Improving Agrometeorological Bulletins –

Regional Perspectives

Improving Agrometeorological Bulletins
Perspectives from RA I (Africa)

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Introduction

The report below is based on the responses to a questionnaire which was sent (during the month of July 2001) to 54 National Meteorological and Hydrological Services (NMHSs) and 6 Institutions (ACMAD, AGRHYMET, DMC Nairobi, DMC Harare, ICRISAT and the Niger Basin Authority) with the assistance of the WMO Subregional Offices in Lagos and Nairobi; and ACMAD (African Center of Meteorological Applications for Development) and AGRHYMET (Regional Center for Agricultural Meteorology and Hydrology) in Niamey. By 20 September 2001, 29 NMHS and 4 institutions, i.e. 55% of the NMHSs and Institutions had responded to the questionnaire. These were the NMHSs of Benin, Burkina Faso, Cameron, Djibouti, Egypt, Ethiopia, Gambia, Guinea Bissau, Guinea Conakry, Kenya, Lesotho, Libya Arab Jamahiriya, Mali, Mauritania, Mauritius, Mozambique, Madeira Island (Portugal), Niger, Nigeria, Senegal, Seychelles, South Africa, Swaziland, Tanzania, Chad, Tunisia, Uganda, Zambia and Zimbabwe and the Institutions ACMAD, AGRHYMET, ICRISAT and the Niger Basin Authority.

Oral interviews and discussions were held with the Director of the NHMS of Niger, and his staff in charge of the agrometeorological bulletin production, the Director General of AGRHYMET, and his staff in charge of the agrometeorological bulletin publication, the Director General of ACMAD and the Director General and staff of the Niger Basin Authority (covering all the riparian states of the Niger river).

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Summary of Responses to Questionnaire

Existence of Independent Agrometeorological Service Unit

About 94% of the respondents indicated that they have an independent agrometeorological unit. The NMHSs of South Africa and Seychelles do not have a unit yet. But South African Weather Service is currently trying, in partnership with the Agricultural Research Council (ARC), to develop a dissemination path for weather and climate information for agriculture. Although Portugal is a member of RA I due to its territory of Madeira Island, most of its agrometeorological activities is carried out in the European mainland. All agrometeorological studies and information, namely those disseminated in the form of periodic agrometeorological bulletins are developed for Madeira.

Issuing of Agrometeorological Bulletins and Advisories

All respondents stated that they issue agrometeorological and advisories. The majority of the respondents (75%) issue their agrometeorological bulletins on a ten-day (decadal) basis while one quarter stated that they issue monthly bulletins as well. AGRHYMET issues decadal, monthly and seasonal bulletins for all the nine African Sahelian countries belonging to the CILSS (Inter-State Committee to Combat Drought and Desertification in the Sahel). Less than 1% respondents issue seasonal bulletins.

On the other hand, ACMAD issues seasonal and inter-annual forecasts for agriculture under the CLIMAG (Climate Prediction and Agriculture) project to NMHSs in RA I.

Collection, Analysis and Presentation of Information in the Bulletins

Half of the respondents indicated the method of their data collection. The most widespread method of data collection is by telephone, post and fax, while less than a third collect through E-mail. Similarly, less than 15% of the respondents indicated what type of software is used for data analysis, i.e. Excel, ILWIS and SURFER. However, more that 95% of the agrometeorological units present their data in the form of text, tables and graphics.

Involvement of Agricultural and Extension Agencies in the Preparation and Dissemination of Agrometeorological Bulletins

About 75% of the respondents indicated that agricultural research and extension agencies are not involved in the preparation or dissemination

of agrometeorological bulletins although a few are involved in data collection. However, the 25% of other respondents, which includes in particular institutions such as AGRHYMET, ACMAD, CILSS and the Niger River Basin Authority, that serve the whole continent, a subregion or a group of countries or any NHMS that has a National Multidisciplinary Agrometeorological Committee, involve the research institutions and extension agencies not only in data collection but also in the preparation and dissemination of the bulletins.

Target Audience for the Agrometeorological Bulletins

The majority of the agrometeorological units (80%) said that their bulletins are targeted at Government agencies, Non-Governmental Organisations (NGOs), regional and international organisations, whilst the remainder stated that their target audience is the research community, farmers, agencies issuing early warning systems and the general public.

The post is the most common method of reaching the target audience, although a few respondents mentioned the use of the web for information dissemination.

Effort to Obtain Feedback from Users of the Bulletins

Eighty percent of the respondents indicated that they have not made any effort in obtaining feedback from users. For those that have done so, however, the process of obtaining feedback is not carried out on a regular or systematic basis.

Effort to Assess the Economic Value and Benefit of Information Contained in the Bulletins

90% of the respondents have not made efforts to assess the economic value and benefit of the use of information provided in the agrometeorological bulletins. This may be due in part to the fact that farming in most parts of Africa is largely a risky business because an essential input, climate, is highly variable and most often unpredictable beyond very short time frames. Since very little land is irrigated in Africa, variable rainfall translates into variable production levels. Rural inhabitants are often very poor and depend upon agriculture for subsistence, the consequences of failure to warn or predict natural disasters such as drought for rural inhabitants can be devastating (Channing *et al*. 2000). These consequences and the issues of poor communication facilities, lack of or poor education of rural farmers, coupled with lack of expertise in NMHSs in Africa, work against an efficient determination of economic values of agrometeorological bulletins.

Effort to Issue Specific Bulletins of a Special Nature

About 70% of the agrometeorological units do make efforts to issue specific bulletins of a special nature to address extreme events such as droughts, floods, forest fires, etc. The rest make to such efforts.

Use of New Techniques such as Simulation Models and GIS

About 60% of the respondents are using some of the new techniques or software, such as WINDISP, IDRISI, SURFER, FAO WRSI (Water Requirement Satisfaction Index) etc. Elsewhere, modern methods are not widely used.

Shortcomings and Limitations in the Current Methods of Preparing Bulletins

Nearly 80% of the respondents cited communication bottlenecks as the number one limitation, which hinder the smooth data collection from weather observatories to the collection centers. Other shortcomings are:

- Poor quality of data
- Lack of adequate computing facilities and appropriate software
- Inadequate training in bulletin preparation
- Poor research/agricultural extension links
- Sparse station network

Comments and Suggestions to Improve Agrometeorological Bulletins

On top of the list for suggestions to improve agrometeorological bulletins was the improvement of communications between meteorological stations and collection centers (indicated by 70% of the respondents). Other suggestions were:

- Organization of workshops on preparation and production of bulletins
- Adoption of uniform bulletin formats
- Closer collaboration between service providers and users
- Closer collaboration with extension agencies
- Acquisition of better computing equipment for data processing and analysis
- Expansion of the station network
- Computerization of phenological observations
- Training of agrometeorological personnel especially in using GIS software

Other Information

One respondent did not answer to this question. However, the rest provided the following additional information:

- Bulletins have a limited circulation
- Efforts must be made to incorporate indigenous knowledge in the bulletins
- The user community must be sensitized on the interpretation of information contained in the bulletins
- The farming community must be educated on the benefits of using agrometeorological information
- The agrometeorological unit should have its own independent communication system
- Training of agrometeorological personnel should be stepped up, especially in strengthening and developing report preparation skills
- Strengthen communication systems for disseminating agrometeorological information to the farming community.

Suggestions for Improving the Timeliness, Quality and User-friendly Format of Agrometeorological Bulletins

This section discusses some aspects of bulletin design and presentation, which could contribute towards improving the quality of agrometeorological bulletins in RA I.

Technical Content

The information presented in the bulletins should be reliable and accurate, and it is essential that the agrometeorological units verify both, quantitative and descriptive data. The inclusion of maps would be more informative as they provide an indication of spatial variability. In most NMHSs in Southern Africa and Sahelian West Africa, agrometeorological units mainly provide a service to the Early Warning System for Food Security, and bulletins will often contain analytical assessments of key early warning indicators.

It has to be kept in mind that rainfall is a key element in the agrometeorological bulletins. In higher latitudes the first factor to control the seasons is the temperature, whereas in Africa we look first to the *rainfall*

pattern and then to the temperature, i.e. in RA I, precipitation is the most important parameter which determines the space-time characteristics of climatology. However, temperature becomes an important parameter over the highlands and as one move from the equator polewards.

Scope and Coverage

It is essential that all bulletins cover certain key topics:

- Current agrometeorological conditions
- Current crop stage (emergence/ vegetative/ flowering/ grain filling/ maturity/ harvest) and condition (excellent/ good/ fair/ poor/ failure)
- Current marketing year staple food supply situation
- Projected following year's staple food supply situation
- Current price developments
- Current agricultural inputs, credit supply and utilization
- Pest and disease outbreaks

These key topics should be considered rather as a checklist of essential agrometeorological themes to ensure completeness of coverage and not a rigid structure to be followed without any flexibility.

Size/Length

A compact and concise report is essential, preferably a one page (front and back) description of the agrometeorological situation in the country, bearing in mind that these bulletins may be directed at senior policy makers and planners who may not always find the time to go through a large document in great detail. However, the size of the bulletin will reflect the situation in individual countries, but in general, quarterly bulletins should not exceed 8 to 10 pages. Careful incorporation of tables, graphs and maps will often help to reduce the length of the bulletin, and each one of these should present a specific/distinct set of information.

Summary/Highlights Section

Even a concise bulletin will require some kind of brief overview, which covers the key points of the bulletin which readers can grasp before they go into the report itself.

Presentation and appearance

The bulletin should be "eye-catching" in order to gain the reader's interest. Initial impressions are very often based on appearances rather than

content, and therefore it is essential that the bulletin should appeal to the readers. Use of modern desktop publishing techniques will improve the layout or design of the bulletin. Furthermore, availability of a well-maintained heavy-duty photocopier will contribute towards the attainment of a high quality reproduction.

Timeliness

Bulletins must be released as soon as possible after the reporting period. This essentially means that there would be no point in embarking on the exercise of producing the bulletin if *strict deadlines* are not adhered to. This applies both to the preparation and release of national as well as regional bulletins.

Dissemination of Information

Consultation with the user community should take place. The objective is to define the requirements of the user community in terms of product characteristics and format and dissemination channel. Some users may prefer color maps and others averages of areas (e.g. over agricultural districts). Some prefer receiving information via E-mail, while others may be restricted to printed material. Some users may even prefer to get the actual image data for their own processing purposes.

The dissemination of information should benefit from modern communication facilities. Usually in early warning activities information is prepared in the shape of a bulletin providing analysis and comments based on the color maps, time series and data tables and are sent to users. This approach is convenient since this agrometeorological-monitoring bulletin can be prepared in a word processing package based on a pre-defined template. The output file from such a package can be used for the preparation of printed copies. Alternatively, to avoid delay, the file itself should be sent by e-mail to users with e-mail access.

In parallel, an Internet version of such a bulletin can be prepared for incorporation in the NMS web pages or in its own specific web page. It has to be noted that within the scope of this project, only basic web document preparation can be provided, but enough should be available to reach a standard suitable for public diffusion. The above bulletin is envisaged to be issued at a 10-day frequency. It is also desirable to prepare and disseminate periodic seasonal assessments - one reporting on the start of the season, a second reporting on the mid-season status and a final end-of-season report.

Reporting frequency

Users of early warning information would benefit from more frequent publications dealing specifically with the developing weather situation and its impact on staple food crops.

Ten-day periods are considered better and they are a standard reporting period for meteorological data; a month is considered too long to depict the current developing weather situation and its potential impact on food crops. However, for other purposes or applications, monthly or quarterly reporting may be deemed suitable.

Sources of data

Key institutions may include those, whose mandate pertains to the national early warning, remote sensing and meteorology, covering such diverse areas as:

- Crop monitoring and forecasting
- Food procurement, stocks, storage, imports and exports
- Food security situation, import requirement and food shortages
- Inputs supplies
- Socio-economic and nutrition indicators

For a Meteorological Service, equipped with both METEOSAT-PDUS and NOAA-HRPT receivers, outputting data in recognised formats and with required characteristics and analyzing and calibrating various seasons of data, parameters that may be generated include:

- Estimates of 10-day rainfall
- Estimates of number of rain days in a decade/month
- Maximum dry period within month/quarter/season
- Occurrence of 10-day sowing rains (early season)
- Daily maps of rainfall occurrence
- Cumulative rainfall amounts (10-day time step)
- Vegetation index maps (cloud masked 10 day maximum NDVI)
- Maps of large scale inundated areas (time step depending on cloudiness)
- Statistics of selected products – area averages, time series

Terminology/Language

Efforts must be made to stress user-friendly products in the bulletin, e.g. not CCD but "rainfall"; not NDVI but "vegetation greenness", etc.

WMO Assistance

WMO should offer assistance to NMHSs in terms of guidelines, expertise, materials and capacity building through training workshops.

Future Technologies to Improve Communication in Africa: the ACAMD "RANET" Project System

Currently there are poor facilities within the Africa region for collection and dissemination of information particularly to rural communities. Moreover, the agro-hydro-meteorological services themselves have insufficient access to data. The greatest limitations to the use of information are:

- Inaccessibility
- Obsolescence
- Poor communication reliability

The RANET System is therefore a "Radio Internet" communication network of systems designed to exchange and disseminate agro, hydro and meteorological based information, data and products to urban and in particular to rural communities through radio, televisions and internet facilities.

The aim of RANET is to reduce the vulnerability for climate hazards by passing vital information to rural and urban users in local languages particularly to rural areas of Africa.

- Agro-hydro-meteorological information, e.g. weather forecasts, alerts, seasonal assessments and observations (for agriculture, forestry, water resources etc.)
- Plant diseases and pests (for food security).
- Social (Health, Education, Disaster preparedness, Town planning, Women and children issues etc.)
- Economics (Energy, Technology, Industry, Water resources etc.)

Objectives of RANET

The overall objective of RANET is to establish a mechanism for dissemination of meteorological information and climate prediction

products through the WorldSpace Foundation in audio, graphics, text and video form (i.e. multi-media).

The specific objective is for the regional development institution:

- Capacity building
- Repackaging of information
- Public awareness
- Introduction of new information and communication technologies within the rural areas.

Further Objectives and Benefits:

- To bring further co-operation with other rural projects – health, education, information, local issues.
- Raise awareness at a national level (i.e. with government and other funding bodies) of the positive contribution that the NMHSs are making to society.

Components of RANET

The Ranet system is an integration of two independent sub-systems namely:

- Radio and Internet
- Radio and television

Through these means the rural communities are provided with audio and video agrometeorological programmes (entertainment programmes inclusive). The audio programmes are provided through a FM radio transmitting station having radiation power of 60W, capable of covering a 25-50 km range radius in an officially allocated FM frequency. The programmes are picked on the FM transmission channels with the radio receivers.

On the other hand, the video programmes as provided through established TV viewing centers equipped with video machines

Radio and Internet

In the radio and Internet system a satellite digital receiver is used to download data (in ZIP format) from the WorldSpace satellite on an African Learning Channel (ALC) through the PC Adaptor-64K and specially installed software. The downloaded data are then further processed to meaningful formats for storage and retrieval.

Pilot Projects -Radio and Internet

The Radio and Internet project is presently located at ACMAD because of its position as the Center for Information Development (CID). It also serves as a data collection platform for the center's research and development needs.

The transmission of data is by a special Internet arrangement to South Africa via Niamey, as South Africa is the only African country with an uplink station to the WorldSpace satellite (Boulahya 2001).

Recommendation

In the survey above 80% of respondents identified communication bottlenecks as the main limitation to data gathering in real time due to inaccessibility and poor reliability of the existing communication facilities in the continent. It is in this vein that the RANET System is presented to the meeting to recommend the new technology for the timely data collection for producing agrometeorological bulletins and dissemination in real time to end users to the next year's 13th (XIII) Session of the Commission for Agricultural Meteorology (CAgM) for adoption.

Indeed, the Twelfth Session of the Commission for Basic Systems in December 2000 noted with interest the development of the RANET Project, which was a cooperative effort initiated by ACMAD in order to improve access to climate and weather-related information throughout Africa. RANET made it possible to receive information in the form of bulletins, reports, observations, satellite imagery and products of NMHSs that were placed in the public domain. The Commission agreed that the utilization of RANET in developing countries in Africa, Asia and South America should be encouraged and promoted (WMO 2000).

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