







Weather Info for All

An Initiative to mobilize public and private partners to ensure availability of reliable weather information to vulnerable communities affected by poverty and climate change



Executive Summary

The Problem

Reliable weather information allows farmers to maximize their productivity and governments to implement preventative disaster management and effective public health measures. However, many of the world's poorest people have no access to this basic, most valuable tool. An estimated 700 million poor people in rural Africa alone are negatively affected by this missed opportunity. This is especially worrisome given recent changes in weather patterns, due to climate change, which are compounding the problem by making traditional farming practices and indigenous knowledge obsolete, and increasing the frequency and intensity of severe weather.

Developing countries, which are most likely to suffer the brunt of climate change impacts, have the least number of ground-level weather data observation systems, the critical basis for efficient delivery of weather information. Despite covering a fifth of the world's total land area, Africa has the least developed land-based weather observation system of all continents, and one that is in a deteriorating state. Many existing weather stations do not operate properly, or do not operate at all. The World Meteorological Organization (WMO) estimates that in an ideal scenario, 10,000 weather stations should be operating in Africa. Currently, there are only around 744 stations operational, less than a quarter of which provide observations that meet WMO requirements for standard and frequency of data. The WMO considers that the minimum required is 3000 stations and that these should be installed in an evenly spaced network grid across the continent with an additional 1,000 in highly populated areas.

There is also a lack of skilled human resources in many African countries able to operate and maintain the weather observation network. In addition, there is a shortage of adequately trained personnel in fields such as agro-meteorology, hydrometeorology and climate modelling who can interpret the data generated by the stations and disseminate it in a practical format for public consumption.

An inadequate legal framework for business, an absence of a quality assurance framework (such as ISO 3000) and technical limitations in capturing and disseminating information also obstruct efforts to bring Africa up to the optimal standard of availability of weather information.

The Opportunity

Empowering the poor with weather information would have far-reaching consequences. The Weather Info for All Initiative (the Initiative) aims to fill the existing ground-level weather observation gap to protect and improve the lives and livelihood of the poor by reducing weather and climate-related risks and contributing to improved decision making in climate-sensitive economic sectors.

According to experts, increased accuracy in forecasting would enable the agricultural sector to be more efficient in the use of agricultural inputs and more effective in preventing crop losses due to extreme weather events, as well as in optimizing the post harvest supply chain. There are cases where skilful use of weather information has resulted in increasing agricultural productivity by 20%.

Communities, health agencies and governments are empowered by early warning of weather patterns, allowing them to take preventative action to limit the spread of climate-sensitive diseases such as malaria, dengue, meningitis and cholera.

Weather information, acted upon effectively, can reduce human and economic losses caused by extreme weather and climatic events. In the case of severe weather related



events, such as floods, droughts, wildfire and storms, accurate weather predictions can initiate preventive action on the part of communities, aid agencies and governments. By issuing accurate forecasts and early warnings (in a form that is readily understood) and by educating people on how to prepare against such hazards, the threat to lives and property can be reduced.

The timing for this Initiative is right. Various renowned and respected international organizations – such as the Group of 8 (G8), the Intergovernmental Panel on Climate Change (IPCC), United Nations Development Program (UNDP), the World Bank and the African Development Bank – have made the improvement of meteorological networks and services in developing countries a priority and are calling for action. The Initiative responds to this call.

The Concept

To bridge the ground-level weather observation gap, the Weather Info for All Initiative aims to supplement the existing weather observation network by rolling out weather observation stations throughout Africa. To achieve this, the Initiative will promote the mass deployment of standard Automatic Weather Stations (AWS), i.e. meteorological stations at which observations are made and transmitted automatically to the National Meteorological Services. They will be installed at new and existing mobile network sites across the entire African continent starting with East Africa. These sites provide all the preconditions for the deployment of automatic weather stations: power, connectivity, maintenance and security.

The Initiative harnesses the opportunity provided by the uptake in wireless communication. Africa is the fastest growing region in the world for wireless subscribers. To bring weather information to the community or village level, the local mobile network service and content providers, in cooperation with National Meteorological and Hydrological Services (NMHS), will disseminate weather information and related products to users in all economic sectors via a suitable telecommunications bearer, for example Short Messaging Service (SMS). Support for all-media dissemination of all-hazards information will be addressed by using the standard Common Alert Protocol (CAP), International Telecommunication Union (ITU) recommendation X.1303.

The weather information value chain has three principal links: collecting data, processing data into information and disseminating information. Data related to weather, water and climate is collected through the efforts of NMHSs. Data collection occurs worldwide and around the clock from human observers as well as sixteen satellites, seven hundred buoys, three thousand aircraft, seven thousand ships and ten thousand land-based stations. This data is compiled and processed regionally and globally using various analyses and forecasting techniques. The resulting information takes the form of weather bulletins, alerts and long-term trends. This official information is then disseminated under the authority of NMHSs using all manner of communications media.

At the technology level, the Initiative focuses on putting additional AWSs where data collection has been sparse, because accurate weather information is fundamentally related to the precision and spatial coverage of data. Given the limitations of existing communications media, it is crucial to leverage the standards-based, all-hazards, all-media approach to public warning.

The Initiative pursues these technological initiatives in concert with the many stakeholders in the weather information value chain, led by the NMHS in each of the countries involved.

In order to ensure its sustainability, the Initiative will foster better collaboration and cooperation between stakeholders in a National Consortium. This Consortium will be spearheaded by the NMHS of respective countries and will include the relevant national ministries (agriculture, transport, health, etc), as well as experts from academia and civil society groups. It will determine local needs to identify the most impactful weather products and the relevant stakeholders to realize them. It will ensure that the newly available weather

information translates into relevant and practical weather products and information for endusers. The National Consortium will have a key role in monitoring the impact of the Initiative.

In addition, the Initiative foresees supporting additional interventions to reinforce the sustainability of the roll-out of weather stations. These supporting interventions include capacity-building in National Meteorological and Hydrological Services (NMHSs) through training and the reinforcement of ICT capabilities to ensure the development and delivery of end-user relevant weather products.

The Plan

East Africa is the focus of Phase 1 due to the expressed interest from regional governments in weather information and the strong market presence of partners to the Initiative in this region.

For each country roll-out, the Initiative will go through an extensive preparatory phase with the NMHS, the government and other key players to obtain a clear picture of the country's requirements and the resources available, in order to customize the installation strategy to the specific country situation. The key objective of the preparation stage is to identify which stakeholders to engage to ensure the sustainability of the investment and what supporting interventions will be necessary to ensure maximum uptake.

The efficiency of the installation phase will be maximised by linking up to existing mobile network sites. Installation and maintenance staff will be trained by the weather station manufacturer along with the corresponding NMHS, with the aid of a manual, published in at least one local language per country.

Once in operation, the weather stations will automatically send raw data to the NMHS and to a collection server for back up. The NMHS will then create weather products for end-users in agriculture, healthcare and disaster management.

The Initiative emphasizes sustainability through a programme of scheduled calibration and maintenance of stations for ongoing data accuracy and full use.

Furthermore, it incorporates an impact assessment milestone to confirm the relevance and use of weather 'products' by its end-users, thereby allowing partners to the Initiative to adjust and improve their work to guarantee impact.

Timing

The roll-out in Africa envisages three successive phases:

Phase 1: Piloting the integration of additional weather stations in the observation systems of Kenya, Tanzania and Uganda (2009)

19 AWSs will be added to the existing weather observation system in these three countries during 2009. Towards the end of 2009, the technical feasibility of integrating these observations systems into the existing national observation system will have been ascertained. Co-locating the AWSs with mobile network infrastructure has proven to add value due to access to power, connectivity and security; this component will be added to the Phase 1 evaluation report.

Phase 2: Weather station roll-out in all of East Africa (2009-2012)

Phase 2 will commence in the fourth quarter of 2009. Approximately 489 AWSs will be progressively installed in the East African region, beginning with Kenya, Tanzania and Uganda; Burundi and Rwanda will be included subject to a satisfactory conclusion of the feasibility study in hand.



> Phase 3: Start roll-out in another African region

Towards the beginning of 2013, an evaluation of the Phase 2 will have been completed for each country, focusing on the impact in key sectors for which weather information was used, regional advantages from sharing weather information across borders and lessons learned from the roll-out and implementation process. Continuous evaluations will be performed during each of the phases to ensure that the Initiative targets are met.

Monitoring and Evaluation

Monitoring and evaluation (M&E) of the Weather Information for All Initiative is an integral part of implementation. It aims to report on progress made and help improve performance towards reaching the objectives. The M&E framework for the Initiative rests within the wider context of internationally recognized goals for development and humanitarian assistance, such as the Millennium Development Goals (MDGs) and the *Hyogo Framework for Action 2005–2015: Building the Resilience of Nations and Communities to Disasters.*

A systemic and objective evaluation of the Initiative will be carried out at three points during implementation:

- A technical feasibility will be undertaken after Phase 1 and will focus mainly on proving the concept from a technical perspective; i.e. successful installation and integration into the mobile network infrastructure as well as the existing national observation system, including automatic transfer of data to the National Meteorological Service and reasonable response times in dealing with issues that may arise.
- A continuous end-user needs assessment, including information delivery mechanisms to various sectors, will be undertaken to identify the chain of an 'end-to-end system' for better collection, assimilation, analysis and delivery of weather information. This will run in parallel to Phase 2.
- > The full assessment of the impact of the Initiative will take place towards the latter part of Phase 2 and will look at the progress of the Initiative in reaching the poor, focusing on the impact of improved availability of weather information in East Africa.

The Global Humanitarian Forum and Partners

The Forum is uniquely positioned to coordinate implementation of this Initiative because it has:

- > Power to mobilize the world's experts
- > Capacity to bridge public and private sectors effectively
- Strong networks with leaders in low and lower middle income countries
- > Flexibility to respond to emerging needs
- > Convening strength to bring national players together in Public Private Partnerships (PPP)
- > Project implementation capacity and local support to make the Initiative a success

Strategic implementation partners to the Initiative are:

- World Meteorological Organization (WMO) Official United Nations' authoritative voice on weather, climate and water, scientific organization
- Ericsson The world's leading provider of technology and services to telecom operators. The market leader in 2G and 3G mobile technologies, Ericsson supplies communications services and manages networks that serve more than 250 million subscribers
- Zain The pioneer of mobile telecommunications in the Middle East and a major player on the African continent
- Earth Institute at Columbia University The Earth Institute, established at Columbia University, is a research institute focused on solving complex issues in sustainable development and the needs of the world's poor
- National Hydrological and Meteorological Services (NMHS) and Governments of participating countries – National Meteorological and Hydrological Services (NMHSs) facilitate access to information related to past, present and future weather and climate

Other mobile operators will be added to the partnership to support full deployment throughout the African continent.

Service partners include **Fairmount Weather Systems, Ltd.** (supplier of meteorological instruments) and **Magnum Photos** (photo-journalistic documentation of the Initiative).

Costs

Equipment roll out and integration costs for the 508 AWSs in Phases 1 and 2, giving complete coverage for Kenya, Tanzania, Uganda and (subject to feasibility study results) Burundi and Rwanda by 2012, has been estimated at USD 8,876,685. This estimate is based on the experience of Phase 1 currently taking place.

