

Weather Infrastructure and Expertise in Malawi

By

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Presentation during WMO Workshop on Climate Monitoring including the implementation of Climate Watch Systems in RA-I with focus on Eastern and Southern Africa

South Africa

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Mandate, Vision, Mission and Core Values

- ***Vision: Towards Reliable, Responsive and High Quality Weather and Climate Services in Malawi***
- ***Mission: To provide reliable, responsive and high quality weather and climate services to meet national, regional and international obligations through timely dissemination of accurate and up to date data and information for socio-economic development.***
- ***Mandate: To monitor, predict and provide information on weather, climate and climate change ,that would contribute towards the socio-economic development of the country.***
- ***MOTTO: Be Wise, Be weather Wise***

Core Values

We believe in;

- **Protection of life and Property**
- **Access to Weather and Climate Information**
- **Networking**
- **Commitment**
- **Investment in Technology**
- **Innovation**
- **Team work**

Functions

- Provision of Weather and climate observation and communication services;
- Provision of Weather and climate forecasting services and climate projections for the development of climate change adaptation and mitigation programmes;
- Provision of Technical coordination and implementation of climate change issues;
- Provision of Weather and climate data and information for various socio-economic sectors;
- Provision of Climate change and Meteorological Education and Outreach services;
- Provision of Climate change and Meteorological Research services
- Provision of Financial, administrative and support services.

1. THE WMO CONVENTION

- In line with the **World Meteorological Organisation (WMO) Convention**, adopted on 11 October 1947, and reviewed in 2007, *the National Meteorological and Hydrological Services (NMHSs)*,
 - Are the **single authoritative voice and source** on weather and hydrological warnings;
- The views of NMHSs are considered to be **scientifically sound** and **impartial** when advising their governments.

2. ESTABLISHMENT OF METEOROLOGICAL SERVICES IN MALAWI

- The present Department started as a small unit in the Department of Civil Aviation then became a fully fledged Department in 1983.
- Now it has about 300 Members of Staff across the country

MEETING THE GOVERNMENT'S INTERNATIONAL OBLIGATIONS

Accomplish Resolution 40 of WMO:

— “provide on a free and unrestricted basis essential data and products which are necessary for the provision of services in support of the protection of life and property and the well-being of the nation”;

▪ Support to the Safety and Efficiency of:

- *National shipping and maritime affairs; and*
- *Civil aviation;*

• Support to Climate Change Adaptation

- Computation of carbon footprint in GHG Inventories
- The monitoring, assessment, and projection of Climate Change; as well as
- Contributing to the assessment of the impacts, measures and options to deal with Climate Change;
- National Adaptation Plans and NAPA

▪ Support For New Innovation Requiring New Technology

- Creation of the multi-disciplinary experts in aviation observations
- Also 35-40% of aviation accidents are attributed to bad weather.

• UNFCCC – Work within the Mandate of SBTSA

• IPCC Working Group 1

2013/01/23

Climate Monitoring Overview

☐ Seasonal rainfall monitoring process

- Seasonal Rainfall forecast
- Monitoring timeliness of start of rains
- Monitoring rainfall distribution
 - Dry spells
 - Floods and

*Their impact on Agriculture and Food Security

☐ Seasonal rainfall monitoring is done through a combination of ground reports received from a network of weather stations and rain gauges scattered over the country, remote sensing imagery, and rainfall/crop water balance modeled products

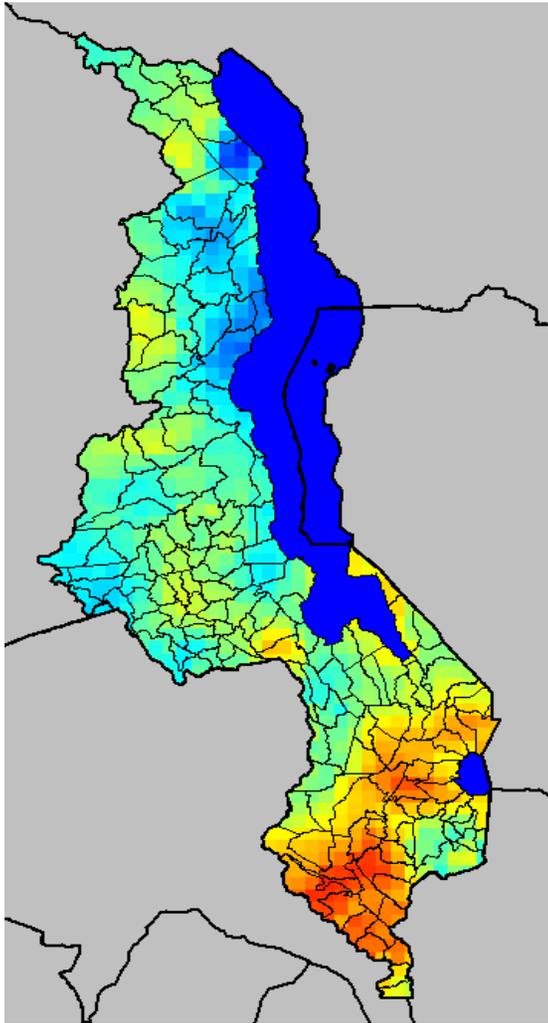
Tools for Monitoring the Season

DCCMS monitors crop growing season using:

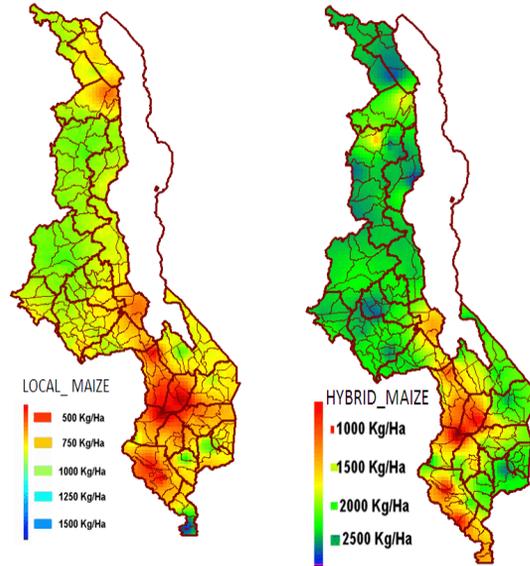
- observations from a network of weather stations and rain gauges scattered over the country**
- Satellite information - NOAA Rainfall estimates (RFE) and NDVI with 8km resolution, or high resolution Spotvgt – 1.1km**
- FAO Crop Specific Water Balance model which relies information on weather, climate, crop and soil water holding capacities and fortnightly crop reports**
- The 10-day Rainfall and Agrometeorological Bulletin**
- Weather forecasts and updates**
 - ✓ **Short (up to 3 days)**
 - ✓ **Medium (5 – 10 days)**
 - ✓ **Seasonal (up to 6 months)**

Products from DCCMS national maize Yield forecasting model

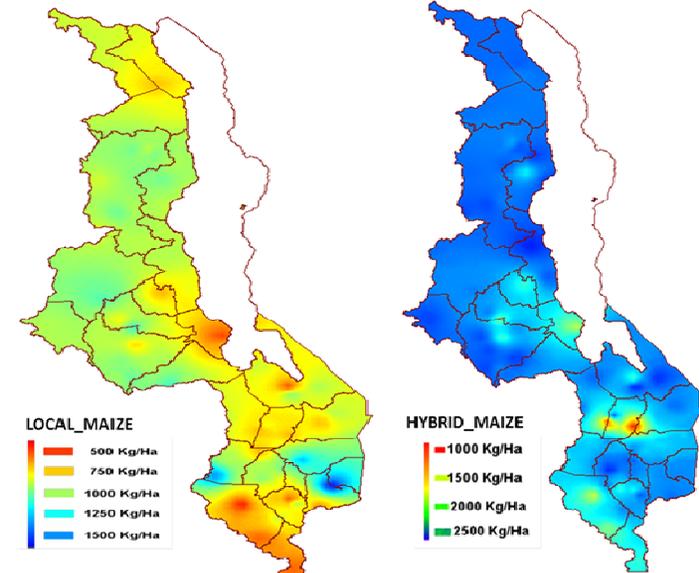
2005 Yield index



2010/11_MALAWI_MAIZE_YIELD_INDEX



2011_12_MAIZE_YIELD_INDEX_MAPS



National Maize Production Estimates
Model Vs Survey from MoAFS



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Services Offered by the Department

1. **Aeronautical Meteorological Service** to the Aviation industry (landing taking-off and enroute forecasting)
2. **Agro-meteorological Services** to Agriculture and food security sector (Onset , amount and cessation of the seasonal rains);
3. **Hydro-meteorological Services** for Hydro-power, solar and wind energy generation and distribution;
4. **Bio-meteorology And Air Quality Forecasting** for Health and public safety (malaria, meningitis, cholera, typhoid, bronchitis, asthma, etc);
5. **Water Resources Management And Development** (fresh water for drinking, sanitation and industry);
6. **Environment And Natural Resources** (Fire weather, Forestry and Wildlife; Recreation, Sports and Tourism, Eco-system conservation);
7. **Disaster Management** (high impact weather and extreme climate events –floods and droughts, wind gusts, lightning, etc);
8. **Weather Services For The General Public** (rain, temperature, heat wave, cold chill, cloudy duration, visibility, etc);
9. **Weather forecast to the Media** (TV, radio, newspapers, web, voice service, mobile services...)
10. **Recreation** (Sport, special events...);
11. **Seasonal Climate Outlook presentation to the National Disaster Steering Committee**, chaired by the OPC
13. **Seasonal Climate/Weather Outlook to stakeholders;**
14. **Building Climatology** for the Building and Construction industry (return period for bridge construction, rainfall amount and rates, sun radiation, temperature, etc);
15. **Climate Change** monitoring, detection, attribution, prediction and assessment to help in Climate Change adaptation and mitigation;
16. **Catastrophic Weather information for the Insurance industry** based on weather risk management within financial risk transfer markets

METEOROLOGICAL INFRASTRUCTURE IN SUPPORT OF SERVICE DELIVERY

METEOROLOGICAL INFRASTRUCTURE

- Data Observational systems and network;
- Data telecommunication systems and network;
- Data procession, analysis and forecasting systems;
- Product and information dissemination systems;
- Human resource capital

CURRENT OBSERVATIONAL NETWORK

Synoptic Stations:

- 22 manned 24-hr Surface Synoptic Stations,
- 15 agro-meteorological stations

Automatic Weather Observing Systems:

- 33 Automatic Weather Stations (AWSs)
- Satellite Distribution and Information System(SADIS) at KIA,

Rainfall Stations:

- Used to have 700 rainfall stations most of which are operated by Voluntary Observers and less than 100 active every year.

Rainfall Logging System

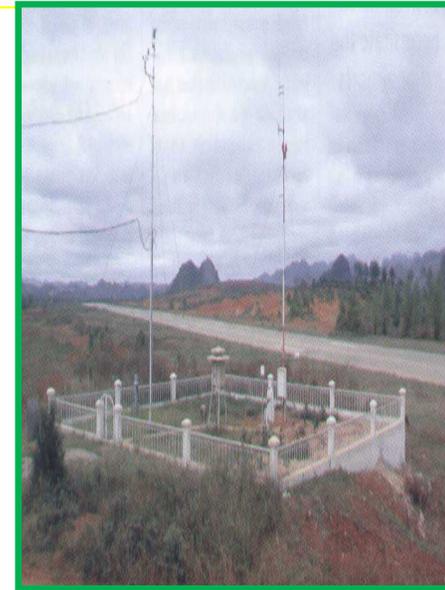
- 34 operational with issues

TV weather Studio

EUMETSAT Satellite Data Receiving Station

AUTOMATIC MESSAGE SWITCHING SYSTEM (AMSS) FOR DATA TELE COMMUNICATION AND EXCHANGE

- Upper Air Observation Station Not Functional
- Weather radar Not Functional



PRODUCTS FOR EARLY WARNING, DISASTER PREPAREDNESS AND MITIGATION

- **Short-range weather Forecasts** (24-hours-3days);
- **Medium-range weather forecasts** (7-days, 10 days or decadal);
- **Long-range forecasts** (30-days or monthly) and (90-days or seasonal weather outlook)
- **Forecasting Capability**
 - Tailor-made forecast as a decision support tool for planning and
 - preparedness in weather and climate sensitive sectors;
- wide range of aviation Forecasts ,Pilot Briefing, Air traffic controllers, Terminal forecasts, Enroute and Landing forecasts)
- **Climatology**
 - Data Management and related services
- **Climate Change and Research (New Unit)**
 - carry out research and development that would improve quality of weather and climate change information

Production and Modes of Dissemination of Information

1. MEDIA

- Press Releases;
- Media personnel/DCCMS interaction;
- In collaboration with NCJ, a number of media personnel have been trained to comprehend the basics contained in a weather Forecasting.

2. Government Organs/Ministries which receive Information and services

- Ministry of Agriculture
- Ministry of Transport
- Ministry of Water and Irrigation
- Office of the President and Cabinet (OPC); National Disaster operations
- Ministry of Energy (MOE);
- Ministry of Health (MoH), etc;

International Cooperation

- ACMAD
- Regional Climate Service Centres(SADC AND IGAD)
- La Reunion for Tropical Cyclone warnings
- Africa Climate Desk of NOAA Climate Prediction Centre
- SA Weather Bureau
- UK MET OFFICE
- BOM Australia
- WMO Regional Centres

Drought Risk Management

Applications of Weather Index Insurance

Application #1:

A weather risk insurance product that compensates smallholder farmers for weather risks that negatively impacts crop yields

- Farmers are organised in clubs
- Participating farmers live within 20km of a weather station
- Index calculated at a nearby weather station
- Uses historical rainfall index and weather stations to establish weather derivative
- Too little rain (drought) triggers a payment
- Premiums included in loan value

Full Weather Station



Crops insured include:
Maize, Tobacco,
Groundnuts

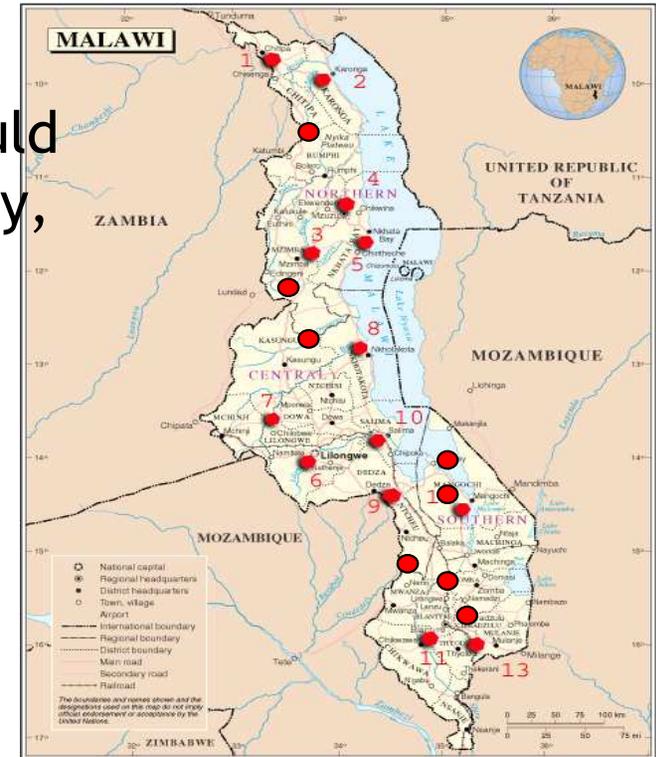


APPLICATION #2: DROUGHT INSURANCE FOR GoM

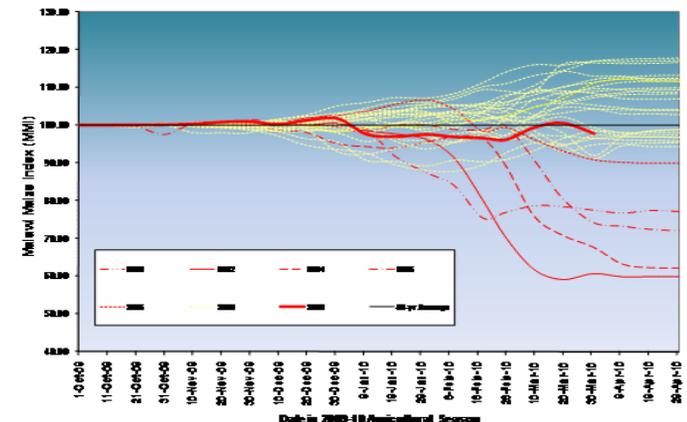
Coverage to protect against the impact of drought on national maize production

Structure designed to reflect conditions which would impact national maize production and food security, resulting in GoM maize imports

- Malawi Maize Production Index (MMPI) is the output of rainfall-based index model for maize production
- Details:
 - Malawi Met Office developed the model, CRMG of the world bank adapted it
 - Crop water balance model, FAO'S WRSI
 - Variable input is daily rainfall data
 - uses 23 primary weather stations throughout the country to track maize yields
- Protection Structure:
 - Trigger to protect against maize output below 1,500,000 MT
 - Strike: 1,500,000 MT
 - Limit: 1,000,000 MT
 - Payout Rate: \$300 per MT



MMI as at 31 March 2010



CHALLENGES

Policy and Legislative Matters

- There is need to have national legal instruments to define the mission and mandate of the Dept which will ensure that the Department's responsibilities are well-defined nationally and its contribution to society is appropriately recognized to ensure adequate resources;
- DCCMS lacks an Act of Parliament establishing its existence. The mission statement should be affirmed in a "Meteorological Act" and Law or other official governmental instrument;
- Policy under Development
- Strategic Plan finalised

Operational Matters

- DCCMS receives low budgetary allocation and has therefore a problem of upgrading its equipment, plants and instruments required for improved information, products and services. Hence the two projects cannot be realized with the current government funding. There is need for a financier. The projects are:
 - **Modernization of Meteorological Services; and**
 - **Climate Change And Meteorological Capacity Development**

CHALLENGES

Human Resource Matters

- 10 Graduates that need further training
- 13 Diploma Holders that needs further Training
- Refresher courses

Service Delivery Matters

- Inadequate technological and marketing capacity to meet the needs of an increasing sophisticated public and private sector clientele
- Lack of proper guidelines for meteorological, hydrological and climate-related services
- Need for continuous public education and awareness;

Key Issues that needs Support

- Data Base Management System
- Improving Seasonal Forecasts
- Numerical Prediction and Climate Modeling
- Enhancing Climate Research Services
- Technical and Human Capacity Building

Thank you very much
for your attention