# Challenges Facing NMHSs In Modernization Of Surface Weather Observing Systems In East Africa

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## Abstract

Ambitious modernization programs have been initiated by the Kenya Meteorological Department (**KMD**), the Tanzania Meteorological Agency (**TMA**) and the Uganda Department of Meteorology (**UDM**). In all cases, the goal is to expand surface weather observations in a cost effective and reliable way. Each program involves installation of Automatic Weather Observing Systems (AWOS) at several locations in each country. In some instances, Hydrological and marine observations have been incorporated in some of the systems.

As the three NMHSs implement their programs, they are yet to incorporate effective maintenance and calibration policies so as to manage a growing number of AWOS. They also have to develop adequate capacity which has to include training, equipment and other logistical requirements.

As the issue of climate change become a major global concern, more and more Governmental and non Governmental organizations are choosing to make weather observations; simply by procuring and installing their own observing systems without adequately involving the NMHSs. These organizations are unlikely to adhere to WMO standards in terms of instruments and methods of observations.

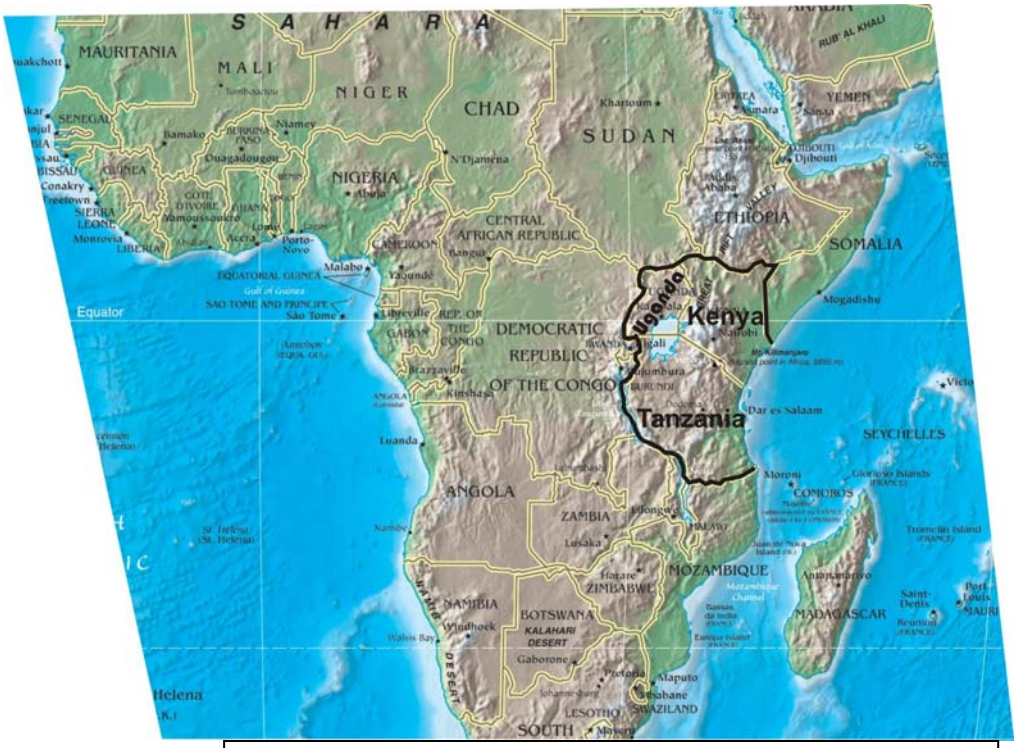
In the unfolding situation, the NMHSs are facing two serious challenges. On one hand, the issue of maintenance and calibration sited above must be adequately addressed. On the other hand, they must move quickly and provide technical support to all organizations that seek to make weather observations. Failure to do this will lead to negation of the gains that have already been made by ending up with inaccurate data sets.

In this paper, the need for the NMHSs within the region to make efforts to correct the situation is addressed. Some practical steps that can be taken are also proposed.

## 1. Introduction

The East African region has very unique climatic characteristics. They range from dense tropical forest to arid and semi arid lowlands. This means that most meteorological parameters vary a lot from place to place. Since the arid and semi arid areas are less developed than others in terms of infrastructure, they host very few observatories. In general, meteorological observations in the east African region are too limited in terms of areal coverage and fall short of optimum requirements.

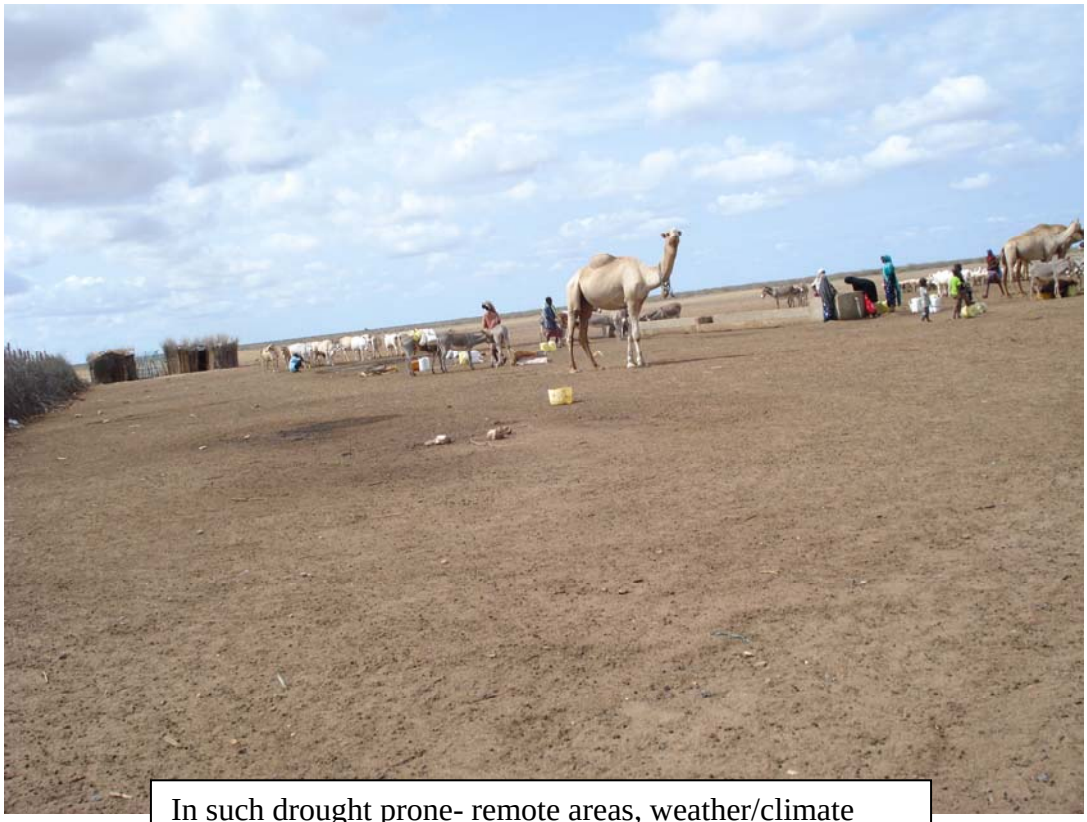
Natural disasters have become frequent within this region. Studies have shown that more than 90% are weather/climate related. The effects of these disasters on communities have been devastating and hence special attention by the international community. This situation has necessitated better and reliable meteorological observations especially in floods and drought prone areas.




*A physical map of East Africa. Note the region's strategic*

As world attention turns to the sensitive issue of climate change and associated short and long term consequences, the importance of meteorological data and information has been recognized by many organizations. They realize that meteorological data must be used for the purposes of development planning, disaster preparedness, prevention and mitigation. This means that user community of meteorological information is rapidly increasing.

Latest technological developments have encouraged organizations(other than NMHSs) to attempt at making their own meteorological observations. This is due to the fact that available data form the NMHSs is inadequate for their needs. Most existing observatories are too far apart and hence data gaps exist is several areas. It is now well understood outside the meteorological fraternity that no sustainable development can take place if weather/climate information is not incorporated in the development agenda.



In such drought prone- remote areas, weather/climate information needed. AWSs are the best option but standards have to be maintained.

For many years, the three NMHSs have struggled to sustain credible meteorological observations. The operational cost of manned observatories has continued to rise over the years mainly due to increased cost of instruments and staff remuneration. As a result there was little expansion in meteorological observations especially in the 1990s. However, from 2003, the three services embraced the idea of incorporating automatic weather observing systems in their networks. This coincided with the rapid growth of communication facilities; mainly GSM and to a lesser extent, ICT. Automatic weather observing systems have also become affordable and more reliable due to technological developments. Some of the advantages considered include:

- They are more consistent in their measurement.
- They provide data more frequently eg every fifteen minutes.
- They will provide data in all weather, day and night.
- They can be installed in sparsely populated/remote areas quite easily
- Relocating the stations is easy
- The systems are battery/solar powered.
- They can communicate via satellite.

However, no concrete decisions have been made regarding the fate of the manual observations. It is not clear whether or when the AWSs will finally replace the ageing manned observatories.

## 2. Challenges

### i. Lack of Proper Operating and Maintenance Policies

Quality of meteorological data and economical operation of instruments/sensors depend heavily on maintenance policies that are put in place. These policies are generally built on:

- Preventive Maintenance
- Corrective Maintenance
- Calibration
- Quality Control of Data

In order to develop and implement proper policies, intensive training of personnel is of paramount importance. So far, it seems only factory training has taken place. No policies have been developed and documented to cover all areas indicated above. This means that early malfunctions will be hard to detect.

Another problem that the NMHSs face is that policy decisions for observation networks are normally made in WMO's CBS. Those in attendance do not link up effectively with those directly involved in operational and maintenance of networks. This leaves the NMHSs ill equipped to deal with policy and standards problems that arise.

### ii Lack of capacity

In order to sustain a good network, trained personnel, equipment and logistical support are critical. So far, both field and workshop calibration facilities are obsolete or non existent. Well trained technicians are too few considering the enormous task involved not to mention that the networks are rapidly expanding.

### iii Sub standard observations

Some organizations have chosen to make their own observations without adequately involving the NMHSs mainly due to:

- Unavailability of meteorological stations within their areas of operation.
- The need to incorporate Meteorological data in their programs but normally underestimate the complex nature of observations.
- The inability by the NMHSs to respond quickly and effectively once they are asked to help.
- The belief that systems proposed by the NMHSs are unnecessarily expensive and opt for cheaper options.

  This is a dangerous trend and it should be addressed immediately. Once the instruments and methods of observations fail to conform to WMO standards, the data that is observed is of no value to the international community. It is important to note that temperature measurements are constantly being used as proof of global warming.

*This AWS was installed by an NGO at a remote place in Kenya. All sensors are 3metres above the ground.*

**Conclusions and recommendations**

**i.** It is a brilliant idea to adopt AWSs as an integral part of observations networks of the three countries. The growth of GSM and ICT should be fully exploited so that the network will be cost effective and reliable.

**ii.** The NMHSs must develop appropriate maintenance and calibration policies that will serve their needs while conforming to WMO standards. The policies should include regular technical audits and clear evaluation procedures.

**iii.** The NMHSs must build adequate Capacity by training technical staff, developing modern calibration laboratories and provide logistical support to field staff.

**iv.** The three NMHSs should be encouraged to establish a peer audit mechanism where they evaluate one another at agreed intervals.

**v.** WMO through CIMO should take a more active role in ensuring that NMHSs meet minimum standards.

**vi.** The NMHSs should if necessary, seek assistance from WMO so as to contain proliferation of substandard or untested observing systems.

**vii.** The three NMHSs should establish a meteorological data certification facility so as to minimize use of bogus data in their countries.

*References*


1. *Guide to Meteorological Instruments and Methods of Observations, WMO-No.8, 2006*
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