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Drought Monitoring and Advisory Services in South Africa*

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Drought during the 1991–92 and 1992–93 Rainy Seasons

The normal total rainfall for the summer rainfall areas in South Africa is 664 mm. Since 1963, the country has recorded 16 seasons below normal and 14 above normal. Since the 1982–83 season, 7 seasons have been below normal and 4 have been above normal. Of these last 11 years, two rainy seasons recorded less than 75% of normal rainfall, which is a coarse estimation of severe drought. These seasons were 1982–83, when an average total of only 408 mm was measured, and 1992–93, when the average total was 484 mm. Although 1991–92 has been called the worst drought this century, for the stations used in this survey, the average total was 510 mm, or about 77% of normal.

The 1981–82 and 1982–83 as well as 1991–92 and 1992–93 seasons were close to being only 75% of normal rainfall. These are the only occasions in the last 70 years that two consecutive summer rainy seasons have had such seriously inadequate rainfall. Fortunately, the geographical and temporal distribution of rainfall varies seasonally, and in 1992–93, adequate rain fell on the main summer cropping areas of South Africa to save the country from experiencing two disastrous crop failures. The greatest impacts of these two very dry seasons were the low levels of surface water stored in dams on which most industrial and urban areas depend and low ground water reserves for boreholes, which support most irrigation and many rural communities. In addition, the sugar industry in Natal and Zululand on the normally wet east coast has been seriously damaged and many sugar mills have closed. Farming and rural communities with accumulated capital losses and mounting debt cannot hope to recover as quickly as the grazing grasses did following good rains in October and November 1993.

Monitoring the Climate and Drought Variations

In 1990, the South African Weather Bureau initiated the Climate Monitoring Service (CLIMOS), which monitors rainfall, temperatures, and humidities daily for nearly 550 stations in southern Africa. This includes the surrounding countries of Namibia, Botswana, Zimbabwe, and southern Mozambique. The daily synoptic reports exchanged every day by the international forecast services are accessed daily by CLIMOS, and the required data are extracted and placed in a data base. The data are checked automatically but are also sorted into climatic regions for ease of manual rechecking. The CLIMOS data base is used "piggy-back" to the main Weather Bureau climate data base so that normals and extremes for long-term climate stations can be accessed for comparison purposes with current climate data.

The current climate data is made available as daily, weekly, and 10-day reports; monthly summaries; and on an ad hoc basis to meet requests from agricultural, economic, and social services as well as the media. Daily rainfall and temperature reports together with weather maps are widely distributed, especially to the media. Daily rainfalls are also used for flood warning services when the situation demands. Weekly and 10-day rainfall reports are passed to agricultural agencies and neighboring countries, in particular to Zimbabwe, where the FAO has situated its Regional Early Warning System at Harare. The monthly summaries include comparative tables, maps, and discussion regarding the main weather impacts on the economy. More recently, "weather outlooks" have been included in these summaries. Nearly 300 monthly summaries are sent to clients in Africa and other countries.

Other Climate/Drought Advisory Agencies in South Africa

South Africa has not managed to organize or institute a drought task force or adopt the ten-step plan as envisaged by the Drought Workshop held in June 1989 under the auspices of SARCCUS (South African Regional Commission for the Conservation and Utilization of the Soil) Subcommittee for Agrometeorology and Climatology. Perhaps, considering the great differences in climates, economies, and communities in a country the size of South Africa, this is inevitable, at least at a time of fundamental political changes.

However, climate variability and regional droughts remain realities, and some measures still must be taken. At the time of this writing, the main agencies, other than the Weather Bureau, appear to be the following:

The Agricultural Research Council (ARC), a privatized arm of the Government Agricultural Department that operates in all parts of the land. They also run a climate data base (using their own station data as well as CLIMOS data) and apply the information directly to crop models and agrometeorological research.

The Natural Resources section of the Transvaal Agricultural Development Institute. This group also uses CLIMOS data for specialized advice for the Transvaal Province.

Two drought advisory and research operations, based at Grootfontein Agricultural Research Centre near Middelburg in the Eastern Cape and Glen Agricultural College near Bloemfontein. These two operations are under the guidance of the Drought Advice Bureau, based in the Orange Free State. The operation at Grootfontein Agricultural Research Centre has instituted its own network of 400 rain gauges covering most of the interior Eastern Cape and Karoo regions. Using their own drought indexes, they advise farmers and drought relief committees. The other operation is developing a satellite/rain gauge integrated model to cover the Orange Free State and Northern Cape regions.

Climate institutions in the Southwestern Cape have not been included because they serve the winter rainfall areas, which are not being considered in this review.

Efforts to coordinate drought advice strategy were intensified by the recent droughts, and the Department of Agriculture has formed the Drought Coordinating Center in Pretoria. Outside government, various NGOs instituted the Drought Consultative Forum, based in Johannesburg. The newly formed organizations used CLIMOS data and information, which was supplied at regular intervals and when requested for specific meetings and committees. The Drought Forum has broad representation and caters chiefly to rural areas, where lines of communication are sparse and where shortages of food and water have been extremely serious.

Climate Outlook Advisories

In the last two years the Weather Bureau has come under increasing pressure to issue "weather outlooks" for the next month(s) and for the season ahead. Because of the lack of expertise and low success rate of this particular form of "weather forecast," the task was taken on with some apprehension. However, such is the demand that, at present, an assessment and outlook for the approaching (current) season is issued with many of the monthly summaries. The data, wording, and assessment relies heavily on the advisories issued by the Climate Analysis Center in Washington, to which full credit is given. Taking into consideration the various research-oriented "outlooks" that are released by the University Climate groups in Pretoria, Johannesburg, and Cape Town, the Weather Bureau compiles its own review of the current situation and the probable effects on South Africa.

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Summary and Recommendations

In terms of the hydro-illogical cycle, we are now at the dangerous point where good rains have shifted us out of the “panic” and toward the “apathy” stage. The momentum that was achieved when the two drought years kick-started the various drought advisory agencies must not be lost. Experience shows that drought (and flood) warning systems tend to lose support when neither of these disasters is occurring. Thus any warning system proposed must cover all climatic parameters that have a bearing on natural disasters and the economy. This is the concept behind the Weather Bureau CLIMOS system, which continues to monitor all weather and climate variations. Comment and discussion will depend on the particular type of impacts expected or experienced. For instance, in the monthly impact assessment, topics such as runaway fires, heat stress on fruit, inclement conditions for tourists, and other weather-related impacts are all pinpointed, in addition to drought or floods when they occur. The Weather Bureau is well placed to run and maintain this type of national monitoring service, which can meet the needs of a wide spectrum of clients, including drought task forces, when the need arises. CLIMOS can be easily expanded to use more stations and other weather parameters. In addition, the different means of assessing weather impacts, such as the Early Warning System in Harare, need to be coordinated. The equipment and expertise necessary to analyze CLIMOS data, satellite rainfall assessments, and NDVI (normalized difference vegetation indices) should be consolidated at a single center in South Africa. Regular assessments and analyses could then be made available to regional “impact centers,” where they would be evaluated in terms of their own requirements.

Discussions with the Drought Forum in particular have highlighted the difficulties encountered in obtaining recent and objective data and information concerning the water and food supplies as well as health standards in rural areas. The Weather Bureau does not have enough weather stations in many rural areas; it would seem that these two deficiencies might be corrected by pooling resources. If funding becomes available for obtaining data on food supplies and health standards, the communication network run by the Weather Bureau could be restructured as “data gathering centers.” A weather station could be enlarged in concept to gather other data and then all the data could be made available to different concerns, using the Weather Bureau data links.

These ideas have emerged after three years of close collaboration and interaction with people involved in measuring drought and reacting to the human hardships and land degradation that has resulted. The time is right to build on the knowledge gained and to coordinate the several systems that emerged from the 1991–92 and 1992–93 years of drought.

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