WEATHER AND CLIMATE SERVICES FOR DISASTER RISK MANAGEMENT

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http://www.acmad.net/new/NEWSITEACMAD/

https://acmad.net/rcc/

Faire du temps, du climat et de l'environnement des ressources pour le développement
Making weather, climate and environment resources for development
OUTLINE

✓ ACMAD CENTRE
✓ ACMAD’S FLOODS/DROUGHTS PRODUCTS
✓ CLIMATE VARIABILITY AND TRENDS
✓ SEASONAL OUTLOOKS
✓ DISCUSSIONS AND CONCLUSION
ACMAD was created in 1985 following the droughts of the 1970s and early 80s through the Resolution 540 of the UNECA Conference of Ministers. It is established in Niamey-Niger since 1992

**VISION**

To be a World Class continental operational Centre of Excellence supporting African countries to be well resilient to extreme events with increased ability to adapt to climate change impacts

**MISSION**

A Continental weather and climate Watch institution and Centre of Excellence for the Applications of Meteorology
Why climate services?

Needs are at least at three levels:

- **Policy level**: move from firefighting to disaster risk prevention and preparation policy
- **Planning level**: update contingency plans, organize early warning mechanisms
- **Practice level**: Sensitize, warn, prepare, give instructions to evacuate, rescue...

✓ **Our Challenge** is to move from firefighting to prevention, preparation and early response therefore effectively implement the SENDAI framework for DRR
Examples of firefighting: 2015/16 Drought in Southern Africa

The Southern African Development Community (SADC) declared a regional drought emergency and launched a regional humanitarian appeal in July 2016.

The Government of Mozambique activated the institutional Red alert due to drought on April 12, 2016.


Malawian government declared a state of disaster as a severe drought has caused a sharp decline in crop production across the country on January 11, 2016.

On 22 December 2015, the Government of Lesotho declared a state of drought emergency and appealed for assistance from the international community.
2014 Late onset in Westernmost Sahel and Firefighting

- FEWS alerted in Dec 2014 - This year 2019 we have the alert in July let’s plan and act
- The ARC paid out $26m in 2015 for the impacts of 2014 late onset
- This year we may prepare for impact earlier and therefore cheaper

Weakness in CIS for early response to drought. There is a high value service to be developed with ARC, the global humanitarian networks and insurance industry.
HAZARDS
Above average precipitation very likely
Moderate to heavy precipitation events during the season

POTENTIALS IMPACTS
Outbreak of water borne diseases, Damages to infrastructure (dams, reservoirs, roads ...)

MEASURES
Provide agro meteorological advices to farmers, prepare for heavy rains and floods
Update and implement flood contingency plans
Better manage water in reservoirs and dams

HAZARDS
Below average precipitation during the season

POTENTIALS IMPACTS
Water shortage

MEASURES
Prepare for shortage of water during the first half of the upcoming winter

HAZARDS
Below average precipitation and weak to moderate drought during the first half of the precipitation season
Onset delays and seasonal precipitation deficits
Irregular distribution of precipitation during the season

POTENTIALS IMPACTS
Water shortage, decrease in crop yields, degradation of pasture, Rise in food prices, low water levels in dams and reservoirs

MEASURES
Prioritize planting in low land areas, Promote drought resistant crops, Harvest precipitation to mitigate water shortages Reduce livestock, activate fuel power plans, Update and implement drought contingency plans

BRIEF FOR POLICY AND DECISION MAKERS BASED ON SIGNIFICANT WEATHER AND CLIMATE EVENTS UPDATE
VALID FROM DECEMBER 2018 TO MARCH 2019
BRIEF FOR POLICY AND DECISION MAKERS BASED ON SIGNIFICANT WEATHER AND CLIMATE EVENTS UPDATE
VALID FROM OCTOBER 2019 TO JANUARY 2020

HAZARDS
Above average precipitation very likely
Moderate to heavy precipitation events during the season

POTENTIALS IMPACTS
Outbreak of water borne diseases,
Damages to infrastructure (dams, reservoirs, roads...)

MEASURES
Provide agro meteorological advices to farmers, prepare for heavy rains and floods
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MEASURES
Prioritize planting in low land areas,
Promote drought resistant crops,
Harvest precipitation to mitigate water shortages
Reduce livestock, activate fuel power plans,
Update and implement drought plans
Normal to below normal cyclone activity is expected during the coming cyclonic season. The privileged cyclogenesis area may be shifted west of Diego Garcia region.
QUALITY OF SEASONAL FORECASTS PRODUCTS – RCOF products are more skillful compared to Dynamical models Outputs

PRESASS

GloSea5

[Graphs and data points showing comparison between PRESASS and GloSea5]

Mot Off GloSea5
- Below normal, ROCSS = 0.117
- Near-normal, ROCSS = 0.041
- Above normal, ROCSS = 0.103
OCCURRENCE PROBABILITY OF EXTREME WEEKLY PRECIPITATIONS
From March 12, 2019 to March 18, 2019

Figure 2: Heavy rain warning for the week, issued on: 20190312
Data Source: Mean of GFS ensemble model
Details: [http://84.203.146.53:8080/threads/fileServer/FIT/RISK.html](http://84.203.146.53:8080/threads/fileServer/FIT/RISK.html)

Table 1: The symbols, their meanings and the actions expected to be taken by Disaster Risk reduction personnel according to the level of risk.

<table>
<thead>
<tr>
<th>Symbol</th>
<th>Implication</th>
<th>Advisories/ Actions</th>
</tr>
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</table>
| ![Symbol] | - 7 days rainfall is expected to be less than 100mm.  
- There is Low risk of heavy rainfall | Disaster Risk Management Authorities:  
- Keep informed;  
- Monitor the next 7 days forecast. |
| ![Symbol] | - 7 days rainfall is expected to be more than 150mm.  
- Be aware of the existing risk of heavy rainfall;  
- There is a potential flash flood in the coming days. | DRR Management Authorities:  
- Taking action is more likely;  
- The situation needs to be monitored closely with National Meteorological Service. |
| ![Symbol] | - 7 days rainfall is expected to be more than 250mm.  
- There is High risk of flash flood due to the high ground saturation and continued heavy rains. | DRR Management Authorities:  
- Prepare to be ready to take action;  
- Meet with National Meteorological Service to identify vulnerable area. |
DAY -3

AFRIQUE DE L'OUEST
Gestion des risques, portal africain

BEIRA (MZ)
Risk of heavy rainfall during the week: HIGH
weekly march: 561.4mm
Mar - 12: 27mm
Mar - 13: 1mm
Mar - 14: 137mm
Mar - 15: 266mm
Mar - 16: 124mm
Mar - 17: 58mm
Mar - 18: 7mm

Data source: mean of GFS ensemble model.
HAZARDS OVER WEST AND CENTRAL AFRICA
High Impact weather watch services every 15 in for Africa to support early response and recovery
Inondations à Abidjan: la pluie a encore tué ce 5 octobre 2019

Une personne est décédée suite à l’effondrement d’un mur à Yopougon Gesco, causé par les pluies et les inondations ce 5 octobre 2019 à Abidjan.

Les pluies ce jour Samedi 06 Octobre 2019 ont eu des conséquences dramatiques.
Alert for heavy rains potentially leading to flooding in Abidjan possible 2 hours ahead based on weather monitoring products.
Vigilance map issue on 3rd October, 2019
Valid from Oct 05 2019 at 006UTC to Oct 06, 006UTC

Vigilance map issue on 4th October, 2019
Valid from Oct 05 2019 at 006UTC to Oct 06, 006UTC

Vigilance for heavy rains over Côte d’Ivoire 2 days and one day ahead available

Heavy rain over Abidjan on 5 October 2019 associated by 3 deaths [lightning]
WEATHER WARNING BULLETIN
ISSUED ON 11th October 2019 at 12h00 UTC

Valid: From 12h00 UTC to 18h00 UTC on 11th October, 2019

Flood reported in Abidjan

Legend
Green: No severe hydrometeorological hazard expected
Yellow: Be aware
Pay Attention
Orange: Be prepared
Red: Take action
Annual precipitation trend over Africa for the period from 1981-2018. Hatched areas show significant increase (positive) or decrease (negative) at 95% level of confidence.
HAZARDS SCENARIOS FOR DISASTER RESILIENCE STRATEGY FORMULATION, PLANNING, DESIGN, BUILDING AND OPERATING RESILIENT INFRASTRUCTURE
INSTITUTIONAL INFRASTRUCTURE FOR CLIMATE SERVICES
– GLOBAL-REGIONAL-NATIONAL
WMO Designated Global Centers for Long Range Forecasts
RCCs provide regional climate products in support of regional and national climate activities

**Mandatory Functions:**
- Long Range Forecasting
  - Climate Monitoring
  - Data Services,
  - Training
  - Coordination of RCCs (Additional Role for ACMAD)

**Highly Recommended Functions:**
- Climate prediction and projection
- Non-operational data services
- Coordination functions
- Training and capacity building
- Research and development

**Two modes of Implementation:** fully self-contained RCCs or distributed-function RCC-Networks
ACMAD SPEARHEAD
Regional Climate Outlook Forums in AFRICA
CORE ACTIVITY OF RCCs
RCCs provide regional climate products in support of regional and national climate activities

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Two modes of Implementation: fully self-contained RCCs or distributed-function RCC-Networks
Continental Seasonal Outlook Update

Valid from July to October 2019

HAZARDS
Above average precipitation very likely, moderate to heavy precipitation events leading the flood during the season

POTENTIALS IMPACTS
Outbreak of waterborne diseases; damages to infrastructures (dams, reservoirs, bridges, roads...)

MEASURES
Provide agro meteorological advices to farmers, prepare for heavy rains and floods, update and implement flood contingency plans, better manage water in reservoirs and dams

HAZARDS
Below average precipitation during the season
Severe little dry over western coastal part and wet onset recorded
Drought occurring over southern coastal parts

POTENTIALS IMPACTS
Water shortage, decrease in crop yields, degradation of pasture and rise in food prices

MEASURES
Prioritize planting in low land areas, promote drought crops, harvest precipitation to mitigate water shortages and update the implementation of the drought plan

HAZARDS
Above average precipitation very likely, moderate to heavy precipitation events leading the flood, landslides and erosion during the season

POTENTIALS IMPACTS
Outbreak of waterborne diseases; damages to infrastructures (dams, reservoirs, bridges, roads...)

MEASURES
Provide agro meteorological advices to farmers, prepare for heavy rains and floods, update and implement flood contingency plans, better manage water in reservoirs and dams
PRODUTS: Contingency plan updated with a pilot experiment with UNOCHA Bureau in Niger

MoU between ACMAD and IFRC recently signed to provide Seasonal forecasts, advisories, watches and warnings for humanitarian action
Regional Seasonal Outlook update

BRIEF FOR POLICY AND DECISION MAKERS BASED ON SIGNIFICANT WEATHER AND CLIMATE EVENTS EXPECTED WITH POTENTIAL IMPACTS AND RESPONSE MEASURES FOR SUDANO-SAHELIAN REGION OF AFRICA
VALID FROM JUNE TO SEPTEMBER 2019

HAZARDS
Below average precipitation, dryness, normal to late onset

POTENTIALS IMPACTS
Water shortage, decrease in crop yields, degradation of pasture, rise in food prices, low water levels in dams and reservoirs, risk of infestation of weed

MEASURES
Prioritize planting in low land areas, promote drought resistant crops, harvest precipitation to mitigate water shortages, reduce livestock, activate fuel power plans, update and implement drought contingency plans

Above average precipitation very likely, regular distribution of precipitation during the season with dry, wet spells and heavy rains leading to floods

POTENTIALS IMPACTS
High incidence of lightening, outbreak of water borne diseases, flooding of crop fields, damages to infrastructure (dams, reservoirs, roads etc...)

MEASURES
Provide agritechnocratic advices to farmers, update and implement contingency plans for floods, improve management of water in reservoir and dams
African annual precipitation in percent of average for 2015

Commodity (e.g. Corn) reserve could be set up with excess production over the Sahel, ECOWAS and ECCAS RECs in October-November 2015 to reduce inflation on commodity markets in Southern Africa from December 2015 into 2016.

A continental Free trade area would accelerate movement of commodities desperately needed to reduce droughts, floods and other events impacts.
The hydrological situation of lakes and rivers reflects the relationship between supply and demand of water for human consumption, livestock forage or hydroelectric power production. On the supply side dependence on precipitation is obvious. Thus, meteorological drought has a direct impact on hydrological drought.

Figure 4: Kariba Lake level fluctuations since 2013/2014 and reflecting the 2015/2016 drought; 475 meters is the minimum level for hydropower production. This level was almost reached between February and March 2016 as detected by Sentinel 3A data.
D. The ACMAD-MESA African Drought Monitor as part of the Drought Service and Continental Seasonal Climate Forecast

Figure 5: Drought Monitor product valid for February 2016.

Mean annual temperature anomalies (°C) over Africa for 1950-2018 period relative to 1981-2010.

- 2018 is the 4th warmest year on record since 1950
- 2017 was the 5th warmest year
- 2010 is still the warmest year on record over the African Landmass
Trends in the mean annual temperature anomalies (°C) over Africa for 1950-2018 period.

Temperature Anomaly in Africa

- El Nino years
- La Nina years
- Neutral years
- Trend 1950-2018 (2.14°C/century)
- Trend 1990-2018 (3.57°C/century)
Temperature Anomalies are close to one of the past 5 to 10 years years
Some degree of persistence???

<table>
<thead>
<tr>
<th>Region</th>
<th>Anomaly (° C)</th>
<th>Ranking per region since 1950</th>
</tr>
</thead>
<tbody>
<tr>
<td>Africa</td>
<td>+0.70</td>
<td>4th</td>
</tr>
<tr>
<td>Northern Africa</td>
<td>+0.84</td>
<td>3rd</td>
</tr>
<tr>
<td>Southern Africa</td>
<td>+ 0.86</td>
<td>3rd</td>
</tr>
<tr>
<td>Western Africa</td>
<td>+0.52</td>
<td>7th</td>
</tr>
<tr>
<td>Eastern Africa</td>
<td>+ 0.70</td>
<td>5th</td>
</tr>
<tr>
<td>Central Africa</td>
<td>+0.82</td>
<td>3rd</td>
</tr>
<tr>
<td>Madagascar</td>
<td>-0.29</td>
<td>35th</td>
</tr>
</tbody>
</table>
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Some degree of persistence???

Formal partnerships for seamless forecasting from nowcasting to seasonal forecasting of tropical cyclones (AUC, IOC, SADC to attend)
SERVICES FOR DRM REQUIRING SUSTAINABILITY INITIATIVES

By supporting continued production with donors and mobilizing policy and country budgets decision makers
SERVICES TO MEET THE NEEDS
At planning level

Seasonal Forecasts are required to update contingency plans, activate early warning mechanisms—

Potentially flooded zones in the contingency plan update in Niger based on seasonal forecasts for summer 2017
CONCEPT FOR A DEMONSTRATION PROJECT PROVIDING AND USING OPTIMAL CLIMATE SERVICES FOR RESILIENCE

• Major steps of the demonstration
• Climate advisory/watch and contingency planning
• Sub seasonal advisory/watch and preparation
• Medium/Short Range Forecasts/watch and early response
• Nowcasting // go-actions of response and recovery
• Forecasts, Outlooks, Advisories, watches and warnings are services dedicated for Disaster resilience
Main Activities of the pilot

- Document historical performance of WMCs products over Africa
- verify WMC products
- develop regionally tailored products
- prepare technical notes to guide forecasts briefings at National level
- deliver bulletins, pilot advisories and watches
- support NMHS to deliver impact based forecasts and risk based warnings as part of twining exercise with WMCs-ACMAD-pilot NMHS
- store data and products for post events studies
- support SWFDP and MHEWS with forecasts of regional scales features driving severe or high impact meso to local scale weather or climate
- organize on the job training and workshops
- Organize joint forecasts discussions involving WMCs-ACMAD-pilot NMHSs with emphasis on potential emergency situations
- Target users: NMHSs, RSMCs, RCCs, DRM Agencies, Humanitarian institutions, AUC and RECs

-Institutions with expertise on risk identification and assessments, warning, communication, preparation and response are the ecosystem of institutions and actors needed for effective resilience
Questions to DRM - recommendations and conclusions

✓ Based of forecasts, advisories, watches and warnings did authorities issued evacuation orders? If not why?

✓ Does the national/regional contingency plans for floods include prevention and preparation as well as early response measures? If yes, how did this worked?

✓ Are the orders mandatory or can be ignored? If not why? Are they left to local official with little DRM experience?

✓ Is there reluctance to issue orders? Are they issued in odd hours?

✓ With climate change, policies, strategies, rules and regulations crafted with old historical experience and empirism no longer apply.
✓ For better or for worse, Africa should innovate in the DRR field because we are the most vulnerable in the world.

✓ ACMAD, UNECA, WB, UNDRR, UNOCHA, IFRC, ARC, and AUC effectively establish and operate the Continental Early Warning System, a similar governance set up with RECs and Countries is highly recommended and urgent.
The **Challenging question** is: **how does the Climate community more effectively let the public/User/DRM Managers know what we know**, and **how it may impact them**?

Trust better forecasts and heed warnings