ADAPTATION LESSONS LEARNT IN KENYA ON CLIMATE VARIABILILTY AND CHANGE

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INTRODUCTION

There has been increased appreciation of the role that climate plays in the lives of Kenyans in recent years. This awakening has been occasioned by an increase in intensity and frequency of occurrence of extreme climate events such as severe droughts and flooding. These extreme events have had negative socio-economic impacts on almost all sectors such as health, agriculture, livestock, environment, hydropower generation and tourism. They have caused increased demand for more specialized and accurate weather and climate predictions and advisories. The response to these needs has resulted in establishment of mechanisms that might enable the country adapt to climate variability.

These mechanisms include formation of the National Disaster Management Authority. Another adaptation mechanism addresses dissemination of weather and climate information to rural communities named the Radio Internet project (RANET). There is also a coping mechanism for development of climate reporting in Kenya that resulted in formation of the Kenya Network of Journalists and Meteorologists (KENJOM).

The meteorological service has also embraced the concept of integrated approach to issues by working with users and professionals from other sectors to develop climate products that are more readily applicable to specific fields.

A strategy for enhancement of the capability of the Kenya Meteorological Department (KMD) to render better service has also been adopted. This includes research on how the state of the Indian, Pacific and Atlantic oceans affects the climate of Kenya. Strong links between ENSO and the Kenya climate has been detected. The Sea Surface temperature anomalies in these oceans have also been found to affect the weather. This understanding has greatly improved the quality of predictions issued to users. Regarding monitoring climate change, Kenya is hosting a Global Atmospheric Watch (GAW) station on Mt. Kenya for monitoring background pollution. The Department is also investing on weather radars that will enable nowcasting for coping with the increasing flood incidences.

This paper attempts to point out lessons learnt in these areas that are meant to enable the country adapt to climate variability and possibly, climate change.

THE NATIONAL DISASTER MANAGEMENT AUTHORITY

Most of the natural disasters that occur in Kenya are weather related. Such disasters have occurred with increased severity and frequency in recent years. It became necessary to develop a mechanism that would help the country adapt to these extreme events of climate variability.

Year	Type of Disaster	Area of Coverage	No. of people affected
2003	Flood	Budalang'i	28,000
2002	Landslide	M,eru, Murang'a, Nandi	2,000
1999/2000	Drought	Widespread	4.4 million
1997/98	El Nino floods	Widespread	1.5 Million
1995/96	Drought	Widespread	1.41 million
1991/92	Drought	Arid/Semi Arid zones	1.5 million
1985	Floods	Nyanza/Western	10,000
1983/84	Drought	Widespread	200,000
1982	Floods	Nyanza	4,000
1980	Drought	Widespread	40,000
1977	Drought	Widespread	20,000
1975	Drought	Widespread	16,000
1971	Drought	Widespread	150,000

Table showing recent history of meteorological disasters in Kenya. Data extracted from the"National Policy on Disaster Management"

In forming the National Disaster Management Authority, the Kenya Government recognized the vital role of KMD in disaster risk preparedness and hence the weather service was integrated in the National Policy on Disaster Management. The goal of the policy is to harmonize the efforts of government ministries/departments, agencies, non-governmental and civil society organizations and international organizations in disaster prevention and response. Through this organization, climate has been factored in food security and disaster preparedness and response. Mapping of drought and flood risk zoning for the country has been recognized as an activity that will provide the necessary tools for disaster management. The lesson learned is that this is an effective mechanism that has helped in mitigating the vagaries of weather. Severe droughts, the magnitudes of which used to cause many deaths in the past through famine either no longer result in death or the death figures are very low. One good example was the severe *La Nina* related drought of 1999/2000. Although the drought is estimated to have affected 4.4 million people, only a few deaths were attributed to it. A similar drought in the horn of Africa had caused death of millions of people in the past. Part of the reason for this result may be attributed to factoring of climate in disaster management.

THE RADIO INTERNET (RANET) PROJECT FOR DISSEMINATION OF INFORMATION TO RURAL COMMUNITIES

The **RA**dio Inter**NET** (RANET) project is a mechanism for enabling rural communities receive weather and climate information as well as other public-good information in formats and languages they understand. One component of the RANET concept allows users to download web-like pages anywhere in Africa without the traditional Internet connectivity even in areas without main grid electric supply. This is because the concept employs the use of WorldSpace digital radios and solar energy sources. In this arrangement, a Community Based Organization (CBO) uses a WorldSpace digital radio receiver and a computer to download RANET web content directly to the hard disk of a computer. This way the CBO accesses weather and climate predictions and advisories developed by the national weather service in collaboration with a multidisciplinary team of experts that adds advice regarding application of climate predictions in various sectors. The CBO then passes this information to the rural communities for application to agriculture, livestock and health management.

The other component of the RANET concept utilizes community based FM radios to pass information to communities within a radius of about 25 kilometers. Although this has not yet been operational in Kenya due to delays in passing a new parliamentary bill on licensing radio broadcasting in Kenya, the equipment is there and the preparatory work has been done. The RANET project has been actualized through collaboration with partners especially the NOAA-OGP and the African Centre of Meteorological Operations for Development (ACMAD).

Development of tools for informing communities on application of seasonal climate predictions to health and agriculture for specific localities is under development by the RANET multidisciplinary team. One of the tools seeks to develop an index for determination of possibility of Malaria breakout for given localities depending on predicted performance of a given rainfall season. The other seeks to estimate maize yield for a given season for the whole country. It will be used as a tool for advising food security policy makers.

The RANET concept is filling an information communication gap and is a powerful tool of informing rural communities who would otherwise receive information in formats and languages they do not understand. It is a concept that will aid rural communities adapt to climate variability and has potential for application to adapting to climate change.

THE KENYA NETWORK OF JOURNALISTS AND METEOROLOGISTS (KENJOM)

The press plays a vital role in passing climate information to the public. Over the years, it was noticed that there was mutual misunderstanding between the press and climate scientists that resulted in poor communication of information to the public. On the one hand, journalists found it difficult to interpret predictions well enough to communicate them accurately within the constraints of limited space and time. Meteorologists also found it daunting to strike a balance between usage of complex scientific jargon and

loosing the essence of the message by over simplification of the jargon. The result was a communication bottleneck between the climate science community and the media. Because of this bottleneck, vital information would be distorted resulting in the public loosing confidence in the weather service and the Government misallocating resources.

To resolve this problem, it was decided to form the Kenya Network of Journalists and Meteorologists (KENJOM) with the main goal being advancement of accuracy and timeliness of climate reporting, building capacity of meteorologists in effective writing of material meant for consumption by the press and developing interest in climate reporting among journalists. Through the support of the Drought Monitoring Centre Nairobi (DMCN), KMD and various media houses, several capacity building activities have taken place. This has resulted in increased reporting on climate issues in terms of space, frequency and variety of subjects. Reporting has gone beyond predictions to factors that determine our climate such as the Sea Surface Temperatures, El Nino, La Nina and other basic meteorological concepts. This has resulted in a better informed public that is better able to appreciate climate variability and change and hopefully to adapt to these phenomena.

BUILDING CAPACITY IN KENYA METEOROLOGICAL DEPARTMENT TO COPE WITH CLIMATE VARIABILITY AND CHANGE

In order to effectively cope with climate variability and change, the KMD has taken certain measures that will enable improvement in quality of service.

Issuing flood forecasts

In order to be able to predict flash floods in cities and other flood prone settlements, KMD is investing in a Doppler radar network. In addition, Meteorologists will undergo training that will ensure maximum exploitation of the radars. Presently there has been frequent occurrence of flooding in which communities have been translocated to camps after their land and houses are submerged in water for months. This was the case in Budalang'i, next to Lake Victoria where 28,000 people were forced to live in camps since for over 2 months. There has also been many cases of people drowning in flood water in cities as well. This was especially so in the 1997/98 *El Nino floods* that caused damage to infrastructure and heralded re-emergence of diseases hitherto believed eradicated.

Long-range climate outlooks

Research towards improvement of seasonal climate outlook predictions has advanced. Predictors based mainly on Sea Surface Temperatures, ENSO and pressure gradients between the Atlantic the Indian Oceans have yielded tools that have enabled KMD advise users on the expected performance of a given season with one to four month lead time. The predictions so far are based on linear regression modelling. We are in the process of adopting climate modelling which could improve accuracy.

The forecasts are presented in probability terciles; above-normal, normal and below normal categories. Many capacity building workshops for users have been held to assist

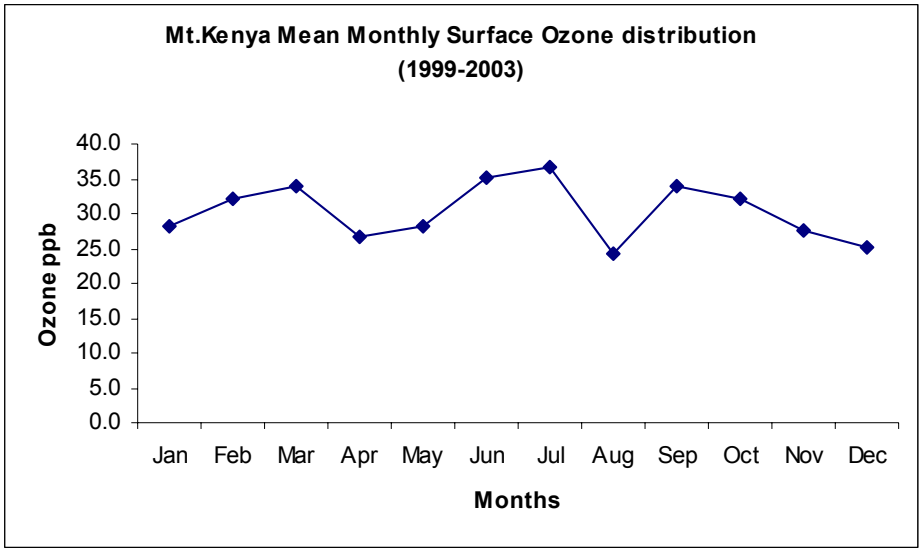
them interpret the presentations. Some users, however, have criticized this presentation preferring quantitative presentations, which would be easier to apply. There are attempts being made on investigating how probabilistic forecasts could be expressed in easier terms for application to various fields.

Climate Change Monitoring

KMD hosts the Mt. Kenya Global Atmospheric Watch (GAW) Station. The goal of the **GAW** programme is to monitor, on long term basis the changing composition of the atmospheric characteristic. Data from the GAW network has been used exclusively in the activities such as the assessment of ozone depletion, climate change and acid deposition. The GAW network consists of stations which, due to the remote locations from pollution sources and sinks, can provide the background data. These baseline stations form the only existing operational network which monitors atmospheric characteristics worldwide. In 1993, the WMO added six global stations in the network in the geographical regions of the world not represented before. The stations total 22 in the world.

Among the six new GAW stations is the MT Kenya GAW station. It is situated in the Mt Kenya national park at an elevation 0f 3897 metres; 0 degrees 3minutes south and 37 degrees 18 minutes east. This is the only such station on the equator.

The GAW stations were established under the organization and technical support of the WMO. However, the stations are the property of the host countries. They are expected to carry out the goals of the GAW programme in conjunction with the goals and missions of the atmospheric monitoring in each country.



Graph showing mean monthly distribution of surface ozone as an example of products of climate monitoring on Mt. Kenya GAW Station.

CONCLUSION

Various mechanisms embraced by KMD for adaptation to climate variability have shown positive results. One common characteristic in most of them is the integrated approach in which stakeholders are involved at appropriate stages of product formulation. This approach ensures ownership of the products and therefore, the inclination to apply them. It is hoped that these mechanisms will evolve to systems that will be applicable to adaptation to climate change. Already, a critical mass of better informed public on climate is developing and these people could provide the necessary agents in adapting to climate change.