Post-Event Briefing - Tropical Storm Eloise
Madagascar | 25 January 2021

Highlights

- The moderate tropical storm Eloise made landfall in the North-East of Madagascar, in the evening of 19 January 2021. Heavy rains, strong winds and flooding were reported in the aftermath of the storm Eloise. At least one person died, and more than 1,000 people were reported as affected in four districts of Madagascar, according to BNGRC.
- A total of 561,047 people was modelled as living in the areas affected, and economic losses caused by storm Eloise in Madagascar are 226,478 USD as estimated by the ARC Tropical Cyclone Explorer (TCE).
- Portfolio losses of storm Eloise in Madagascar are less than the attachment point of 17,562,830 USD set in the country's insurance policy. As a result, no payout is due to the Government of Madagascar.

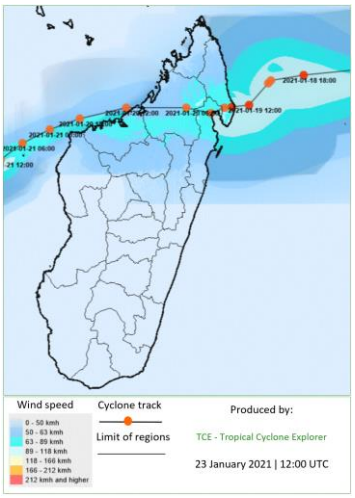
Event Overview

The moderate tropical storm Eloise formed over the Indian Ocean on 17 January 2021 and moved towards North-East of Madagascar. It made landfall South of the city of Antalaha, in the evening of 19 January 2021 at a maximum wind speed of 100 km/h, according to Météo Madagascar. It subsequently weakened into a tropical depression while crossing the northern parts of Madagascar, exiting on 20 January before heading towards the Mozambique Channel.

In Madagascar, humanitarians and authorities are responding to the disaster under the lead of the National Office for Risk and Disaster Management (BNGRC[1]). Preliminary reports indicate that heavy rains, strong winds and flooding have been reported in the aftermath of TC Eloise in the north-east of the country[2]. The storm flooded 134 houses and destroyed 56, while nearly 100 classrooms were damaged. At least one person died, and more than 1,000 people have been reported as affected in four districts, according to BNGRC.

Monitoring Storm Eloise using ARC's TCE

Under the ARC's Tropical Cyclone (TC) parametric insurance policy, a post-event report is required for any cyclone event affecting a Member State for winds speed of at least 63 km/h. The ARC's *Tropical Cyclone Explorer (TCE)* software was used to monitor in real-time the characteristics of the tropical storm Eloise in Madagascar. The wind and storm surge footprints are parts of TCE's outputs, which shows the regions affected by certain extents of the tropical storm. Based on TCE's footprint for the tropical storm Eloise, wind speeds between 40 km/h and 80 km/h were estimated across the northern regions of Madagascar. However, due to the physical conditions of Eloise, the storm surge impact was not significant, and therefore did not contribute to the damages.



TCE Loss Calculations

The post-event run of the ARC's TC model estimated a total of 561,047 people was living in the areas affected by the tropical storm Eloise. The economic losses caused by TC Eloise in Madagascar were estimated at 226,478 USD. These losses are direct losses solely due to wind hazard and storm surges (negligible in this case), and do not consider damages due to flooding, nor indirect economic losses.

Country	Event name	Losses (USD)	Population potentially affected per wind speed category				
			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	Eloise	226,478	561,047	0	0	0	0

TC Insurance Policy

The payout under the parametric cyclone insurance policy held by a country depends on the conditions of coverage chosen. A key parameter is the Attachment point, the minimum severity of the event loss that results in a payout.

For Madagascar, the calculation of the losses caused by the storm Eloise was made using the following insurance model parameters: Premium of 2,000,000 USD, Coverage limit of 9,890,026 USD, Ceding percentage of 0.37%, Attachment point of 17,562,830 USD and Exhaustion point of 2,704,142,526 USD.The results indicated that losses due to the tropical storm Eloise 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 with the above parameters.**

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

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

[1] Bureau National de Gestion des Risques et des Catastrophes (BNGRC)

[2] OCHA Southern Africa -Tropical Storm Eloise - FlashUpdate#3: https://reliefweb.int/sites/reliefweb.int/files/resources/ROSEA_20210120_TropicalStormEloise_FlashUpdate%233_def.pdf

Tropical Cyclone Explorer (TCE)

About ARC

The African Risk Capacity (ARC) was established by treaty as a Specialised Agency of the African Union (AU) to help Member States improve their capacities to better plan, prepare and respond to extreme weather events and natural disasters, therefore protecting the food security of their vulnerable populations. By linking early warning systems with contingency planning and supported by modern financial mechanisms, ARC enables governments to provide targeted responses to disasters in a more timely, cost-effective, objective and transparent manner, thereby reducing response costs and loss of livelihoods.

About TCE

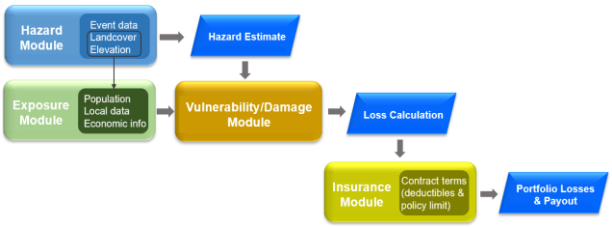
The ARC Tropical Cyclone (TC) risk model is a parametric insurance product developed for the South West Indian Ocean (SWIO) region to provide rapid financing and early response to countries affected by tropical cyclone events**.** It covers winds and storm surge hazards while excess rainfall associated with cyclones will be covered under another ARC insurance product.

The Tropical Cyclone Explorer (TCE) software package is a dedicated interface, developed by the ARC to allow users to easily access all the model data and view the characteristics of the cyclone (trajectory, wind speed, storm surge heights, etc.), calculate the affected population as well as the economic losses caused by the cyclone event. The losses calculated by TCE are limited to six SWIO countries: Mozambique, Comoros, Madagascar, Mauritius, Seychelles and Tanzania. The TCE will be available to ARC Member States and partners via the ARC's *Africa RiskView* (ARV) platform.

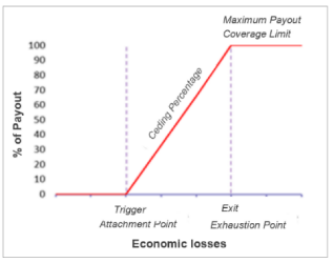
Methodological Note on TCE

TC Risk Model

The ARC's TC risk model is implemented through four modules, logically sequenced to offer a reliable estimate of people affected and economic losses caused by cyclones, namely hazard, exposure, vulnerability/damage and insurance modules.



- *Hazard module*: It calculates in near-real time the maximum wind speed and the height of storm surges caused by a tropical cyclone.
- *Exposure module*: It describes the economic assets based on the land use categories in each country as well as the replacement cost of each exposed asset.
- *Vulnerability/Damage module*: It defines the probability distribution of economic losses for different levels of wind speed and storm surge height induced by a tropical cyclone.
- *Insurance module*: It calculates loss estimates for an asset portfolio based on contractual conditions. The payout is based on the following set of parameters selected by each country: Attachment Point, Exhaustion Point, Coverage Limit and Ceding Percentage.



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

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

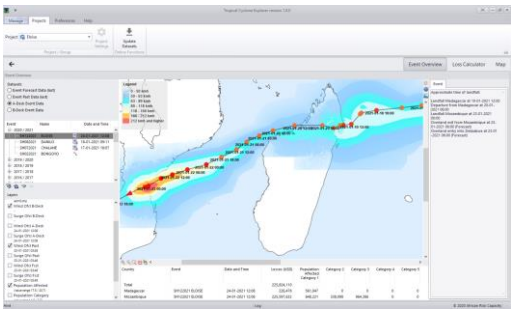
where:

P	MCLD Payout Amount
L	Coverage 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

TCE Components

The TCE is a client Windows application which is composed of three main modules:

- *Loss Calculator*: It is the main element for calculating the economic losses and the population affected and for each country.
- *Event Overview*: It is a dedicated module which combines mapping and loss calculation. It helps viewing different elements of one event during calculation.
- *Map*: It provides to users a general GIS mapping functionality including vector and raster-based project parameters.



After downloading the dataset, the *Loss Calculator* engine calculates the modeled losses for the selected country (ies) and selected cyclone event(s). The losses (in USD) is calculated only for A-deck and B-deck data, not for in-event data and forecasts. In addition, the TCE's *Loss Calculator* calculates the number of populations affected for five categories of cyclone wind speeds.