Post-Event Briefing - Tropical Cyclone GOMBE Mozambique | 25 March 2022

Highlights

- Following GOMBE's landfall on the east coast of Mozambique on 11 March 2022, more than 488,570 people have suffered damage to their homes, more than 23,408 people have been displaced, and 61 persons have died according to the INGD.

- The modelled economic losses due to GOMBE in Mozambique was estimated at USD81.9 million by ARC's Tropical Cyclone model. This amount would have exceeded the attachment point if Mozambique had taken the TC policy insurance for the 2021/22 season. **As a result, a payout of USD1,867,553 would have been due to the Government of Mozambique for this current cyclone event.**

Overview of the Cyclonic Event

The tropical cyclone GOMBE made landfall in Mossuril district (Nampula province) on 11 March 2022, almost at the stage of an intense tropical cyclone with winds of about 166 km/h, and gust

Figure 1: Destroyed school, Mogincual District, Nampula (CENOE) Figure 2: Interrupted EN1 road, between Nicoadala-Mocuba (Credit: INGD)

between 150 km/h and 185 km/h[1]. It then weakened as it crossed inland to reach Malawi, before returning to Mozambique and gradually disappearing into the ocean. GOMBE brougth heavy rains (up to 200 mm/24h) and heavily affected the provinces of Nampula and Zambezia, and to a lesser Sofala, Beira, Tete, and Niassa provinces.

The cyclone GOMBE follows tropical storm ANA which hit the country in January 2022, and tropical depression DUMAKO which struck in February 2022. Together, these previous storms have already affected more than 200,000 people in Nampula, Zambezia and Tete provinces[2].

According to the latest data from the Institute for Disaster Management and Risk Reduction (INGD), GOMBE affected at least 488,570 people (95,717 families), caused 61 deaths, and injured 82 people[3]. Some 23,408 people have been displaced and are currently hosted in 52 accommodation centres, and two resettlement sites. GOMBE's winds and rains have heavily damaged houses and schools. A total of 41,587 houses have been damaged along with 69 health centres and 1,458 classrooms (143,904 students affected).

According to the INGD, GOMBE caused considerable damage to transport infrastructures, leaving some of the hardest-hit areas inaccessible by road.

Monitoring of GOMBE with TCE

As part of the ARC Parametric Tropical Cyclone Insurance Policy, a post-event report is required for any cyclone event affecting a Member State for windspeeds higher than 63 km/h. The ARC's Tropical Cyclone Explorer (TCE) software enabled real-time monitoring of the characteristics of the tropical cyclone GOMBE in Mozambique. Wind and storm surge footprints are among the products generated by TCE, and these indicate the areas affected by GOMBE. From the begining of GOMBE to its departure from Mozambique, TCE estimated a maximum windspeed of 175 km/h.

The maximum storm surge caused by GOMBE was estimated at 2.1 m by TCE.

Calculation of Economic Losses and Population at Risk

The post-event run of TCE showed that a total of 5.3 million people were living in the areas affected by the cyclone GOMBE (Table below). The economic losses caused by GOMBE were estimated at USD81.9 million in Mozambique by TCE. These losses are direct losses solely due to winds hazard and storm surges, and do not consider damages due to flooding, nor indirect economic losses.

| Country	Event name	Losses (USD)	Number of population potentially at risk per windspeed categories				
			Category 1 (63 km/h)	Category 2 (89 km/h)	Category 3 (118 km/h)	Category 4 (167 km/h)	Category 5 (212 km/h)
Mozambique	GOMBE	81,923,804	2,195,711	2,372,612	709,772	6,195	0

TC Parametric Insurance Policy

The payout under the TC parametric 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 Mozambique, the calculation of the payout per the insurance model, in relation to the wind and storm surge risks associated with GOMBE, was carried out using the following insurance model parameters: Coverage limit of USD14,720,025, Ceding percentage of 2.50%, Attachment point of USD7,221,694 and Exhaustion point of USD596,579,708.

Results of the insurance model showed that the losses due to GOMBE would have exceeded the Attachment point if Mozambique had taken the TC policy insurance for 2021/22. **As a result, a payout of USD1,867,553 would have been due to the Government of Mozambique under the policy of the parametric insurance against the risks of tropical cyclones with the above parameters.**

The ARC Group expresses its sympathy to the Government and people of Mozambique for the impacts on communities and infrastructure caused by the tropical cyclone GOMBE.

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

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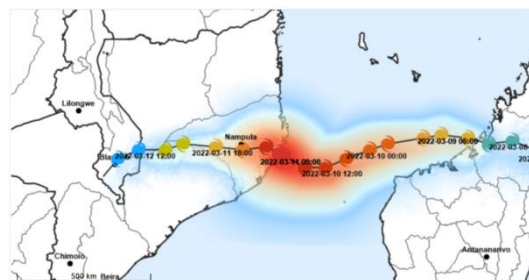
[1] Meteo France
[2] OCHA - Mozambique: Tropical Cyclone Gombe - Flash Update #2 - 14 & 18 March 2022

[3] OCHA - Mozambique: Tropical Cyclone Gombe - Flash Update #5 - 22 March 2022

Tropical Cyclone Explorer (TCE)

About ARC

The African Risk Capacity (ARC) was established by treaty as a Specialized 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 Southwest 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, Mozambique, Mauritius, Seychelles, and Tanzania. The TCE will be available to ARC Member States and partners via the ARC's *Africa RiskView (ARV)* platform.

Overview of the Tropical Cyclone 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.
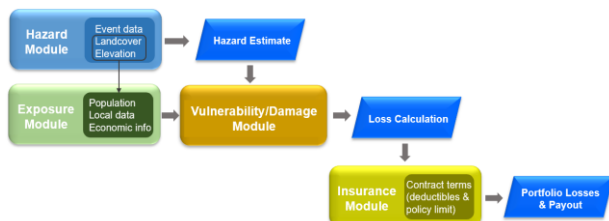
- *Hazard module*: It calculates in near-real time the maximum wind speed and the height of storm surges caused by a tropical cyclone.

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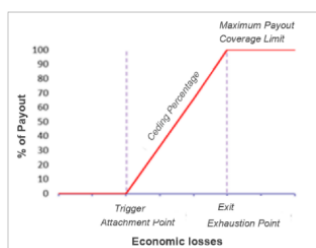
As per Section 6.2 of the TC Policy, the calculation of the MCLD (*Modelled Cyclone Losses and Damage*s) payout amount is shown below using the following formula:

$P = \min(L, y * x)$, 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

Components of the TCE

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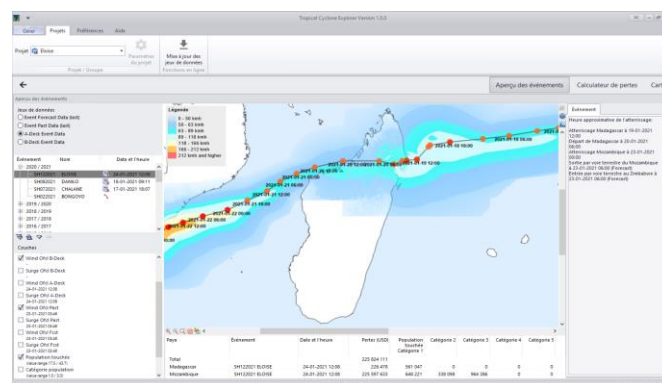
After downloading the dataset, the *Loss Calculator* engine calculates the modeled losses for the selected country (ies) and selected cyclone event(s). The losses (in USD) are calculated only for A-deck and B-deck data, not for in-event data and forecasts. In addition, the TCE's *Loss Calculator* calculates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

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