



# Building, Operating, and Integrating Infrastructure for The Weather Enterprise

Ari Davidov

Director, International Development

Session 3: Using Public-Private Partnerships to Accelerate  
NMHS Commercialization Efforts

Creating Value Added Weather and Climate Services through Innovative  
Public Private Partnerships Workshop, 3- 5 March, 2015, Kampala, Uganda

# “The Weather Enterprise”: LDC Context

- Made up of key participants or “sectors”
  - Public sector AND development partner(s): fundamental challenges
  - Academia AND international universities (limited capacity and impact)
  - Private sector AND NGOs: as supplier to NMHS, direct B2B services
- Working toward a collaborative, growth-oriented model...
  - Engage development partners for seed funding, programmatic support
  - Help establish a scientific base within the country and region
  - Harness the innovative drive and business skills of the private sector
  - Enhance primary AND secondary value chains to BUILD MARKETS
  - Offer customers modern products/services via internet and mobile
  - Be a sustainable model for all participants or “sectors” (above)
- Earth Networks contributes by providing modern real-time EWS infrastructure and technology transfer, ACCELERATING innovation and sustainability

# Snapshot of EN in Least Developed Countries

**Real-Time AWS & Severe Weather Nowcasting Stations**

**LDCs: ~40 stations:**

**Benin – 1**

**Burundi – 1**

**DRC – 1**

**Ethiopia – 1**

**Guinea – 12**

**Malawi – 2**

**Mozambique – 11**

**Tanzania – 4**

**Uganda – 3**

**Zambia – 1**

**Nepal – 1**

**Haiti – 2**

**Forecasting Service and Weather Data Display Evaluation Licenses**

**NMHS of LDCs:**

**Benin**

**Burundi**

**Guinea**

**Malawi**

**Mozambique**

**Rwanda**

**Tanzania**

**Uganda**

**Haiti**

- Local partner companies in many parts of Africa provide representation, installation support, and training services to NMHS
- Regional installation/maintenance hubs with TAHMO East (Kenya) and West (Ghana)
- Agreements with NMHS, relationships with mobile tower and telecom operators
- R&D partnerships with NGOs, academia, climate adaptation stakeholders

# Pilot Project in Severe Weather Nowcasting Based on Total Lightning Detection in Lake Victoria Region

Burundi, Kenya, Rwanda, Tanzania, Uganda



With regional technical support from



## EAST AFRICAN COMMUNITY SECRETARIAT

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ARUSHA, TANZANIA



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E-mail: eac@eachq.org  
Web: <http://www.eac.int>

**Our Ref: P&I/2/3/5**  
**Date: 6<sup>th</sup> August, 2014**

During its 11th meeting held on 23rd - 27th June 2014 the Sectoral Council on Transport, Communications and Meteorology also endorsed the recommendation as presented by the Heads of National Meteorological and Hydrological Services and directed the implementation of the project. Once fully operational, the following benefits will accrue from the project:

- i) Protection of Life and Property- supporting the overarching mission of the region's NMHSS;
- ii) Climate Change Adaptation- warnings for increasing incidence of fast-moving climate induced hazards;
- iii) Disaster Risk Reduction- ability to automatically alert at the local level in real-time;
- iv) Food Security- early warning of severe weather damage to agricultural production;
- v) Flood and Drought Warning- wide-area long term rainfall totals in remote areas with no radar;
- vi) Water Resource Management- monitoring impact of storm systems on water levels downstream;

Hon. Jesca Eriyo  
Deputy Secretary General  
(Productive and Social Sectors)  
**For: SECRETARY GENERAL**



# Phase I Lake Victoria EWS Pilot Project

network deployment, EWS content, validation, training



# The EWS Delivers Real-Time Content for Safety of Life and Property

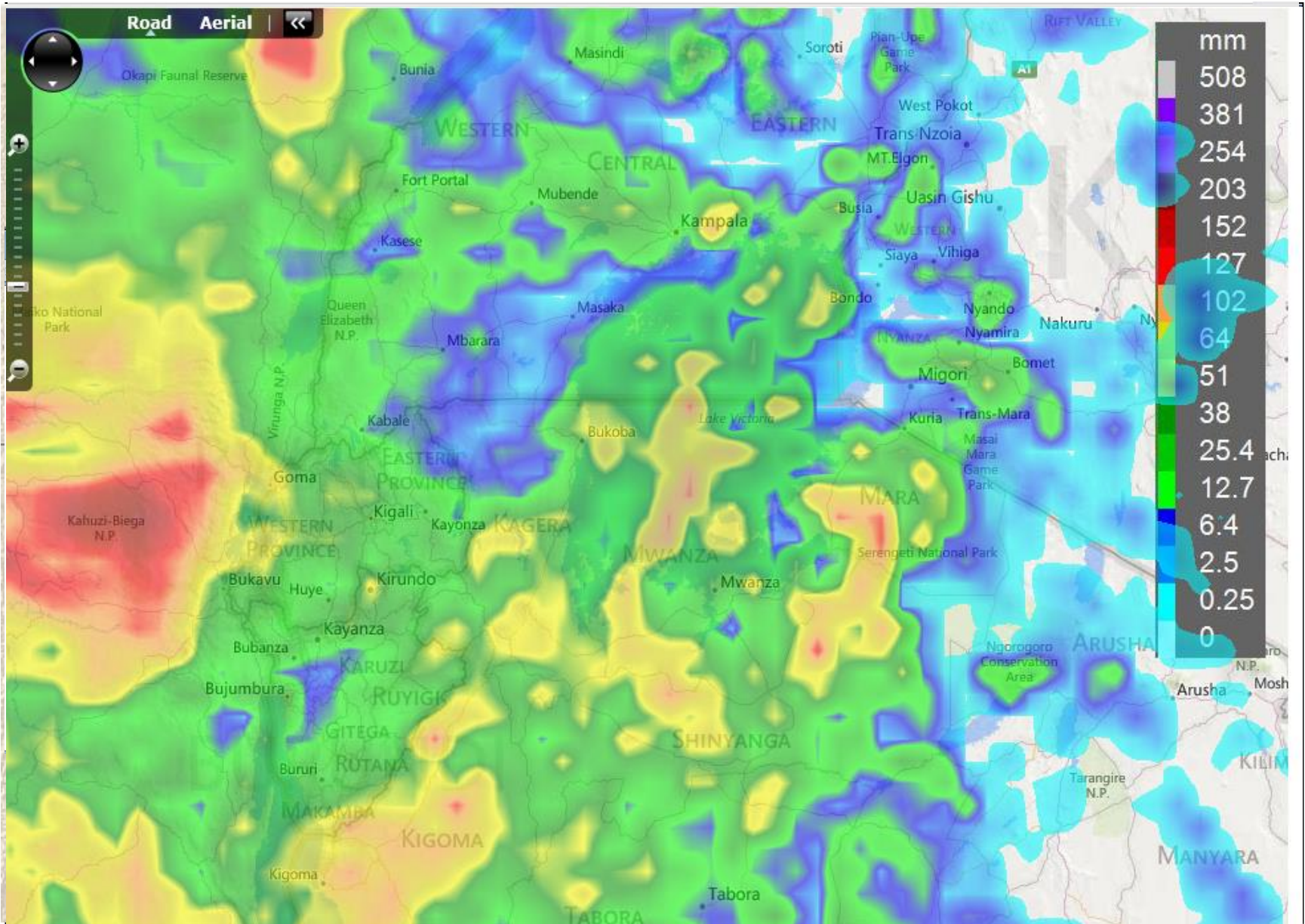
## Framework



## Timescale

## EWS Service

Next 1-2 Weeks Several Days	ENcast
Next Few Hours	ENcast DTAs &PulseRad
Next Hour Minutes	DTAs &PulseRad Current Conditions
NOW	Current Conditions Lightning Proximity
Post-Event Assessment	Lightning Database Storm Cell Tracks





# Extensions and Follow-on Prospects

- **NMHS capacity building:** ongoing training of technicians in field work and forecasters in real-time monitoring and alerting
- **Scale-up:** covering more pilot zones and national/regional with the use of mobile telecom towers for network support
- **High level of interest in scientific collaboration:** WMO/WWRP, UNEP/CLIM-WARN, LVBC, SERVIR, RCMRD, HyVic, etc.
- **USAID/Rockefeller:** EN is part of a consortium to scope an end-to-end EWS that won Phase-1 of the Global Resilience Challenge
- **The all-important “last mile”:** delivery of real-time warnings to communities via mobile phones and CAP-format bulletins
- **Fit-for-context:** surveys of impacted communities to learn from past efforts and customize content
- **Sustainability planning:** design of a multi-sectoral approach to cost recovery including fisheries, agriculture, hydropower and others



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# “The Weather Enterprise” in the Developed Country Context

- Made up of key participants or “sectors”
  - Public sector: public welfare, infrastructure, partnerships
  - Academia: science, innovation, validation
  - Private sector: efficiency, productization, customization
- Combined strengths built into value chains
  - Primary: standard Outlooks, Watches, and Warnings to public
  - Secondary: localized weather data, specialized forecasts, applications
- Evidence of a successful model
  - Public sector: good service delivery, sustainability
  - Academia: leading research institutions and meteorological training
  - Private sector: vibrant industry full of service providers and OEMs
- Earth Networks contributes by building, operating, integrating, and distributing high-resolution surface observation and forecasting content (B2C/B/G)



# A Multi-Sectoral PPP: The US National Mesonet Program



# EN PPPs in Severe Weather Monitoring and Forecasting

National Oceanic and Atmospheric Administration



Federal Aviation Administration



National Transportation Safety Board



Air Force Weather Agency



National Aeronautics and Space Administration



Research and Development Centers / Research Universities



# ENcast: Local Hourly Forecasts out to 15 Days

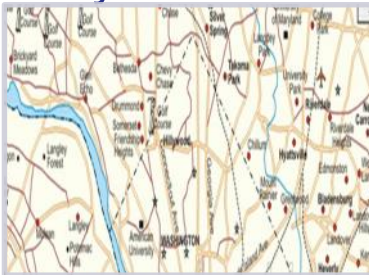
## Sensor Forecast



## Point Forecast



## City Forecast



Accuracy

- Ensemble of top global models (ECMWF, GFS, GEM, etc.)
- Forecasts use current weather and total lightning data to localize and enhance performance
- This web-based portal allows the user to view forecast information for specific locations, variables, and timescales

## A Leading Public Info Platform

# #1 private distributor of forecasts and alerts via all devices on all platforms

- National Weather Service alerts
- EN's advanced severe weather alerts



# WeatherBug informs and alerts more than 40 million users

- Mobile
- Desktop app
- Website





# EN Mobile Weather Content and Alerts for Basic Phones

## Baseline "Pull" information

Current Weather Conditions and Forecast Information for any location called up from the NMHS and EN PulseAPI

## Options for generating Dangerous Storm Alerts:

Subscription SMS services with alerting for fixed locations

No-cost SMS to some of the subscriber segments if there is an alert

### Forecast Information

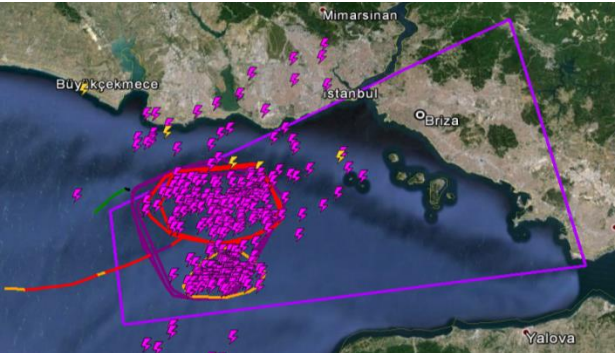
Local Fcast: Kisumu Fri 18/23c showers, Sat 18/24c showers, Sun 18/25c showers, Mon 17/25c clearing showers

### Current Conditions

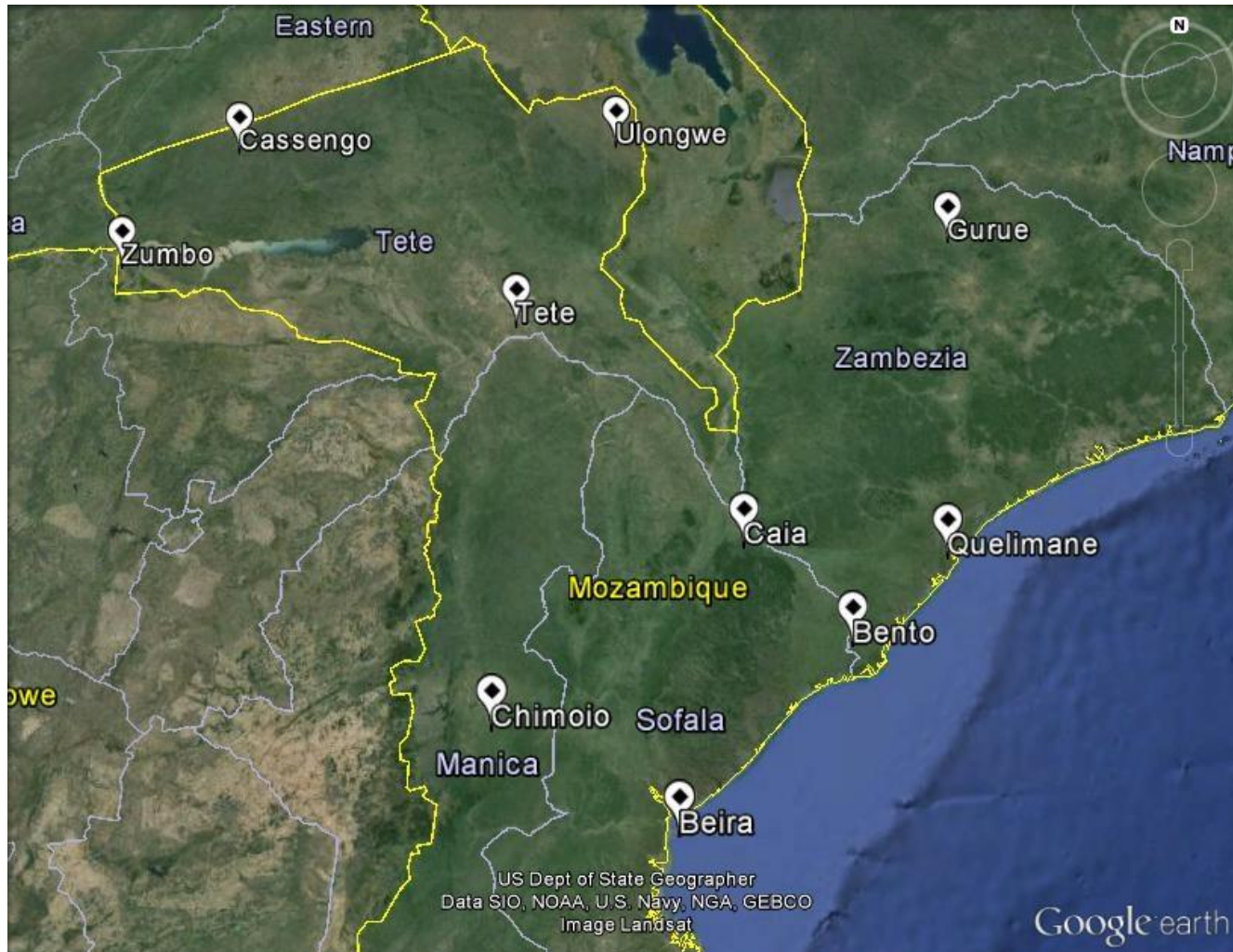
Curr Cond: Kisumu 12:35 07/03 Temp: 29/26C Wind: N/NE 10/15 kph Press: Hum: 20% Rain: 80% chance of t'storm

### Storm Proximity Alerts

17:20 08/02 A Severe Thunderstorm Warning for the Nairobi Metropolitan Area and has been issued.



# Mozambique: EN Pilot Early Warning Network with INAM



Prospective Stakeholders:

Hydropower -



Dozens of mines-



**RioTinto**

**USAID** – *Coastal City Adaptation Project (CCAP)*



# Guinea Demonstration Project



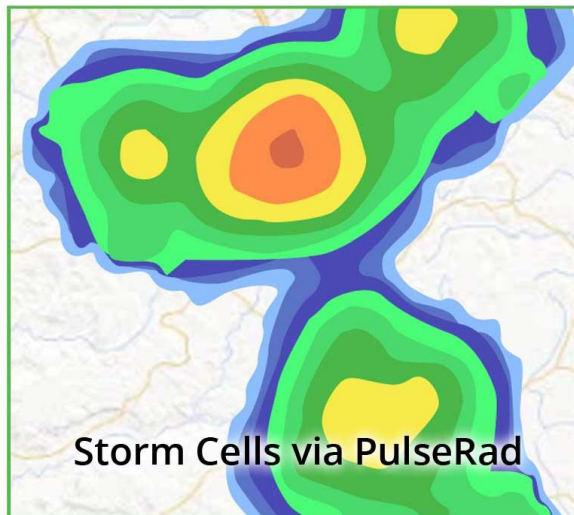
12 Sensor Locations



Weather & Lightning Sensors

A screenshot of the PulseRad Display web interface. It includes the National Meteorological Directorate logo, a 'PulseRad (Live)' checkbox, and a map of Guinea showing rainfall estimates. The current time is 2013-10-25 16:20:48Z.

PulseRad: Proxy Radar



Storm Cells via PulseRad


A screenshot of a weather alert for a dangerous thunderstorm. It includes a map of the region and a table of current weather conditions.

Fria (GII)		Earth Networks	
Fria, GN 00000		FRIAA	
Latitude : 10.366	Longitude : -13.584	Elev: 212 m	
Observation Time : 8:27PM GMT 10/14/2013			
CurrentTemp	18.9 °C	Other	Now
Temp Rate	-7.1 °C/hr	Dew Point	18.9 °C
Heat Index	N/A	Humidity	100 %
HighTemp	29 °C	WetBulb	18.9
LowTemp	20 °C	Pressure	1011.83 mb
		DailyRain	19.56 mm
			79.25 mm/hr
NWSForecast	N/A		
NWSHigh			
NWSLow			
		Hourly Gust	59 mph
		Daily Gust	58 SE

Dangerous Thunderstorm Alert

# Guinea Feedback on EN EWS

République de Guinée  
Travail – Justice – Solidarité  
-----  
Ministère des Transports  
-----  
DIRECTION NATIONALE  
DE LA METEOROLOGIE



LE DIRECTEUR NATIONAL  
DE LA METEOROLOGIE

**Initiation of a demonstration project of a system for monitoring and warning of hazardous weather phenomena with the National Directorate of Meteorology of Guinea and the company Earth Networks**

**by Dr. Mamadou Lamine BAH, National Director, Direction Nationale de la Meteorologie, Guinea and President of Regional Association 1 (Africa) for WMO (World Meteorological Organization)**

*“After a few weeks, it became possible to follow thunderstorm activity, to monitor areas of precipitation in high resolution and to alert to severe weather conditions across Guinea.”*

*– Dr. BAH, Guinea DNM & WMO RAI President*