

## Highlights

- A total of thirteen named cyclonic events occurred in the SWIO region. Four of these cyclones reached the stage of intense tropical cyclone, one tropical cyclone, seven tropical storms, and one tropical depression.
- Among these thirteen events, six made landfall in Madagascar (ANA, BATSIRAI, DUMAKO, EMNATI, GOMBE and JASMINE), three in Mozambique (ANA, GOMBE and JASMINE), one in Malawi (ANA) and one in South Africa (ISSA).
- The total fatalities associated to these events is estimated at 818 persons. From this number, 435 deaths were caused by ISSA in South Africa.
- The modelled total economic losses associated to these cyclonic events (excluding ISSA) was estimated at USD2.4 billion by the ARC TCE software, with Madagascar being the most affected (USD2.2 billion).
- An amount of USD10.7 million was paid to the Government of Madagascar on 18 February 2022, under the 2021/22 parametric insurance policy against the risks of tropical cyclones.

## 1. Introduction

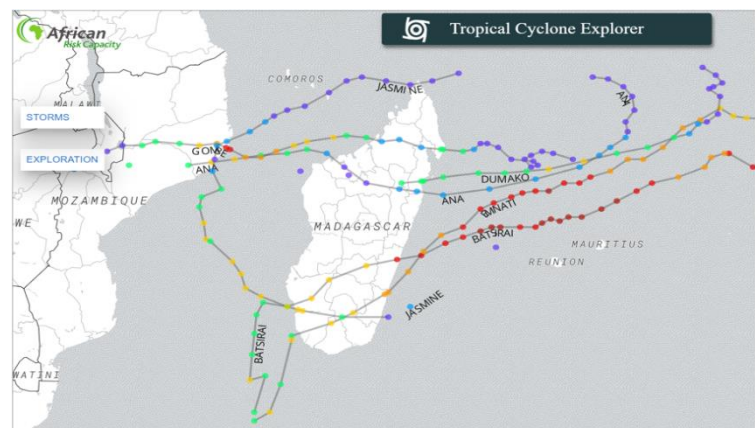
The Southwest Indian Ocean (SWIO) region is one of the most active areas in the world in terms of tropical cyclone development. On average, ten cyclone events with wind speeds greater than 63 km/h and possibly exceeding 200 km/h occur each year in the SWIO region. High wind speeds are a key factor contributing to the damage caused by tropical cyclones.



Wooden buildings completely destroyed by the passage of a tropical cyclone. Source: Adobe Stock

Developments in the SWIO region in 2019, including the devastating effects of cyclones IDAI and KENNETH in Mozambique, led to renewed interest from countries in parametric tropical cyclone insurance coverage. Therefore, ARC has developed a model capable of correctly estimating the risk and economic losses resulting from tropical cyclones, which is suitable for SWIO countries, such as Mozambique, Madagascar, Comoros, Mauritius, Seychelles, and Tanzania.

In November 2020, the African Risk Capacity (ARC) Group launched a new insurance product, the Tropical Cyclone (TC) parametric insurance mechanism for the SWIO region. The first of its kind in Africa, the TC insurance policy will provide rapid financing for early response to countries affected by tropical cyclones. It is triggered based on exceeding a pre-established event loss threshold, the Attachment Point. Under the ARC's TC insurance policy, real-time monitoring and post-event reports are issued for any cyclone event affecting a SWIO country.



The ARC tropical cyclone model which is at the heart of the parametric insurance product covers hazards related to winds, storm surges and waves. It is encapsulated into the Tropical Cyclone Explorer (TCE) software, a dedicated interface developed by ARC to allow users to easily visualise the characteristics of cyclones, estimate the affected population as well as direct economic losses caused by cyclone events.

Madagascar was the first country in the region to subscribe to the ARC parametric insurance cover the 2020/21 and 2021/22 season. Madagascar's participation complemented government efforts to reduce the impacts of climate change and weather variability on the most vulnerable populations.

## 2. Overview of the SWIO 2021/22 Cyclonic Season

During the 2021/22 season, a total of thirteen named cyclonic events occurred in the SWIO region. Four of these cyclones reached the stage of intense tropical cyclone (speed greater than 166 km/h), one reached the stage of tropical cyclone (between 118 km/h and 166 km/h), seven tropical storms (between 63 km/h and 118 km/h), and one tropical depression (below 63 km/h).

Among these thirteen cyclonic events, six landed in Madagascar (ANA, BATSIRAI, DUMAKO, EMNATI, GOMBE and JASMINE), against three in Mozambique (ANA, GOMBE and JASMINE), and one in Malawi (ANA) and South Africa (ISSA). The total fatalities caused by these cyclonic events is estimated at 818 persons. From this number, 435 deaths were caused by floodings associated with ISSA in South Africa.

However, as South Africa and Malawi are not among the countries covered by the ARC's Tropical Cyclone

Number of cyclonic event	Tropical depression	Moderate tropical storm	Severe tropical storm	Tropical cyclone	Intense tropical cyclone	Max wind speed	Max Storm surge	Total deaths
13	1	5	2	1	4	> 195 km/h	≈ 2.5 m	818
100%	8%	38%	15%	8%	31%			

Explorer (TCE) software, the rest of this document will not report on ISSA.

- ANA, a moderate tropical storm was the first event to occur in the SWIO. It made landfall in Madagascar on the 23<sup>rd</sup> of January 2022. It weakened slightly while crossing Madagascar before picking up speed in the Mozambique channel towards the Mozambican coast where it made landfall on January 24th. ANA's landing winds speeds were 62 km/h and 85 km/h for Madagascar and Mozambique respectively.

Cyclonic event	Dates	Event classification	Max wind speed	Country affected	Deaths
ANA	20 -25 January	Moderate tropical storm	85 km/h	Madagascar, Mozambique	142
BATSIRAI	24 January - 8 February	Intense tropical cyclone	195 km/h	Mauritius, Reunion, Madagascar	123
DUMAKO	10 - 18 February	Moderate tropical storm	85 km/h	Madagascar	28
EMNATI	15 - 24 February	Intense tropical cyclone	175 km/h	Mauritius, Reunion, Madagascar	15
GOMBE	5 - 17 March	Tropical cyclone	165 km/h	Madagascar, Mozambique, Malawi	72
JASMINE	21 - 27 April	Severe tropical storm	110 km/h	Comoros, Madagascar, Mozambique	3

- BATSIRAI was the strongest tropical cyclone to occur in the SWIO region during the 2021/22 season. It formed on 21 January 2022 and strengthened in early February to become an intense tropical cyclone with a maximum wind speed of about 195 km/h. BATSIRAI passed north of Mauritius and La Réunion before landing on the south-east coast of Madagascar with destructive gusts of up to 230 km/h. BATSIRAI was the strongest cyclone to hit Madagascar since the major cyclone ENAWO in 2017. It caused widespread flooding, wind damage, and power outages in Madagascar and about 123 fatalities.
- The month of February was the most active of the season; it experienced three major tropical cyclones. In addition to BATSIRAI, DUMAKO (moderate tropical storm) and EMNATI (intense tropical cyclone) also made landfall in Madagascar accompanied by widespread flooding causing 43 fatalities in total.
- In March, the tropical cyclone GOMBE made landfall in Madagascar and Mozambique. However, unlike in Mozambique where it caused 72 deaths in the same area previously affected by the ANA, GOMBE's impacts were minor in Madagascar.
- The TC season in the SWIO ended with the severe tropical storm JASMINE in April, the sixth named storm to affect Madagascar in 2022. It formed north of Madagascar but first made landfall in Mozambique before reaching Madagascar with winds speed up to 110 km/h.

All these cyclone events were accompanied by very intense winds and heavy rains which caused widespread flooding and landslides resulting in considerable damage to houses, schools, and health centres. Significant damages were also caused to transport infrastructure, leaving some of the hardest-hit areas inaccessible by road.

### 3. Economic Losses and Population at Risk as Estimated by the ARC TCE

The ARC's TCE enabled real-time monitoring of the characteristics of tropical cyclones affecting the SWIO region. Wind and storm surge footprints are among the products. The post-event run of TCE showed that the total number of populations at risk (people living in areas affected by cyclonic events) for the 2021/22 season reached almost 20 million with the cyclone BATSIRAI.

Cyclonic event	Country	Economic losses	Population at risk	TC policy payout
ANA	Madagascar	2,031	0	0
	Mozambique	186,307	1,149,497	NA
BATSIRAI	Madagascar	2,176,988,546	19,801,944	10.7 million
	Mauritius	72,493,110	1,229,184	NA
	Reunion	12,961,580	653,317	NA
DUMAKO	Madagascar	75,961	371,198	0
EMNATI	Madagascar	54,397,904	8,835,850	0
	Mauritius	9,258	0	NA
	Reunion	85,324	59,812	NA
GOMBE	Madagascar	11,812	42,005	0
	Mozambique	81,923,804	5,284,290	NA
JASMINE	Madagascar	1,652,923	1,482,738	0

The total economic losses associated to the six named cyclones were estimated at USD2.4 billion with Madagascar being the most affected (USD2.2 billion). 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.

For Madagascar, which was affected by six cyclonic events, BATSIRAI alone was responsible of 97.5% of the total economic losses. In Mauritius and La Reunion which were hit by two intense tropical cyclones, 99.99% and 99.35% of all economic losses were caused by BATSIRAI respectively. In Mozambique, GOMBE (tropical cyclone stage) was responsible of 99.8% of the total economic losses.

Country	Total economic losses (USD)
Madagascar	2.2 billion
Mozambique	82.1 million
Mauritius	72.5 million
La Reunion	13.1 million

### 4. TC Insurance Payout Policy

Under the ARC's TC insurance policy, real-time monitoring and post-event reports are issued for any cyclone event affecting a SWIO country. It is triggered based on exceeding a pre-established loss threshold, the attachment point which represents the minimum severity of the event loss that results in a payout. The insurance branch of the ARC Group (ARC Ltd) insures the country against costs incurred under the country's contingency plans in response to a TC event which has occurred during the risk period, and which causes losses and damages beyond the point of attachment. The TCE and insurance model are used to determine the payout amount for any TC event insured under this policy within the risk period.

Of the six cyclonic events that made landfall in Madagascar, only BATSIRAI reached a level of severity sufficient to trigger the insurance policy. The modelled losses due to BATSIRAI exceeded the attachment point, and as a result, an amount of USD10,714,206 was paid to the Government of Madagascar (10 days after the end of the cyclone) under the 2021/22 parametric insurance policy subscribed by the Government. The amount was used for interventions agreed beforehand in the contingency plan, such as provision of:



- Health and nutritional support to children under 5, pregnant and lactating mothers,
- Food assistance to affected household (in the form of rice and oil),
- Seed to affected farmers (rice, clove, maize, and citrus),
- Shelter and habitat to affected households, and
- Educational materials and reconstruction of schools.

The government of Madagascar will be sending ARC an interim report in September 2022, which will provide a full account on the utilisation of the payout.

## 5. Conclusion

This report on the cyclonic activity in the SIWO region aims at capturing the severe impact extreme weather events continue to have on the southern African countries, in particular Madagascar and Mozambique. ARC work in the region is an important part of a disaster mitigation system. Not only the insurance mechanism does help reduce the financial burden on our Member States, but it also gives incentives to take preventative and preparedness measures. This is especially critical given how the intense tropical cyclone in Madagascar have resulted in strong winds and widespread floods that endangered the lives and livelihoods of millions of people. Indeed, TCE's real-time and post-event reports are critical as they offer invaluable information for governments and humanitarian organisations to help reduce the dramatic impact of these extreme weather events on their populations. These reports are useful for planning the evacuation of the population at risk, as well as for the repositioning of humanitarian stocks. In addition, the TCE reports contribute to the planning and implementation of response and recovery activities.

Finally, the ARC Group plans to expand TC's risk pool in the SWIO region and urges Donor Partners to strengthen their financial capacity to better support Member States and vulnerable populations because:

*«Our objective is to continue to diversify our offer of insurance products to respond effectively to the needs of our Member States. This parametric insurance against tropical cyclones allows Member States to better anticipate and manage extreme weather events while ensuring that the impact of these events on the population is mitigated,»* Mr. Ibrahima Cheikh Diong, Director General of the ARC Group.