

WEATHER FORECASTING IN RWANDA

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OUTLINE

- Weather forecasting
- Forecasting methods
- Forecasting ranges
- Impacts of extreme events
- Dissemination channels
- Recommendations

1. Weather forecasting

What is weather forecasting? is a tool used for predicting future demand based on past information.

The science and technology is used to predict the conditions of the atmosphere for a given location and time.

Why is forecasting important?

Demand for products and services is usually *uncertain*.

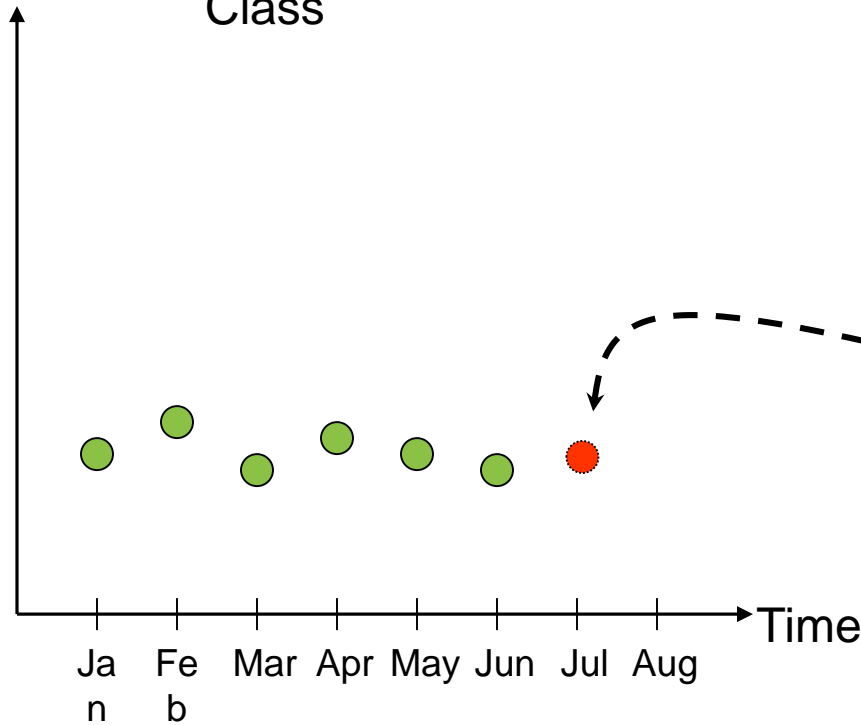
Forecasting can be used for...

- Strategic planning (long range planning)
- Finance and accounting (budgets and cost controls)
- Marketing (future sales, new products)
- Production and operations

- Forecasts are more accurate for groups or families of items
- Forecasts are more accurate for shorter time periods
- Every forecast should include an error estimate
- Forecasts are no substitute for calculated demand.

What is forecasting all about?

Demand for Mercedes E Class



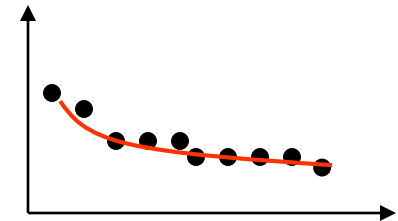
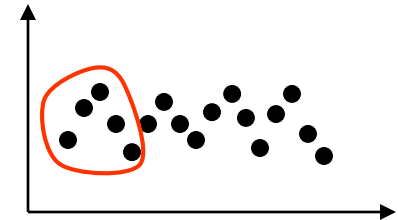
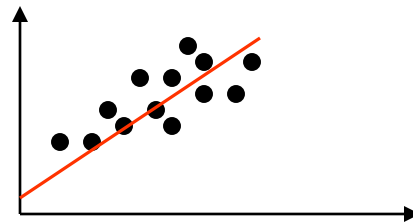
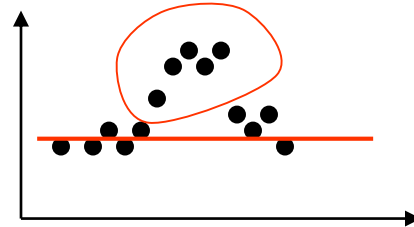
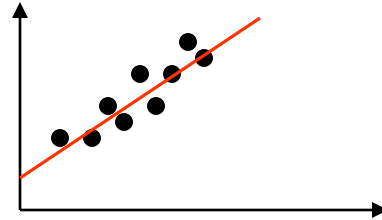
We try to predict the future by looking back at the past

Predicted demand looking back six months

- Actual demand (past sales)
- Predicted demand

Forecast considerations

- Trends
- Seasonality
- Cyclical elements
- Autocorrelation
- Random variation



2. Forecasting methods

Qualitative methods

Rely on subjective opinions from one or more experts.

Quantitative methods

Rely on data and analytical techniques.

Forecasting methods

Quantitative forecasting methods

Time Series: models that predict future demand based on past history trends

Causal Relationship: models that use statistical techniques to establish relationships between various items and demand

Simulation: models that can incorporate some randomness and non-linear effects

Qualitative forecasting methods

Panel Consensus: deriving future estimations from the synergy of a panel of experts in the area.

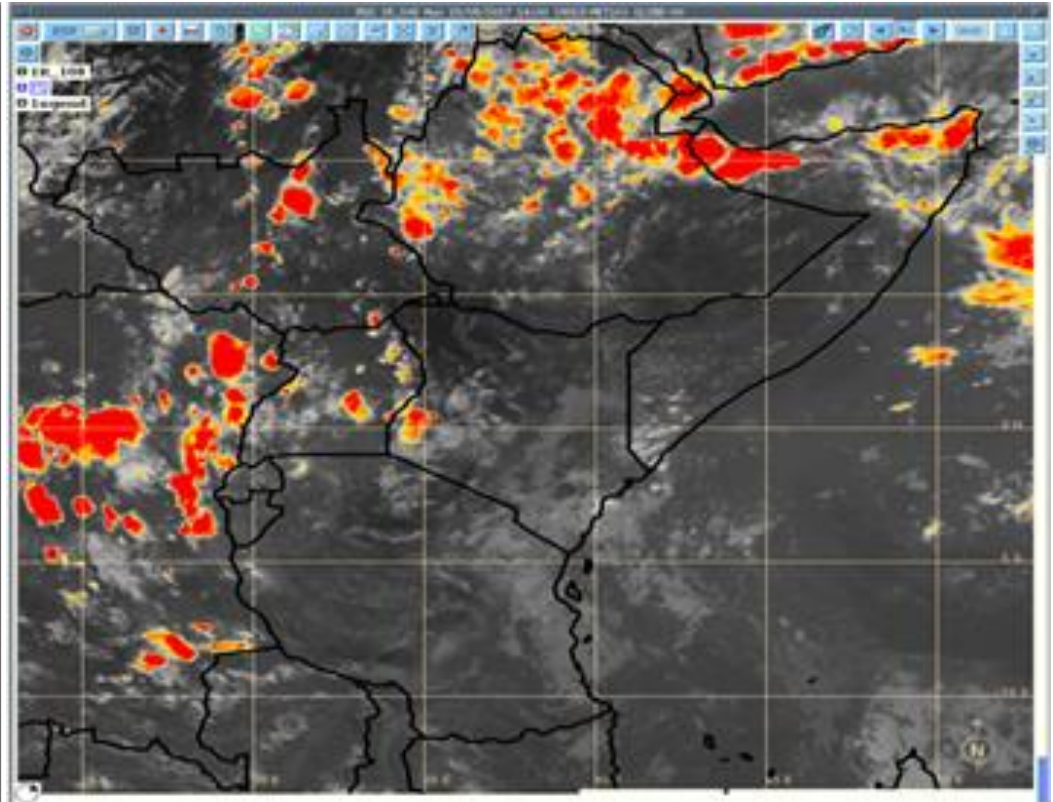
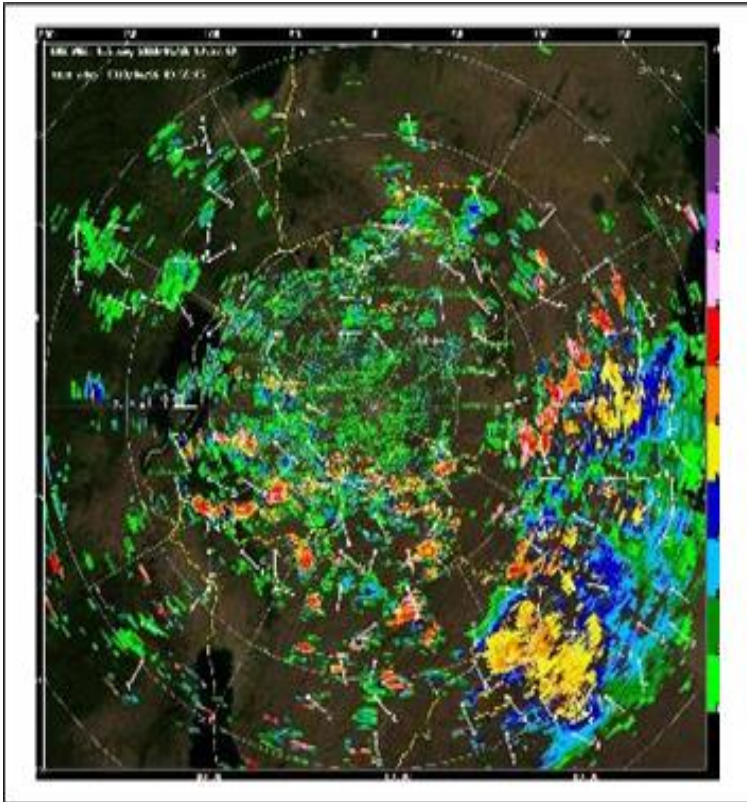
Historical Analogy: identifying another similar market.

Delphi Method: similar to the panel consensus but with concealed identities.

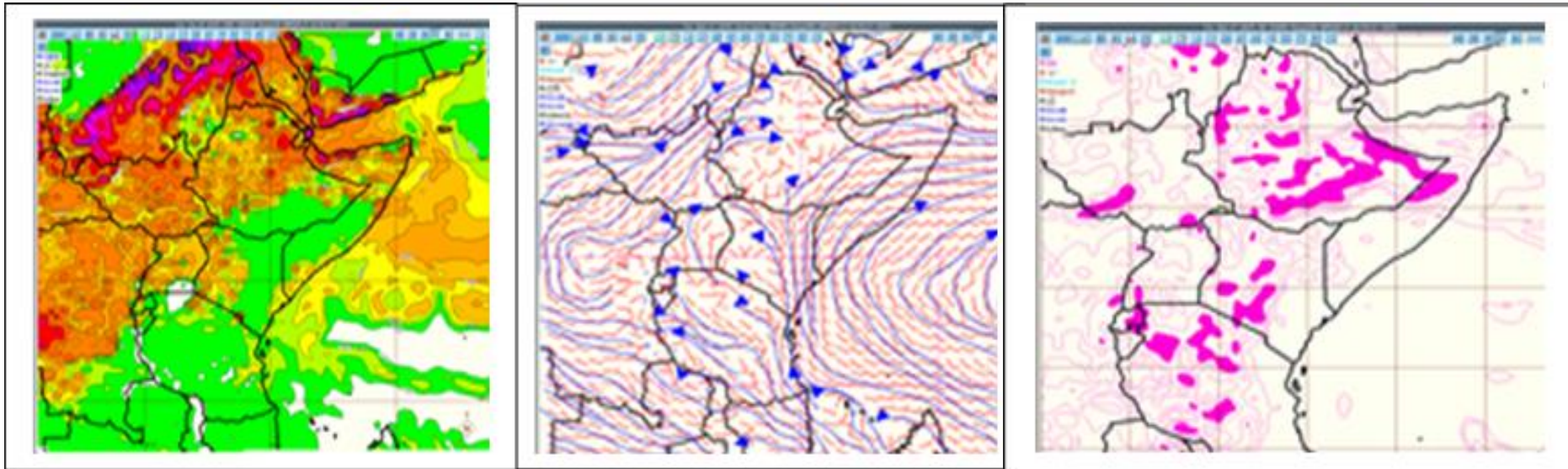
3. Forecasting ranges

- Now casting
- Daily forecast
- Three days and five days forecast
- Seven days forecast
- Ten days Bulletin
- Monthly outlook
- Three months forecast

1. Weather radar and Satellite Imagery (Mostly used in Nowcasting)

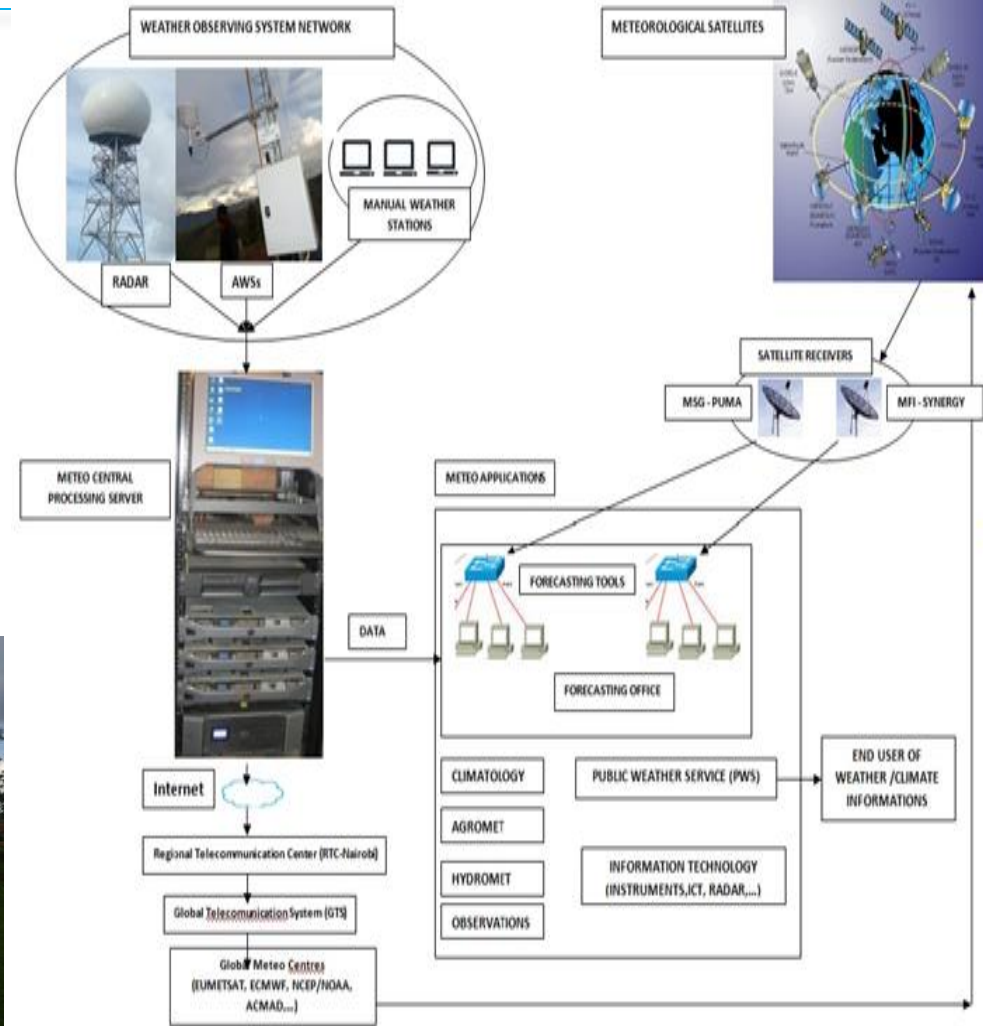
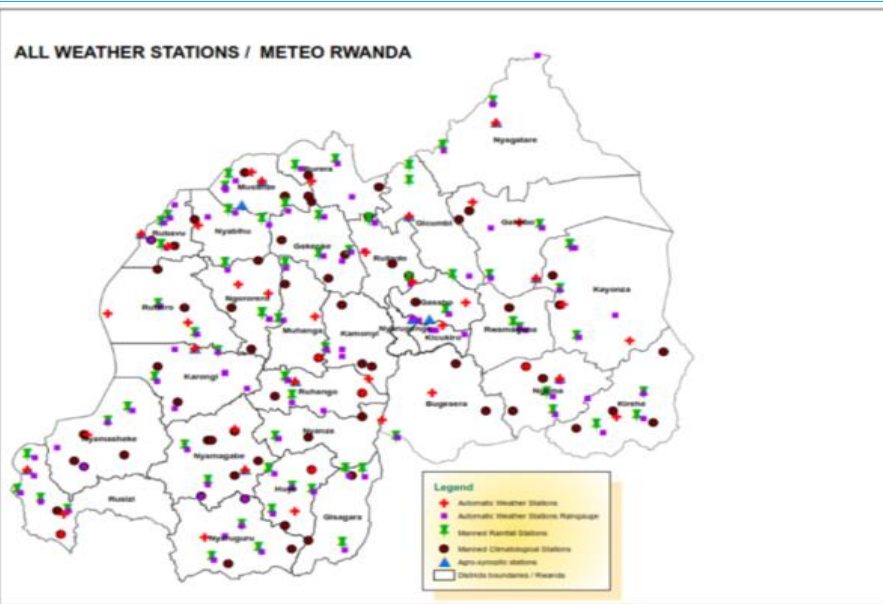


2. Numerical weather Prediction Systems; SYNERGIE and MESSIR (used in Short and Medium range weather forecast)



Produce Forecasts

3. Network of stations and Radar



Early Warning Message



Iteganyagihe riburira

Kigali, Kuwa 09 Ukwakira 2018

Ibidasanze: Imvura nyinshi irimo umuyaga

Kuva ku itiliki ya 09 kugeza kuya 13 Ukwakira 2018, hateganyijwe imvura nyinshi iri ku kigero cya milimetero hagati ya 20 na 30 ku munsu irimo n'umuyaga mu Rwanda. Iyi mvura iteganyijwe ishobora gutera imyuzure n'inkangu cyane cyane mu turere dukunda kwibwirwa n'ibi biza aritwo: Musanze, Gicumbi, Gakenke na Burera mu Ntara y'Amajyaruguru; Nyabihu, Rubavu, Rusizi na Nyamasheke mu Ntara y'Iburunguzuba ndetse n'Uturere twa Nyamagabe na Nyaruguru mu Ntara y'Amajyepfo.

Bitewe n'uko turi mu gihe cy'imvura, bigaragara ko imvura irimo imiyaga n'inkuba izajya ikunda kuboneka muri ibi bihe by'imvura bityo mukabe musabwe kwitwaririka tukurikiza inama muzajya mugenzwaho n'abubishinzwe mu nzego zitandukanye. Muri rusange turabona ko imvura ihari n'abwo bigaragara ko hari aho yagiye itinda kugwa.

Mukenye ibindi bisobanuro rwahamagari ku murongo utishyurwa **6080**.


John NTAGANDA SEMAFARA

Early Warning Message

Planning forecast for Ngororero District

Date:	Monday 04/12/17								24hr total	Tuesday 05/12/17				24hr total	6/12/17		24hr total	7/12/17		24hr total	8/12/17		24hr total
Disruption Level	0200	0500	0800	1100	1400	1700	2000	24hrs	0200	0800	1400	2000	24hrs	0800	2000	24hrs	0800	2000	24hrs	0800	2000	24hrs	
YELLOW							L																
ORANGE																							
RED																							

Guide to potential disruption levels that may be experienced:

Grey	Disruption not expected.
YELLOW	Flooding to road surfaces, localised agricultural areas, livestock in flood-prone areas may be at risk.
ORANGE	Flooding of minor and some larger roads in valleys, extensive agricultural areas, possibility of livestock loss, localised flash flood, some damage to rural housing.
RED	Severe widespread flooding to major rivers and catchments, damage to and loss of housing, major landslides, loss of livestock and risk of loss of human life and livelihoods.

Guide to approximate probability of event occurring:

	Disruption not expected (<15%)
L	Less likely to see disruption at this level (>15% and <50%)
M	More likely than not to see disruption at this level (≥50% and <85%)
H	High probability of disruption at this level (≥85%).

NOTE: The expected rainfall in individual time steps may not be enough to cause disruption on its own, but the total accumulated rainfall over the 24hr period may be high enough, therefore it is possible for disruption to be indicated over 24hrs but may not be indicated in any of the individual time steps that day. Accumulations of rainfall indicated within a 24hr period may occur in a significantly shorter period of time.

Issued by MeteoRwanda

Forecaster:- Félicien

This product should be used for planning purposes only. It is not amendable and can be superceded by the issue of weather warnings at any time.

For further information/clarification please contact the duty forecaster

Impacts of extreme events weather and climate



Dissemination channels

- Through Radio recording and providing radio scripts to partners radio stations
- Through TV presentations that is aired every evening on National television (RTV)
- Through training workshops to farmers in partnership with projects boosting agriculture like CIAT,PASP, FAO, etc
- Through responding to the public's queries by use of a Toll Free (6080) and USSD *845 #
- Through Emails
- Through printing of the daily forecast on a partnering Newspaper like the New Times , Igihe.com and Izuba rirashe
- Issuing a special forecast incase of severe weather events where disaster is highly probable,
- Daily briefings provided to joint forces
- Through social media platforms (WhatsApp, Twitter, Facebook and Youtube)

Mobile Application



Gasabo	☁️	27° / 16°
Nyarugenge	☁️	27° / 16°
Kicukiro	☁️	27° / 16°
Musanze	☁️	24° / 11°
Cicumbi	☁️	22° / 14°
Burera	☁️	20° / 12°
Gakenke	☁️	23° / 13°
Rulindo	☁️	24° / 14°
Huye	☁️	25° / 15°
Nyamagabe	☁️	25° / 15°



Friday
Mayange station, Last update 08h50'

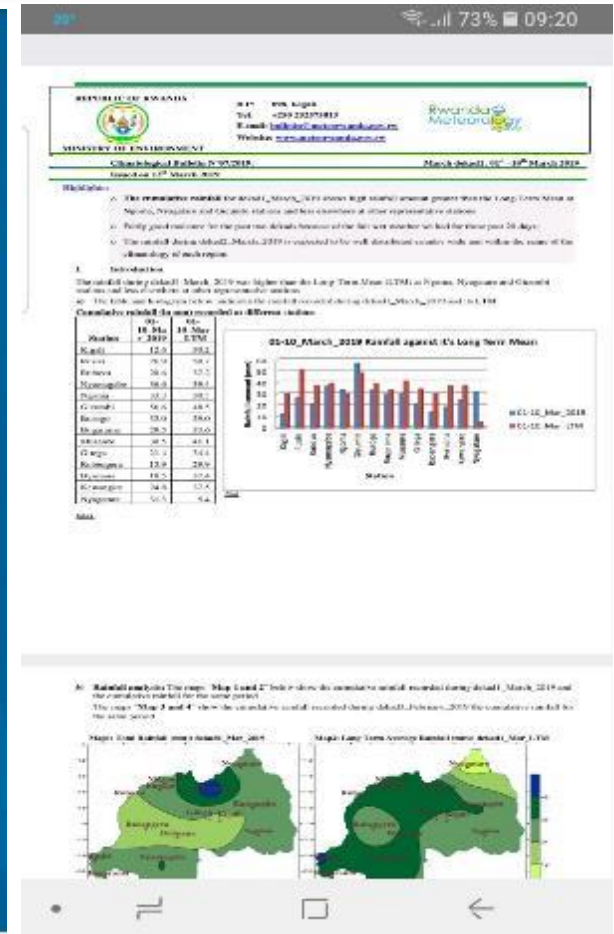
0 mm | 1.1 m/s | 84.7RH% | 18.1°C

Precipitation | Wind | Humidity | Temperature

FORECAST

Hourly | **7 Days** | 10 Days | Monthly | Seasonal

Friday	Mostly cloudy	☁️	26° / 16°
Saturday	Mostly cloudy	☁️	27° / 16°
Sunday	Mostly cloudy	☁️	26° / 17°
Monday	Mostly cloudy	☁️	26° / 16°
Tuesday	Mostly cloudy	☁️	26° / 15°
Wednesday	Mostly cloudy	☁️	26° / 16°



MINISTÈRE DES ENVIRONNEMENTS
Rwanda Meteorology Agency

05-10_March_2019 Rainfall against its long term Mean

Station	05-10_March_2019	05-10_March_1970-2019
Kicukiro	12.0	25.4
Burera	19.0	19.0
Burungana	26.0	17.2
Cicumbi	22.0	28.1
Gakenke	16.0	24.7
Musanze	13.0	24.0
Nyamagabe	18.0	25.0
Ruhengeri	27.0	21.1
Rusizi	11.0	14.4
Sukuma	13.0	22.0
Taraka	19.0	22.0
Umuhele	14.0	17.4
Umutanga	11.0	14.0

Map 1: Rainfall against long term mean - Mar 2019

Map 2: Long Term Average Rainfall against long term mean - Mar 1970

Recommendations

- ❖ There is a need to enhance the feedback of weather and climatic extreme events.
- ❖ Institutions and different end users should endeavour to apply weather and climate information in planning and decision making
- ❖ Warning institutions should establish collaborative early warning systems.



THANK YOU