Operational Agrometeorological Services: Regional Perspectives

Perspectives from Regional Association I (Africa)

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Abstract

Operational agrometeorological services in Africa were described based on the responses to a questionnaire designed by the World Meteorological Organization (WMO) Secretariat. The questionnaire was sent by fax and e-mailed to 51 countries and centers in Africa. The countries that responded included: Cape Verde, Mali, Eritrea, Mauritius, Ethiopia, Republic of Central Africa, Gabon, Guinea, Kenya, Malawi, Sudan, Tanzania, Togo, Tunisia, and Zimbabwe.

The distribution of these countries is fairly representative for the different geographical regions of Africa. It should, however, be noted that it is rather risky to draw meaningful results from such limited responses. Considering the short period devoted to consultation, it is desirable to try to highlight the present state of the agrometeorological services in Africa and to draw useful guidelines for activities and future prospects.

Introduction

Summary of Responses to Questionnaire:

Agrometeorological Units

Most of the meteorological services in Africa have independent agrometeorological units and a few of these are based in the agricultural services (usually ministry of agriculture). The major role of these units is to provide data on a real-time or historical basis and to make simple data analyses in addition to a routinely published bulletin. The units provide services for the agriculture, water and the environment sectors, and other related concerns. However, there is a high staff turnover due to poor working conditions which results in well-experienced agrometeorological staff and well-trained scientists and technicians leaving the meteorological services to join other institutions.

Major Customers

Major customers include government institutions such as ministries of agriculture, livestock, fisheries, water and forest services, rural development, etc. In Malawi, Zimbabwe, and other countries, the major customers include:

- Government departments
- Donor community
- Private sector
- Banking community

- Non-government organizations
- Schools and colleges
- Agricultural extension department
- Food security department
- Disaster management department
- Early warning unit
- The media
- Research institute
- Farming community

Many countries provide services for international organizations such as the Food and Agricultural Organization (FAO), the World Food Programme, and the World Health Organization. In countries like Ethiopia, about 70 Non-governmental Organizations (NGOs) are users of agrometeorological information.

Operational Aspects

A large majority of the countries issue regular agrometeorological bulletins and offer advisory services. Nearly half of the respondents mentioned that they issue early warning information valuable for strategic planning and efficient monitoring. More than 70 percent of the respondents indicated that they have an efficient role in assessing the impact of extreme events. Ethiopia also provides information on frost.

Major Types of Agrometeorological Services

Most of the countries undertake studies to help reduce the impact of natural disasters, including pests and diseases. Only Kenya indicated that they do not provide short- and medium-range weather forecasting for agricultural purposes. Malawi indicated that it issues the forecasts, but not specifically for agricultural purposes.

WMO's Climate Information and Prediction Services (CLIPS) organize training courses for the different countries of the region in centers designated for capacity building for the different regions. The purpose is to acquire skills and use tools to predict the rainy season. The project is successful with new strategies to enhance food production and supply in the relevant countries. The model is still experimental although the results continue to be good in many countries. The model showed negative response in Ethiopia, however, efforts are continuing to improve model performance at the national level.

Only Mali and Tunisia acknowledged provision of services to help reduce the contributions of agricultural production to global warming. It appears that studies targeted towards such services need some attention.

Zimbabwe is currently generating production estimates for the rain-fed agricultural sector, using the FAO model based on crop-water requirement satisfaction index (WRSI). Efforts to improve the understanding of this model are underway.

Work limitations

Data for agrometeorological purposes are usually inadequate in many countries. The density of observational network is low and network communication is not satisfactory. The

distribution of the existing observational network is uneven. Countries like Mali have demanded CLImate COMputing (CLICOM) and INSTAT software. Provision of analytical tools such as GIS is, however, challenging. Tools to allow precise analysis and better presentation are needed.

Training the staff is another problem in addition to educating farmers. Closer contact with farmers is vital; it is very beneficial to train them at least to make field observations and collect and transmit data. The help and direction given to farmers by extension workers could be useful but there is always a lack of a direct link between extension workers and agrometeorological staff.

Operational services are not adequate due to limited financial resources, at times, in many countries. The priority given to the agrometeorological services is not yet well identified. Station inspection is crucial, but it is unlikely to be achieved in most cases due to budgetary problems.

Limits of Collaboration

In some countries ties with agricultural research units are relatively good but agrometeorological units interact with extension services only in a few countries. Data flow could be made easy for some users, but in some countries data have commercial value and access is restricted. Collaboration hardly exists between agrometeorological units and research units and extension services. Countries like Ethiopia and Kenya investigate problems related to agriculture without sharing information with agricultural research units. This might be because the infrastructure of the agrometeorological units in these countries is so strong as to achieve independence.

Extension services are available in a few countries. In Mali, there is a multidisciplinary body forming a working group for monitoring the growing season. The list of participants includes the agrometeorological unit and the extension services.

Most countries adopt decadal (10-day) analysis in addition to the monthly and annual analysis, especially at district level. Only a few countries adopted the system of weekly analysis instead of the decadal analysis. Daily observational data, which are requested at times by the agricultural research units, are provided in a format easily transformable into weekly or decadal values. Interaction with these users is either slow or irregular.

Global Connection

Many countries are aware of the requirements of the International Conventions and agreements related to the United Nations Framework Convention on Climate Change (UNFCCC), UNCCD, and the Convention on Biological Diversity. More than 30 percent of the countries have no clear understanding on the World Food Summit Plan of Action. More than 25 percent of the countries have no clear access to plans of action of these international conventions and agreements.

Improved Operational Services

Respondents expressed a variety of ideas on methods and tools of analysis to improve operational agrometeorological services at the national level. A summary of these ideas, based on the respondents, indicates the following order of priority:

1) Improve and rehabilitate agrometeorological stations and introduce automatic stations;
2) Improve communication links and consider new facilities;
3) Provide training (short and long-term) and analytical tools (introduce and improve methodologies);
4) Update and strengthen information system and technology (computers, software, GIS technology, etc.);
5) Develop user-tailored products;
6) Enable monitoring and inspection;
7) Initiate roving seminars; and,
8) Improve bulletins and introduce automation of data collection, processing, and information transfer.

Strategy to Build National Capacity

The questionnaire raised several key points. Accordingly, national capacity building can be achieved through:

- A capacity-building project and training of personnel;
- A project for acquisition of automatic stations;
- Making agrometeorological services semi-autonomous to enable resource mobilization from private sectors and to deliver quality products; and,
- Training and acquisition of tools (equipment and software).

Several other points were drawn, but they are rather low in priority.

Future Prospects

Africa is rich in natural resources and the agricultural potential is high. Genuine efforts are needed to utilize the resources for the benefit of mankind.

Operational tools for agrometeorological activities have been greatly developed, taking advantage of the rapidly developing technology. Training, among other things, is vital to bridge the existing gap between scientists and farmers. Contacts, sharing knowledge, improving techniques, and exchanging ideas remain important tools for improving agrometeorological services.

Automation

Conventional instruments and equipment used for measurement in the agrometeorological stations are simple and easy to handle and maintain. It is now becoming difficult to maintain the stations because some conventional instruments are not manufactured anymore. A striking example is Robitch (a mechanical instrument for measuring global and diffused radiation) that is no longer available in the market. Old equipment cannot be replaced to

keep continuous data records. The alternative is a high-precision electrical instrument, but electrical power is often either irregular or not available. Other examples also exist.

Conventional instruments for agrometeorological measurements are on their way to be replaced by automatic weather stations. Most of the sensitive elements are measured by sensors and recorded automatically without much interference from the staff. This will enable rehabilitation of the network and reduce the number of the staff required, provided that technicians are well trained to run and maintain the automatic stations.

Agricultural Production

Many countries in Africa complain of a frequent shortage in grain crops. This is mainly attributed to climate variability. Drought is frequent in Northern Africa and floods are frequent in Southern Africa. A combination of the two is likely at any location. Estimates of crop yield and production become vital in planning rescue operations at the national level.

FAO has already proposed the Crop Water Stress Index (CWSI) as a qualifying model for drought impacts. However, little work has been done to enable routine use of the model at the national level.

Agriculturists have their own traditional way (for instance the crop-cutting method) for estimates of national grain production. Such estimates usually become available 2-3 months after complete crop maturity. Use of the FAO model, which provides earlier indications of crop performance, can bridge the time gap. Other similar models can also be used. The agrometeorologists will take the lead when they are able to provide such earlier information on crop yield and production nationwide. Efforts are needed to organize application missions.

Remote Sensing

Remote sensing is widely used in developed countries for provision of accurate information that may help in improving agrometeorological services for agriculture and other related disciplines. The technique is not easily available for developing countries due to technical restrictions, high costs, and lack of resources.

Information on rainfall estimates and Normalized Difference Vegetation Index (NDVI) is vital for all agrometeorologists to improve services and gain confidence. The Inter-Governmental Authority on Development (IGAD) countries took the lead to consider providing remote sensing technology for all member countries for provision of information on rainfall estimates using the Primary Data User System (PDUS) and monitoring the progress of the cropping season (NDVI). Other downloading facilities for some other elements are also considered. The project, which is just starting, shall strengthen national capacity and provide links with different users in the region and in each country. Similar examples are encouraged.

Conclusions

Although many African countries can provide improved agrometeorological services for the different users, they are still lagging behind. The flow of information is limited and methodologies have to be improved; technology is in high demand.

The density of the observational network is low in many countries. Some countries have only one or two agrometeorological stations, limiting agrometeorological activities. Agrometeorological units are hampered by lack of trained personnel and limited budgets. Efforts are needed to assist these countries.

The flow of data to users continues to be a high requirement. Users, especially the farming community, usually request information on the onset of effective rains (to know when to plant), the length of the cropping season (to decide what to plant), the behavior of the dry and wet spells within the cropping season, and how likely an extreme event is likely to occur. The provision of this information is currently very limited.

Governments and farmers are greatly interested in knowing how much grain yields and crop production are expected by the end of the rain/crop season. This knowledge helps strategic planning.

Genuine efforts are, therefore, needed to improve agrometeorological services and make their products accessible to users.

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