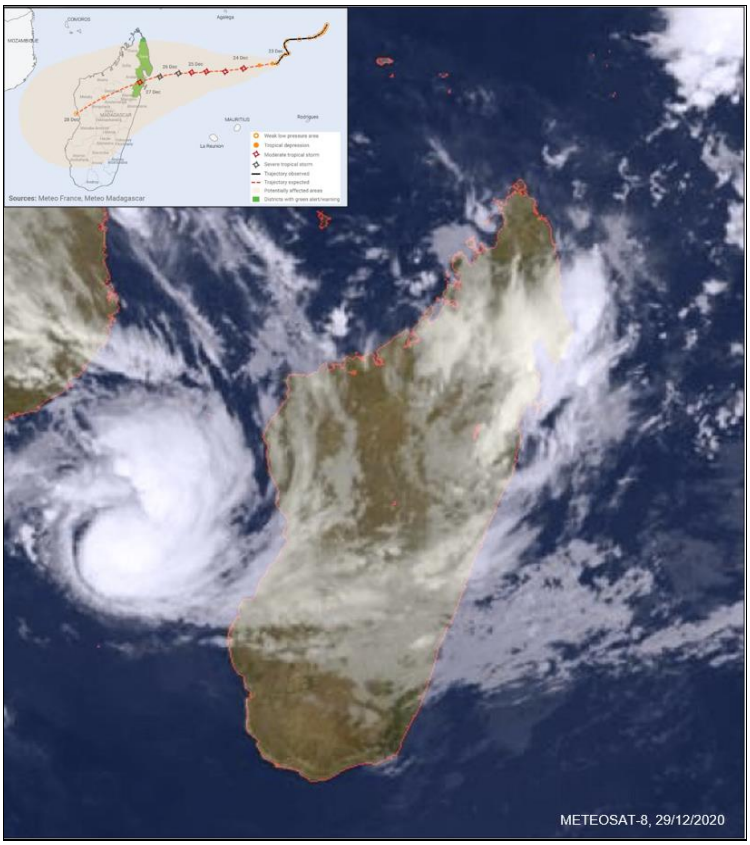


Figure 1: Satellite image and trajectory of Chalane crossing Madagascar.
*Source: Météo France/Météo Madagascar & METEOSAT*

[1] Southern Africa, Flash Update No.2: Tropical Storm Chalane - https://reliefweb.int/report/madagascar/southern-africa-flash-update-no2-tropical-storm-chalane-24-december-2020

## 2. Monitoring of Chalane using ARC TCE

Figures 2 and 3 below generated by the ARC's *Tropical Cyclone Explorer (TCE)* software illustrate wind speed magnitudes, storm surge height, and the trajectory and position of the tropical storm Chalane. The results of TCE were generated based on the cyclonic bulletins from the Regional Specialized Meteorological Centre (RSMC)/La Reunion, mandated by the World Meteorological Organization to predict cyclones in the Southwest Indian Ocean region. These figures show that Chalane made landfall in Madagascar with a wind speed of less than 63 km/h. The speed of Chalane rapidly decreased thereafter to between 40 km/h and 50 km/h, becoming a tropical depression inland. Chalane then regained strength as it left the island of Madagascar with a speed approaching the stage of a tropical cyclone in the waters of the Mozambique canal. Figure 3 shows that Chalane caused storm surges of a maximum height of between 0.5 m and 1.5 m.

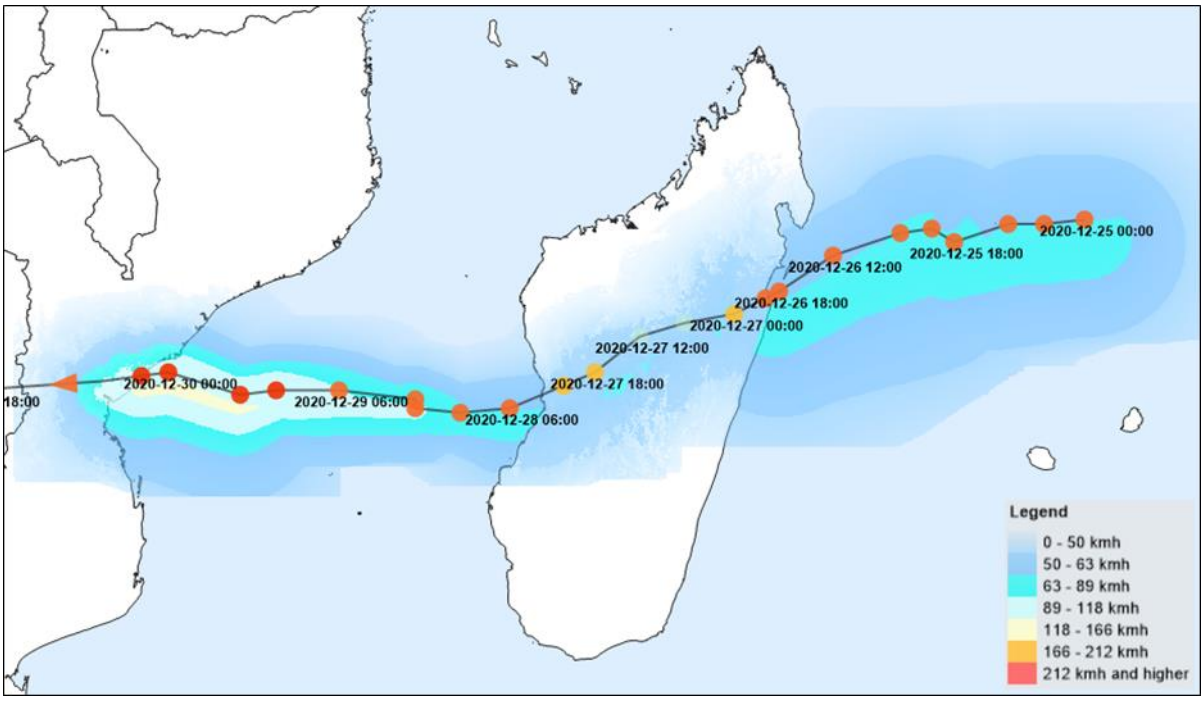


Figure 2: Footprint of the maximum wind speed caused by Chalane
*Source: ARC Tropical Cyclone Explorer (TCE), 30/12/2020*

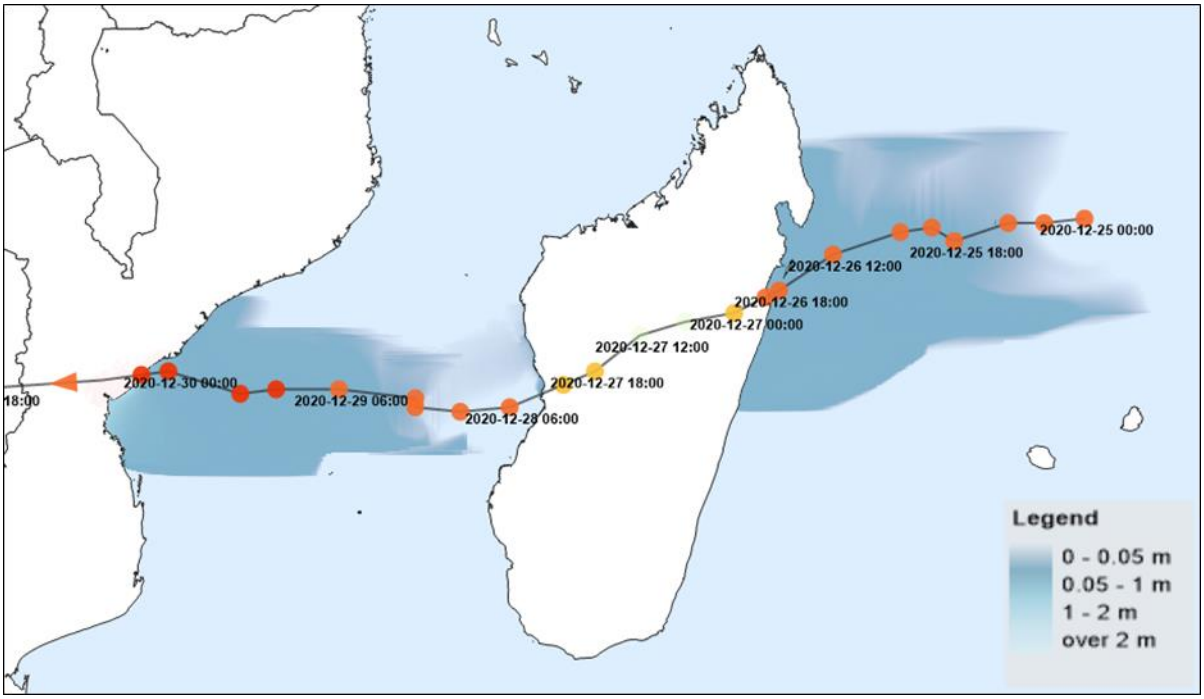


Figure 3: Maximum height of the storm surge caused by Chalane
*Source: ARC Tropical Cyclone Explorer (TCE), 30/12/2020*

## 3. Impacts of Chalane in Madagascar

In Madagascar, the National Office for Risk and Disaster Management (BNGRC[2]) is leading response activities and humanitarian partners have identified emergency supplies available in districts on the northeast coast. Preliminary reports indicate that the tropical storm Chalane caused no significant damages in Madagascar[3]. As a result, local authorities have indicated that no emergency stockpiles of humanitarian partners are required at this time.

Although Chalane caused little damages in Madagascar, isolated flooding was reported in the country; but no loss of life was reported. Damages to the electricity distribution network were also observed as a result of the storm Chalane, causing power outages in several parts of Madagascar[4].

## 4. Calculation of Losses Associated with Chalane

The ARC TC model covers cyclonic damage related to wind, storm and wave hazards. Currently the ARC TC model uses cyclone tracking information produced by the RSMC/La Reunion. Available information includes the trajectory and location of cyclones from the beginning and forecasts, as well as wind speeds and storm surge depth. The post-event estimations from TCE shows the economic losses caused by Chalane in Madagascar are estimated at $1,088 USD. These losses from TCE are direct losses due solely to wind hazard and storm surges (the impact of storm surges is negligible in this case) and do not consider damages due to flooding, nor indirect economic losses.

Table 1: Losses and population affected by categories of wind speed (source: ARC TCE, 02/01/2021)

| Country | Event name | Losses (USD) | Population affected by categories of wind speed | | | | |
|---|---|---|---|---|---|---|---|
| | | | Category 1 (63 km/h) | Category 2 (89 km/h) | Category 3 (119 km/h) | Category 4 (159 km/h) | Category 5 (211 km/h) |
| Madagascar | Chalane | $1,088 | 0 | 0 | 0 | 0 | 0 |

## 5. Tropical Cyclone Insurance Policy

The payout under a parametric cyclonic insurance policy held by a country depends on the conditions of coverage chosen, in particular the attachment point. This is the minimum severity of the event loss that results in a payment and therefore the value of the loss to which a policy is triggered.

[2] Bureau National de Gestion des Risques et des Catastrophes
[3] Southern Africa, Flash Update No.3: Tropical Storm Chalane - https://reliefweb.int/report/madagascar/southern-africa-flash-update-no3-tropical-storm-chalane-28-december-2020
[4] http://www.midi-madagasikara.mg/economie/2020/12/29/degats-de-chalane-huit-centres-dexploitation-de-la-jirama-endommages/

As per Section 6.2 of the Policy, the calculation of the MCLD (Modelled Cyclone Losses and Damages) payment amount is enumerated below using the following formula:

P = min (L, y * x), where x = min (EP - AP, max (MCLD - AP, 0))

where:

| | |
|---|---|
| P | MCLD Payment Amount |
| L | Aggregate Limit |
| AP | Attachment Point |
| EP | Exhaustion Point |
| x | The amount by which the MCLD exceeds the Attachment Point (AP) (which amount shall not be greater than the Exhaustion Point (EP) minus the Attachment Point) |
| y | Ceding Percentage |

From Exhibit B to the Policy:

| | |
|---|---|
| *L* | $9,890,026 |
| *AP* | $17,562,830 |
| *EP* | $2,704,142,526 |
| *y* | 0,37% |

x = min ($2,704,142,526 - $17,562,830; max ($1,088 - $17,562,830; 0))

x = $0

P = min ($9,890,026; 0,37% * $0)

P = $0

The MCLD Payment Amount is: $0 USD (Zero dollars)

As shown above by the calculations from the TC insurance model, the losses caused by Chalane are less than the attachment point set in Madagascar's insurance policy. As a result, no payout is due to the Government of Madagascar under the policy of the parametric insurance against the risks of tropical cyclones.

The ARC expresses its sympathy to the government and people of Madagascar for the impacts on communities and infrastructure caused by the tropical storm Chalane.

For additional information, contact the ARC at: info@arc.int