

‘Combining indigenous and scientific weather forecasting knowledge in Climate Risk Management in Semi-arid Areas of Tanzania’

Presentation made at a Workshop

on

‘Achieving Benefits of Enhanced Service Delivery by National Meteorological Services in Eastern and Southern Africa’

by

Prof. Henry Mahoo and Dr. Emanuel Mpetwa

SUA and TMA

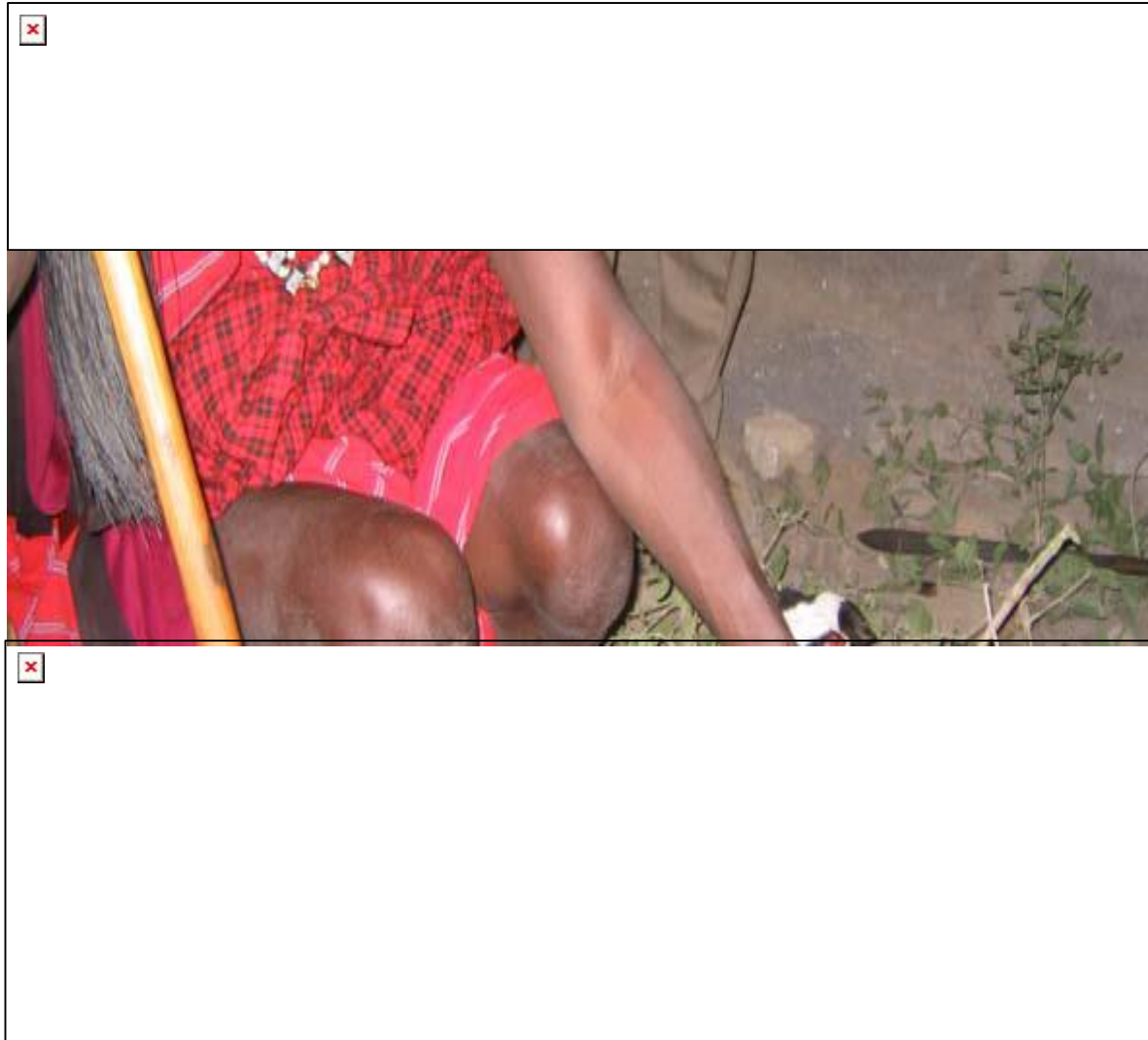
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Outline of the presentation

- Introduction (IK and SF forecasting)
- Shortfalls IK and SF weather forecasting
- Climate information needs (farmers, extension, researchers)
- The '*needs*' and '*information*' gaps
- Methodology
- Formation of IK Groups and Core Team of experts
- Results: SF and IK seasonal forecasting OND 2010
- Concluding Remarks
- Acknowledgement

Introduction-indigenous and scientific forecasting

- In Tanzania, farmers have used traditional knowledge to understand weather and climate patterns in order to make decisions about crop production cycles (SWMRP, 2007; Mhita,2006)
- This knowledge has been gained through many years of experience, and has been passed on from previous generations.
- The knowledge is adapted to local conditions and needs.



Source: Mhita, 2006: A traditional weather forecaster using IK



Local maize variety

intro. (cont.)

- In the semi arid areas of Tanzania, soil degradation, decreasing water resources, and changes in the climate are some of the main obstacles in sustainable agricultural development.
- Climate including weather is an important variable that influences crop production, and
- One of the ways to deal with increased vulnerabilities due to climatic variability is by integrating climate concerns in the development process



Degraded soil in Same

Some shortfalls of IK

Some of the inherent shortfalls of IK include:

- IK weather and climate information is seldom documented and in many cases it is lacking
- IK and scientific weather/climate forecasting are not linked or integrated
- There is seldom or no direct communication between IK experts and scientific experts (lack of fora)

Scientific weather forecasting (SF) - shortfalls

- The current generic seasonal forecast information provided by the National Meteorological Agencies provides **limited help** to farmers and other stakeholders (e.g. inputs stockists) to take alternate decisions at the farm level
- This is because the information comes at a scale that is much coarser than what is required to make decisions at farm level, and
- Downscaling at the farm level is currently not done by the national met. services

Climate information needs

FARMERS:

- According to SWMRP (2007), using a stakeholder's analysis approach, the climatic information needs by farmers and other stakeholders such as extension staff, researchers, and input suppliers and stockists in Same-District in the western Pare lowlands (WPLL) included the following:
 - When will the rain start and end? [**This will enable them to plan their activities**]
 - What will be the actual amount of rain to be expected? [**This would help them to know whether it will be enough or not.**]
 - What crops to grow based on the predicted/forecasted season?

Climate information needs cont.

(farmers cont.)

- In terms of timing of the climate information, the farmers wanted the information to reach them well before the start of the season and be **updated on the progress of the rain from time to time**
- The information should be transmitted to all stakeholders.
- Relevant climate information should be put in a form easily to be understood by all stakeholders [e.g. use of local languages]

Climate information needs cont.

Extension staff/researchers

- seasonal forecast,
- amount of rainfall at each time and
- the distribution of rainfall, and what it means to agricultural activities and specifically what does the forecast translate to the farmer.
- the wind, heat, clouds, solar radiation, relative humidity, maximum and minimum air temperature, and the rate of evaporation, moisture in the atmosphere and various changes in the season.
- Information on rainfall intensity (to assist in determining the severity of rainfall storms and whether they will cause floods or not.)

The '*needs*' and '*information*' gaps

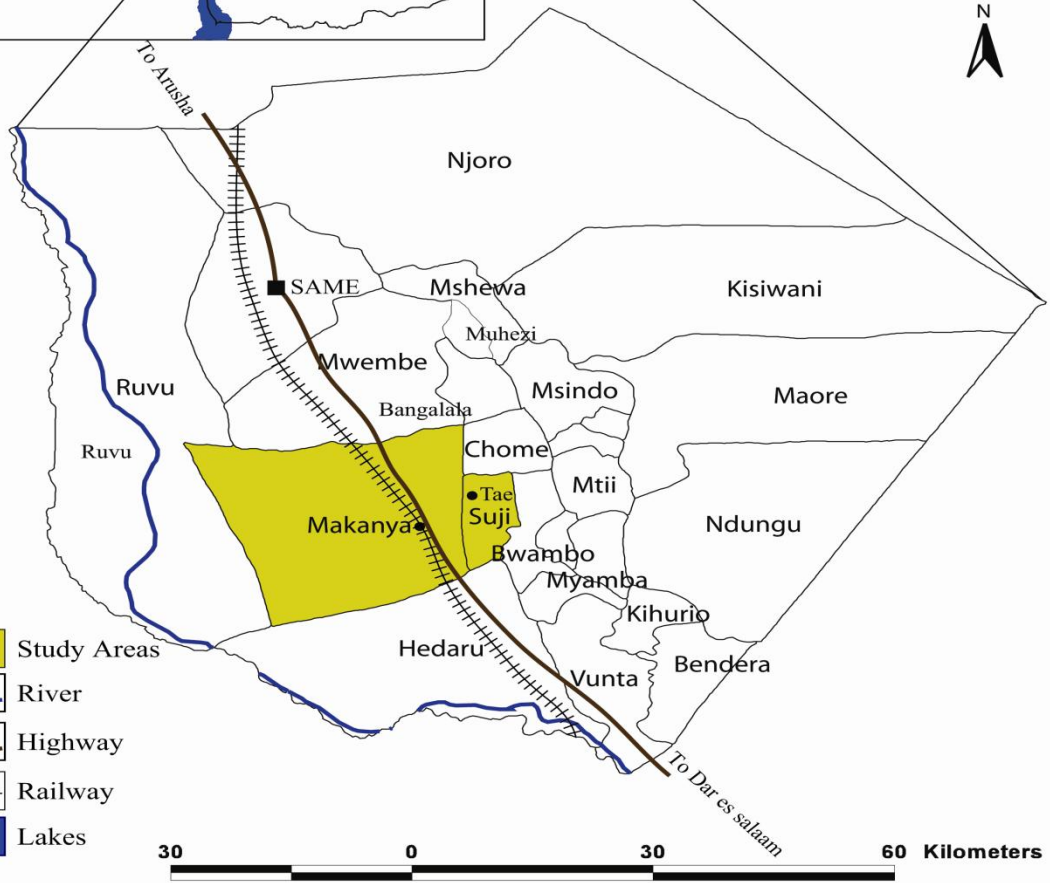
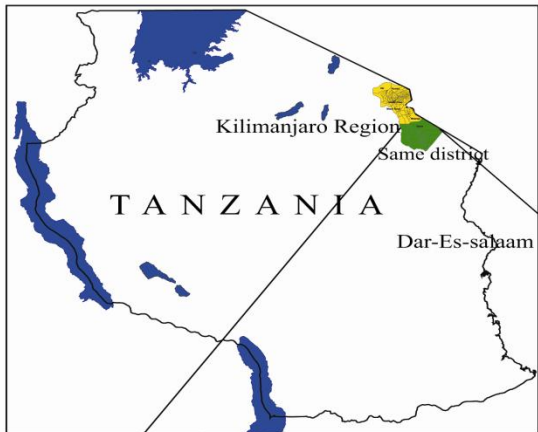
- From the preceding slides there is a gap in terms of the type of climate information required by farmers and other stakeholders at field scale compared with what is currently being supplied by the Meteorological Departments and other climate information service providers.
- Although the capacity to generate and supply site-specific medium range weather forecast has been enhanced in recent times, access to get location specific rainfall forecasts that can assist to take proper decision at the farm level is limited or lacking.
- It is for this reason many farmers and other stakeholders in the agriculture sector have resorted to Indigenous Forecasting (IF) using indigenous knowledge (IK).

Methodology

In trying to link IK and SF, a study was conducted as part of the project “**Managing Risk, Reducing Vulnerability and Enhancing Agricultural Productivity under a Changing Climate**” funded by IDRC/DFID.

- This project is being implemented in **Ethiopia, Kenya, Sudan and Tanzania.**
- Sokoine University of Agriculture is the lead institution

Location : Same District , Kilimanjaro Region



Formation of groups of IK weather forecasters

Three groups of IK weather forecasters were formed following the topo-sequence

- **IK group 1:** is located in the lowlands at Ruvu village (**5 members**)
- **IK group 2:** is located in the mid-slopes at Bangalala village (**5 members**)
- **IK group 3:** is located in the highlands at Mhezi village (**5 members**)

IK groups (cont.)

- These IK groups met regularly to make weekly forecasts especially rainfall
 - The criteria they used is based on:
 - **plant phenology** (e.g. flowering of certain tree species)
 - **air temperatures, winds, and clouds** (e.g. high temperatures, strong winds)
 - **animals, birds and insects** (goats making noise)
 - **astronomy** (moon, stars)
- (see Climate Witness (DVD) – climate change testimonials from Tanzania)

Formation of Core team of

MAIN OBJECTIVE:

- Build a core team of research and extension experts within the district for development and dissemination of climate information products and for providing advisory support for rural communities in Same District.

Reasons for building the core team were as follows:

- To enable the research and extension experts to share their knowledge and experiences
- To enable the climate information products to reach to the farmers timely, correctly, and in a way that is easily understandable
- To enable farmers to get advise on what to do once they are given the climate forecast
- To form a team that will act as a model that can be adopted by other areas in the country
- To propose a way that will make this team sustainable.

Core Team Structure

Team composition

➤ DALDO	1
➤ TMA Same	1
➤ District extension Officer (agriculture)	1
➤ District extension Officer (livestock)	1
➤ Indigenous Knowledge (IK) forecasters	3
– Ruvu, Bangalala, na Mhezi	
➤ Ward Extension Officers	7
– Ruvu, Njoro, Gavao, Bangalala, Vumari, Mhezi, na Tae	
➤ SAIPRO (NGO)	1
➤ Agricultural inputs stakeholders	1
➤ SUA	1
➤ TMA Headquarters	1
The proposed total number of team members is	18

Core Team Structure

- It was proposed that the team should be under the office of the District Agricultural Development Officer (DALDO).
- The team will be chaired by DALDO.
- The Manager of the TMA Same office will be the Secretary of the team.

Terms of References (ToR)

- The following will be the terms of references for the team:
- To make sure that the research and extension experts exchange ideas and experiences on weather and climate information and forecasts
- To search and interpret climate information, and to make sure that the forecasts reaches to farmers timely, correctly, and in a way that is easily understandable
- To give advise to farmers on what to do once they are given the climate forecast

Facilitation and sustenance of the Team

- To start with, the meetings of the team will be facilitated by the CCAA Project, which is funded by IDRC/DFID, and managed by SUA.
- When the Project comes to an end in March 2011, it is proposed that the team should be supported by the office of the DALDO.
- The DALDO office should arrange for the team to be integrated in the District Agricultural Development Plans (DADP) as a long term plan. **This has been done**
- The village and ward extension and executive officers should be given training and education on weather forecast and interpretation of climate information

Schedule of meetings

The following schedule was proposed for the team to meet:

- At the beginning of September (before OND (*Vuli*) season)
- At the beginning of November (Mid of OND (*Vuli*) season)
- At the beginning of February (before MAM (*Masika*) season)
- At the beginning of April (Mid of MAM (*Masika*) season)

Type of information

- Seasonal weather forecast
- Monthly forecast
- 10-days forecast
- Daily forecast (rains, winds, temperature)
- The start and end of seasons, and seasonal lengths
- Proposed planting dates, types of crops, and seed varieties, based on weather forecast
- The spread of rainfall within the season and dry-spells (critical periods)
- Occurrence of extreme events e.g. El-Nino, La Nina, extreme winds

Source of information

- from TMA and IK forecasters.
- Information should be integrated together to come out with a single forecast (**consensus forecast**).
- The IK forecasters use indicators such as positions of moon and stars in the sky, presence of certain types of insects and birds, winds, plants, clouds, etc.

Language and interpretation

- Kiswahili and possibly
- local languages- *KIPARE*
- Information should be prepared in form of leaflets, posters, statistics, and figures (*vielelezo*).

Means of disseminating climate information

- Village meetings, ward, communal, and informal (street) meetings and gatherings
- Notice boards in the village and ward offices, and other public places (schools, mosques, churches)
- Radio broadcasts (e.g. TBC1)
- Farmer field schools
- Farmers and pastoralist groups
- Social gatherings e.g. functions, after worship gatherings
- TVs, electronic (internet, RANET, phones)
- Leaflets
- Meetings of researchers and research farmers
- Translated Weather Bulletins
- Newspapers

People who will be responsible to disseminate the information

- The team should receive and customize information from TMA and IK groups
- The team should send the information to District officials responsible with agriculture and other agricultural stakeholders in the District (NGOs, farm input agents, etc)
- The team should send information to the village extension and executive officers through their respective ward extension officers/executive officers
- The ward extension officer should be responsible to make sure that the villagers get the weather forecast through their village executive officers
- The ward extension officers will be responsible to give feedback to the team on the delivery of the weather information and response from farmers.

Time of spread of information

- The information on weather forecast will be disseminated soon after the team has met for the seasonal forecast so that farmers can make their decisions as early as possible.
- Information will also be spread before the beginning of the season.
- The 10-days and monthly forecasts are also very valuable to farmers in making their decisions.

Follow up of information flow

The following people will be responsible

- The core team should make follow up and get feedback from ward and village extension officers on how farmers get and utilize the climate information
- The DALDO should make sure that the team meets and perform their tasks as planned
- TMA HQ should make sure that the team is getting the weather forecasts in time
- The CCAA research team while on their project activities should check to see that farmers are getting climate information as planned
- NGOs

RESULTS: seasonal forecast SOND 2010

- From 23rd August to 3rd September 2010 climate scientists and experts from National Meteorological Services of the Greater Horn of Africa (GHA), and International Meteorological Centre convened in Kenya to formulate consensus seasonal outlook guidance for October - December 2010 rainfall season in the Eastern African sub – region

RESULTS: SF- seasonal forecast SOND 2010

TMA-PRESS RELEASE - 8th September, 2010

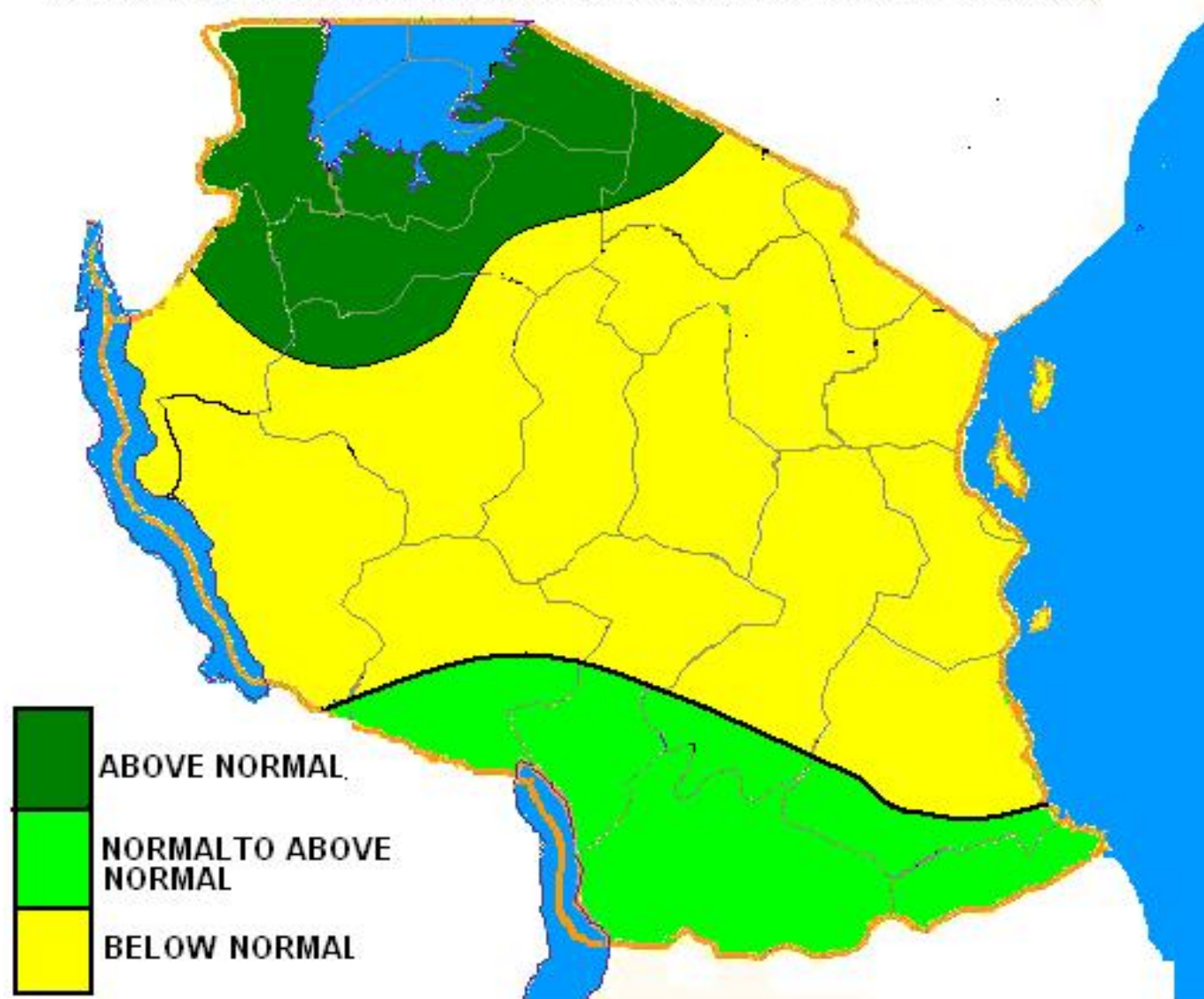
Short Rains (OND, 2010)

- The October to December rainfall season (*Vuli*) is more significant for the north-eastern highlands, northern coast areas and the Lake Victoria basin.
- **Below normal rainfall is expected over the northeastern highlands, northern coast and its hinterlands.**

(cont.)

- The short rainy season in the northern Tanzania (bimodal areas) is due to commence from **third to fourth week of September** over the Lake Victoria Basin and later to the northern coast and northeastern highlands towards mid October, 2010.
- The start dates of the short rainy season over bimodal areas are likely to delay, resulting into shorter season.

RAINFALL OUTLOOK FOR OCTOBER TO DECEMBER 2010



**RESULTS: IK - seasonal forecast
OND, 2010**

Ruvu village

IK: OND, 2010

- The season (OND 2010) will be normal.
- The rains are expected to start between the first to second week of October 2010
- The rains (OND 2010) are expected to end early.

Advise to farmers(crops) in Ruvu village

- Farmers should use improved seeds since they use irrigation.
- Recommended maize seeds include: SC513, 627, 713, KITALE 513, and PH04.
- Farmers with crops that have not been harvested should harvest them to avoid damage by the OND rains. The harvesting should be done by end of September 2010

Advise to farmers (livestock) in Ruvu village

- The OND rains will allow pasture regeneration
- However, livestock keepers should implement their traditional rotational techniques locally called “*milimbiko*” since the rains will stop early
- At the onset of the rains livestock keepers should not graze in valley bottoms in order to avoid livestock diseases

Advise to inputs suppliers (crops)

- Stockists should make sure that agric. inputs are available early during the first week of October.
- The following maize varieties must be available: SC 513, 627, 713, PH 04, and KITALA 513.
- The following vegetable seeds should also be available: tomatoes, and onion sweet pepper

Advise to inputs suppliers (livestock)

- Stockists should make sure that they have enough drugs against disease outbreaks such as *Rift Valley Fever*.
- Other drugs such as Berenil, Novidium, and Oxy-tetracycline should also be available

Concluding remarks

- There is need of downscaling the national seasonal forecasts to field scale level in order to meet the needs of stakeholders such as famers, inputs stockists, extension staff and NGOs. The technology and models exist (use of computer power and modelling)
- IK should be given attention and be considered as complementing SF.
- Can IK and SF be combined to provide consensus forecasting at field scale level?

ACKNOWLEDGMENT

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Thank you for your attention