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

- **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**

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

<table>
<thead>
<tr>
<th>LDCs: ~40 stations:</th>
<th>Forecasting Service and Weather Data Display Evaluation Licenses</th>
</tr>
</thead>
<tbody>
<tr>
<td>Benin – 1</td>
<td></td>
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<tr>
<td>Burundi – 1</td>
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<tr>
<td>DRC – 1</td>
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<tr>
<td>Ethiopia – 1</td>
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<tr>
<td>Guinea – 12</td>
<td></td>
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<tr>
<td>Malawi – 2</td>
<td></td>
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<tr>
<td>Mozambique – 11</td>
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<tr>
<td>Tanzania – 4</td>
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<tr>
<td>Uganda – 3</td>
<td></td>
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<td>Zambia – 1</td>
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<tr>
<td>Nepal – 1</td>
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<tr>
<td>Haiti – 2</td>
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</tbody>
</table>

#### NMHS of LDCs:

- Benin
- Burundi
- Guinea
- Malawi
- Mozambique
- Rwanda
- Tanzania
- Uganda
- Haiti

**LDCs: Benin, Burundi, Guinea, Malawi, Mozambique, Rwanda, Tanzania, Uganda, Haiti**
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
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

<table>
<thead>
<tr>
<th>Framework</th>
<th>Timescale</th>
<th>EWS Service</th>
</tr>
</thead>
<tbody>
<tr>
<td>OUTLOOK</td>
<td>Next 1-2 Weeks</td>
<td>ENcast</td>
</tr>
<tr>
<td>READY</td>
<td>Several Days</td>
<td></td>
</tr>
<tr>
<td>WATCH</td>
<td>Next Few Hours</td>
<td>ENcast DTAs &amp; PulseRad</td>
</tr>
<tr>
<td>SET</td>
<td></td>
<td></td>
</tr>
<tr>
<td>WARNING</td>
<td>Next Hour</td>
<td>DTAs &amp; PulseRad</td>
</tr>
<tr>
<td>GO!</td>
<td>Minutes</td>
<td>Current Conditions</td>
</tr>
<tr>
<td>EVENT</td>
<td>NOW</td>
<td>Lightning Proximity</td>
</tr>
<tr>
<td>SAFETY</td>
<td>Post-Event Assessment</td>
<td>Lightning Database Storm Cell Tracks</td>
</tr>
</tbody>
</table>

The EWS delivers real-time content for safety of life and property through various timescales and EWS services, ensuring timely alerts and assessments.
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

- 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

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
Mozambique: EN Pilot Early Warning Network with INAM

Prospective Stakeholders:

Hydropower -

Dozens of mines -

US AID – Coastal City Adaptation Project (CCAP)
Guinea Demonstration Project

12 Sensor Locations

Weather & Lightning Sensors

PulseRad: Proxy Radar

Storm Cells via PulseRad

Dangerous Thunderstorm Alert
“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