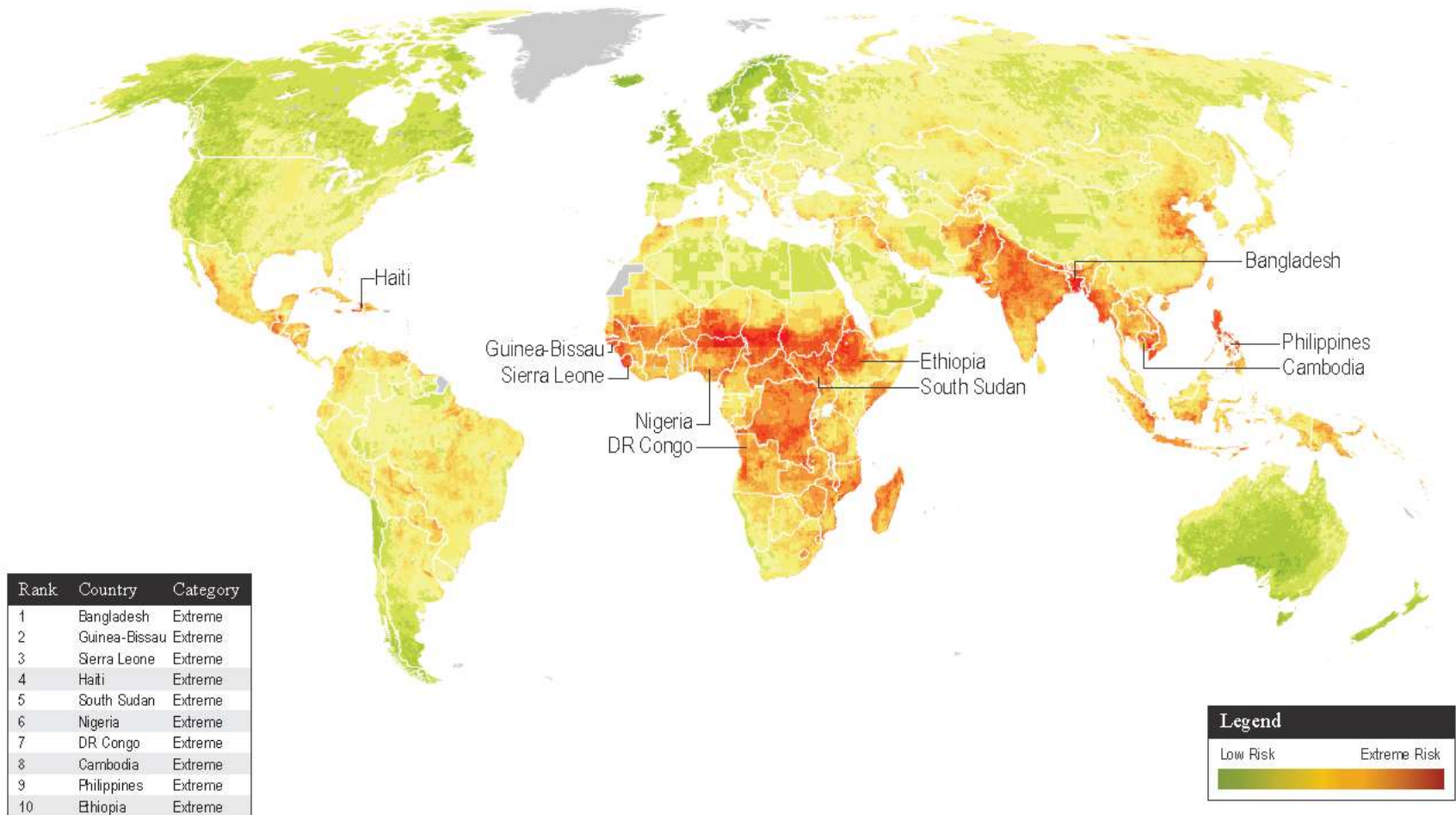


CLIMATE CHANGE ADAPTATION BY MEANS OF PUBLIC PRIVATE PARTNERSHIP TO ESTABLISH EARLY WARNING SYSTEM



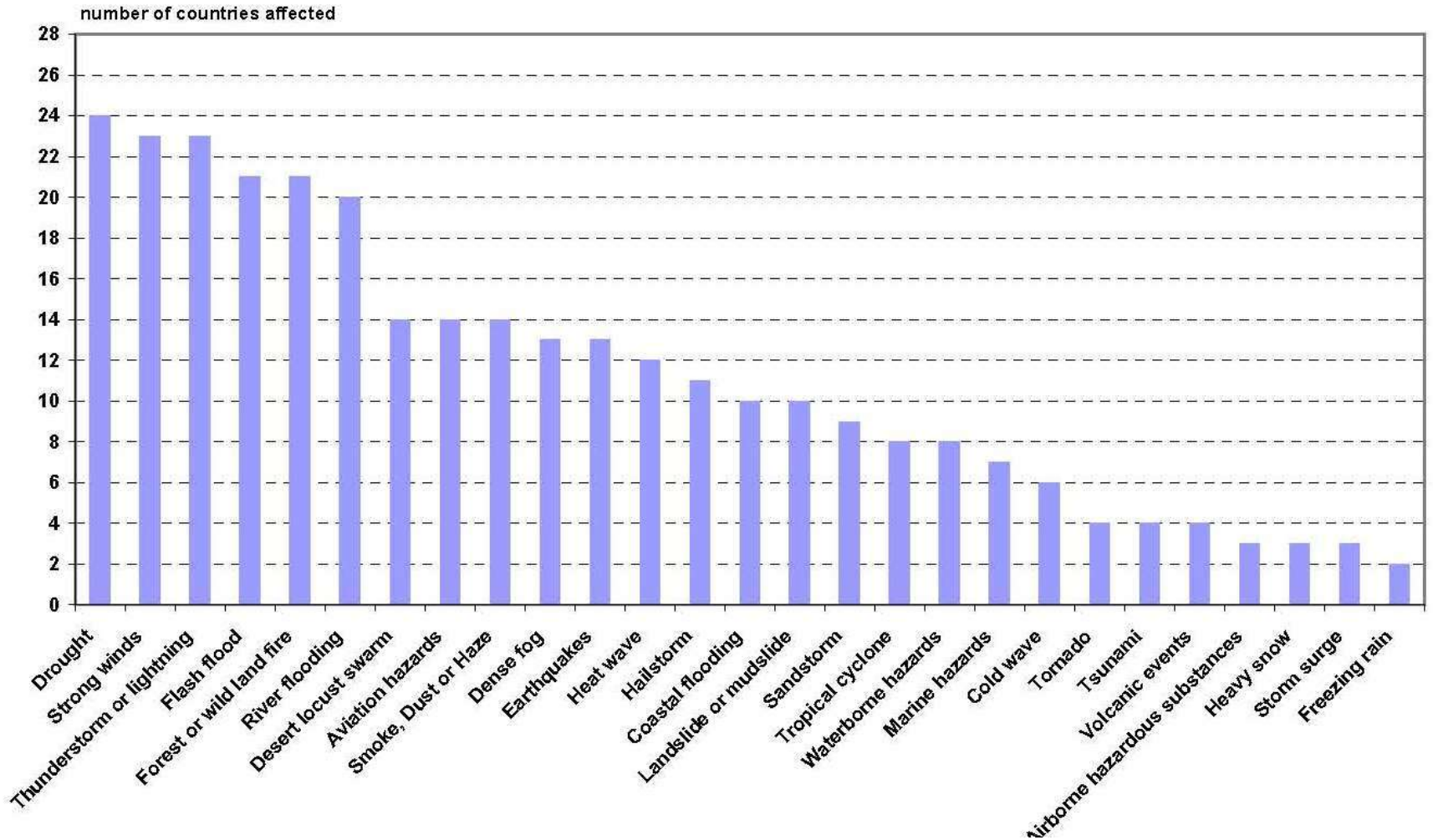
By: Dr Mamadou Lamine BAH, National Director
Direction Nationale de la Meteorologie (DNM), Guinea
President, WMO Regional Association I (Africa)

African Least Developed Countries Are Among Most Vulnerable to Economic Impacts of Climate Change



Source: Climate Change and Environmental Risk Atlas 2014 - Maplecroft

Types of Hazards Affecting Countries in Africa



Guinea Context

- With the support of technical and financial partners, Guinea has been engaged in more accurate assessment of:
 - multifaceted impacts of climate change
 - risks of natural disasters
 - potential solutions and opportunities that can support actions to adaptation and mitigation
- National Action Plan for Climate Change Adaptation (NAPA) was developed and adopted in 2007 when twenty-five (25) profiles of priority projects have been identified
- Among vulnerable regions of Guinea noted, the coastal area is in a very advanced state of degradation
- Guinea's NAPAs include priorities relevant to DNM such as the implementation of a system of early warning climate forecasts to protect agricultural production

DNM Climate Information Systems in Guinea

Manual Weather Station in Boffa



Automatic Weather Station in Boké



Training Seminar on Meteorological Applications for Agriculture on the North coast - Boffa July 18, 2013



Manual Weather Station in Boké



Recently Installed AWS in Dubréka



Training Seminar on Meteorological Applications for Agriculture on the south coast - Dubréka July 18, 2013



Manual Rain Gage in Boké



Manual Data Download from New AWS



Many Observation Needs Are Not Met

- Observations for air navigation safety
- Upper air soundings
- Various precipitation data
- Temperature (surface and upper data)
- Wind profiles
- River flow rates
- River discharges
- Gauging for water levels
- etc.

WMO's Disaster Risk Reduction Survey:

- Many of African NMHS have 24/7 monitoring, produce basic observations, and send them to regional centers
- There is a lack of appropriate observing networks for hydro-met conditions and inadequate maintenance of such systems
- This limits the NMHS' ability to provide services and make the NMHS reliant on key data from other organizations inside and outside the country

DNM Early Warning System Pilot Project

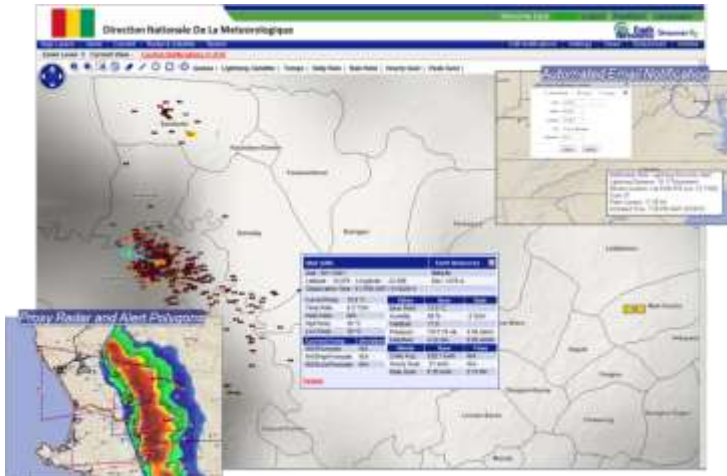
- Help protect the population against hazards with strongest impact like severe thunderstorms, flash floods, floods and droughts
- Climate information system needed which operates in real time based on nowcasting and hourly forecasting
- Deployment and initial maintenance of traditional radar in a country like Guinea would require upwards of 10 million U.S. dollars
- Less expensive, innovative technology alternative for NMHS in African least developed countries must be found
- Earth Networks (USA) has an early warning system that provides national and regional early warning using a few key data points
- DNM has connected with Earth Networks to establish and transfer this comprehensive technology within a public-private partnership
- Guinea mobile operator Cellcom has provided their infrastructure, staff time, and services for pilot project and continues to support

Use Cases of Early Warning System (Since August 2013)

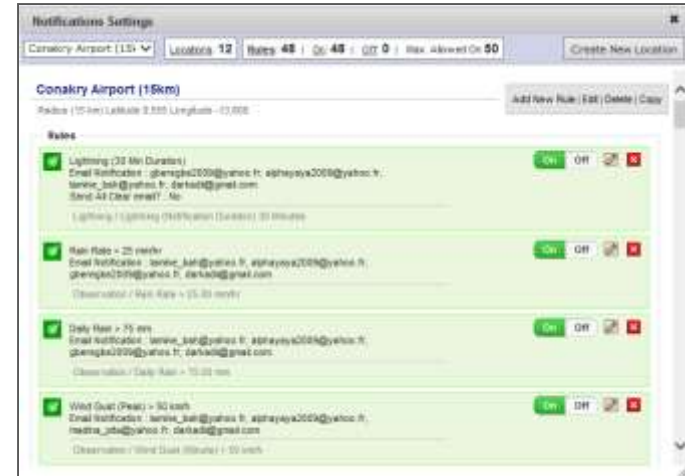
- Multiple nighttime storms in capital Conakry with confirmed damage and injuries
- Many fatal lightning strikes in the highlands region
- Confirmed extreme rainfalls in cities in north-west of Guinea
- Maritime activity near coastal areas during severe thunderstorms
- Presentation of post-event reports to highest government office
- Including EWS observations and forecasts in daily weather report
- Data points used with other data for flood/drought monitoring
- Eye-witness verification of EWS storm data by staff at remote meteorological stations
- During dry season, weather data and forecast are used to monitor and warn for heatwaves and other dangerous conditions

DNM Uses New EWS Information to Enhance Services

Web-based GIS Display



Email and Audio Notification



<http://guineameteodemo.wordpress.com>



Mobile Applications

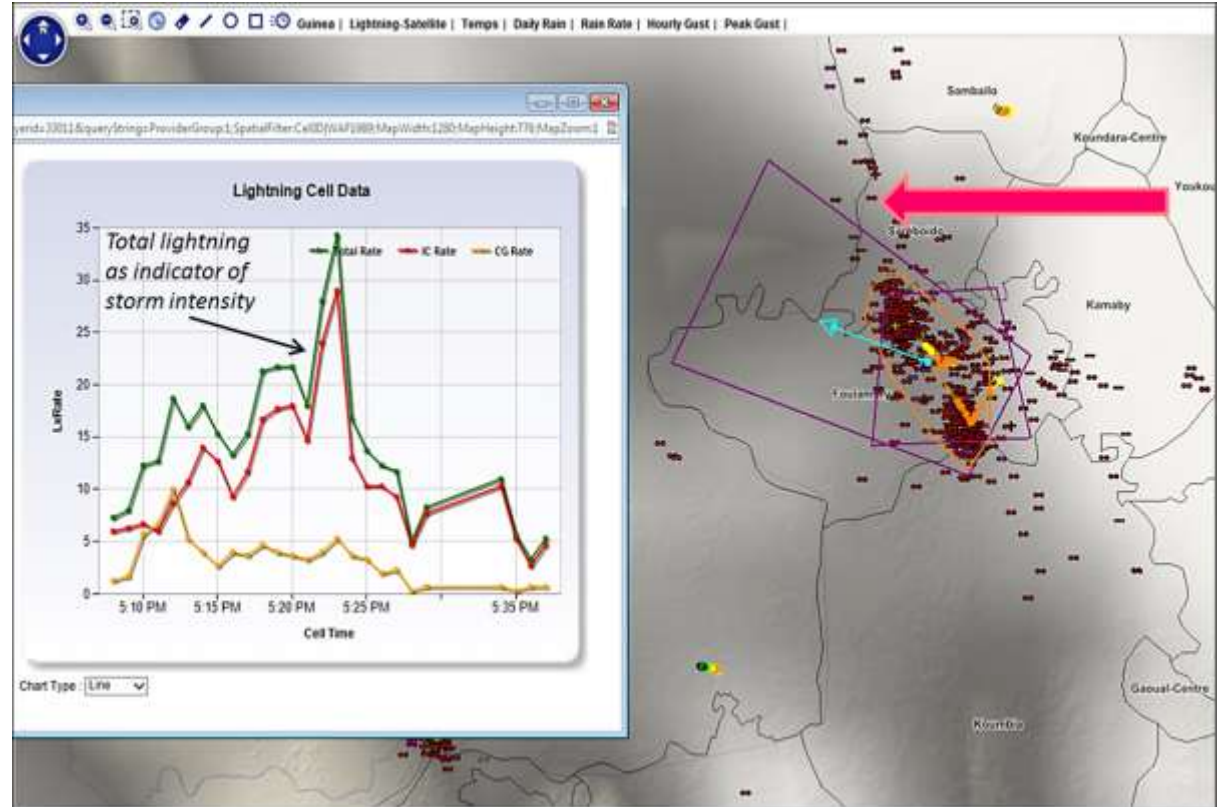


Observation Network Installation and Operation

- Date: July 2013
- Twelve (12) Earth Networks Total Lightning Sensors with Automated Weather Stations
- Complete, three week implementation on Cellcom mobile telecom towers
- Onsite training on installation and maintenance by Earth Networks
- Technicians representing Direction Nationale de la Météorologique and Cellcom
- Benefits: quick installation, good internet connectivity, 24/7 electricity and security provided



“Total Lightning” Is Used Like Radar



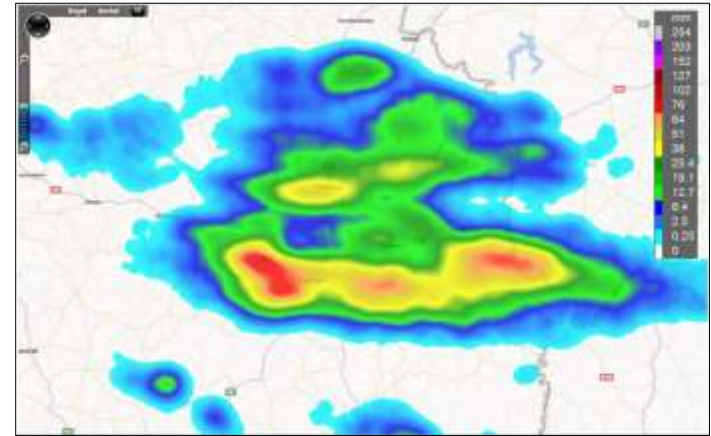
Severe Weather Monitoring and Alerting

- Storm Cell Identification and Tracking
- Early Warnings of highest probability of Heavy Rains, Hail, High Winds, Lightning Strikes, Microbursts
- Automated Alert Generation and Distribution

High Resolution Radar Like Images in Guinea

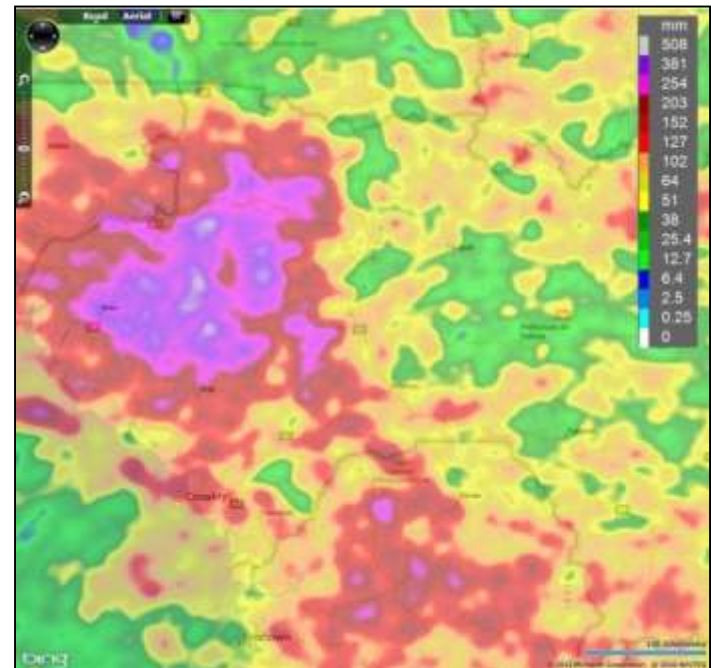


Real-time Rainfall Intensity



Accumulated Rainfall Estimates

- Correlation of Total Lightning to Radar Reflectivity (dBZ values)
- Real-time Flash Flood Early Warning
- Drought and Flood Potential Monitoring
- Accumulated Rainfall Totals
- Functioning Well in All Terrains and Sea
- Regional Reach beyond Guinea Borders



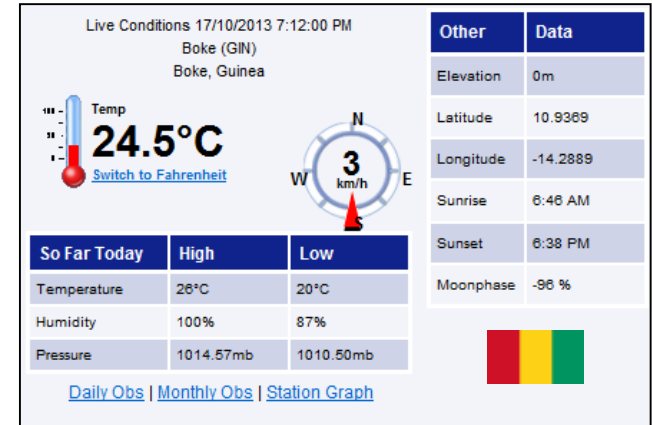
Monthly/Annual National Estimates

“Fit for Purpose” AWS for Local Conditions and Forecasts



**Real-time Quality
Controlled Weather
Data on Web-Based
Display System and in
Electronic Database**

**Hourly ensemble
forecast for all Guinea
METARs in GTS, all new
AWS, plus 50 towns and
villages with no stations**



Future Work

Public Private Partnership will continue to evolve:

- Series of additional training workshops for field engineers, end-users, and stakeholders
- Data intercomparisons of manual stations and AWS for enhanced weather data QA/QC and network monitoring
- WMO Common Alerting Protocol (CAP) format bulletins
- Partnering with mobile operators on delivery of weather content and alerts to public at large
- Introduction of graphical weather content into TV broadcasts
- Developing international funding and sustainability partnerships
- **Regional coordination with neighboring countries to bring benefits of linked EWS to everyone affected by climate change**