Drought Monitoring and Information Centre Established for Arid Zone of South Africa

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Drought policy in the Republic of South Africa has been extensively reviewed in *Drought Network News* (Bruwer, 1989; Bruwer, 1990a; Bruwer, 1990b). The protection of natural resources against deterioration (natural vegetation = veld) and the protection of rural communities and infrastructure against disruption of agricultural and socioeconomic development have always been major thrusts behind drought relief subsidies.

Since 1980, two important provisos for drought relief payments to stock farmers have been implemented: (1) a drought must assume *disaster proportions* (Bruwer, 1990b) and (2) stock numbers must not exceed the official carrying capacity (Department of Agricultural Development, 1992).

The pressure on politicians and policy makers to provide additional aid at times of drought—that is, to go beyond previously agreed-on limits—is immense (Smith et al., 1992). This is especially true for the arid zone of South Africa, as was classically illustrated by Bruwer (1990b). Between 1956 and 1985, the greater part of this zone has been declared drought-stricken for more than 50% of the time, compared to the intrinsic occurrence of disaster droughts of less than 30%. This prompted the establishment of the Drought Monitoring and Information Centre (DMIC) at the Grootfontein Agricultural Development Institute in 1992. This center was commissioned to develop scientifically sound drought assessment, detection, monitoring, and management systems for the arid zone.

South African Arid Zone

The arid zone of South Africa is primarily situated in the Northern Cape Province (although portions are also situated in the Western Cape, Eastern Cape, Free State, and Northern Province). Apart from an inherently low rainfall (<300mm per annum), it is also highly variable in temporal distribution. Schulze (1980) categorizes this zone as being mainly desert and poor steppe. The natural vegetation is sparse and constitutes mainly arid shrubland and grassland. It is primarily used for small stock farming.

Activities of DMIC

Land-based drought assessment, detection, and monitoring. As in Australia (White and O'Meagher, 1995), several criteria are applied to determine whether farmers qualify for financial drought relief in South Africa. These criteria include climate (meteorological condition), veld drought condition, livestock condition, and stock water availability (Roux, 1991). Financial assistance for drought-stricken communities will only be considered once the meteorological criterion for disaster drought conditions has been met. This limits the opportunity to assist farmers experiencing human-induced fodder shortfalls.

The DMIC assesses meteorological conditions (spatial and temporal drought intensity and severity) on a monthly basis. Precipitation (1,000 stations) and temperature (50 stations) point data are converted to climate indices by means of the ZA-model of Venter (1992). These point data are then interpolated, categorized into 4 climatic condition classes (disaster drought, subnormal, normal, and wet), and mapped (6'x6' resolution). These monthly maps are distributed to the National Drought Committee, District Drought Committees, Minister of Agriculture, financial institutions, individual farmers, and so forth.

Before implementation, this drought assessment methodology has been discussed with all relevant parties (politicians, policy makers, drought committee members, farmers, extension officers, rural community leaders, organized agriculture, and so forth). It is now generally accepted as a reliable and objective means of assessing the spatial and temporal extent of drought in the arid zone.

Remotely sensed drought assessment, detection, and monitoring. Disputes that arise from land-based assessment of meteorological drought conditions can invariably be attributed to one of three reasons:

1. a specific area is not adequately covered by the existing network of rainfall stations;
2. after a protracted drought, the ZA-model tends to be meteorologically overoptimistic in comparison to the actual recovery of vegetation; and
3. farmers experience human-induced fodder shortages due to overgrazing (see Fouche et al., 1985).

At this point, satellite-based drought assessment technology seems to be the most suitable technology for settling possible disputes. The DMIC is in an advanced stage of developing such technology. For this purpose, NOAA AVHRR imagery is used. The basic methodology entails a process whereby the current reflectance is weighted against a standard reflectance value for a specific homogeneous aridity land class. The departure from this standard reflectance value is then categorized into drought indices.

Drought risk management. According to Bruwer (1989), "for one reason or another, effective countermeasures have not yet materialized [in South Africa], and with the onset of each drought, many land users are seemingly unable to cope with the adverse conditions." Past drought policy never addressed long-term proactive solutions, but was aimed at tiding stock farmers over until the rains came (see, for example, Drought Policy Review Task Group, 1990). The financial assistance given during droughts served as a safety net and did not encourage self-reliance. Therefore, most stock farmers never assumed that drought was part of the normal risk on the farm. Past policy also facilitated high-risk production systems that proved to be profitable and sustainable only in good years. All these factors actually mitigated against one of the primary objectives of drought policy—to protect the veld against deterioration.

The present policy of the government states that farmers must accept drought as a normal risk through their farming and financial management (Department of Agriculture, 1995). The realization that ineffective drought relief schemes actually jeopardize resource conservation was the major thrust behind this new policy.

Since the inception of the DMIC, there has been a realization that much effort should be invested into the synthesis of effective drought risk management systems. The farming community itself shaped the specific route that has been followed. Cavaye (1994), a Queensland cattleman, echoes the precise sentiment of the South African stock farmer: "What farmers require is not more information about weather and climate, but improved analysis of decision processes. Simulation models and expert systems are aptly named decision support systems. They stop before the decision."

The DMIC strategy in drought management support is as follows:

1. Identify, delineate, and map homogeneous drought risk zones.
2. Test and categorize the economic viability of various long-term strategic management options within each homogeneous zone. The objective with long-term strategies is to ameliorate the effects of drought proactively. This includes management options like stocking rate, type of small stock, type of production system, type of veld management system, drought resistant fodder crops, and fodder banks.
3. Test and categorize the economic viability of various short-term tactical management options within each homogeneous zone. Short-term tactics should serve as *release valve*s during progressing drought periods. These tactics include factors like marketing of stock and drought feeding.

Additional methods of risk management could also include the use of long-term climate forecasts. Presently, however, this does not receive much attention from the DMIC, since these forecasts are not yet very reliable over small geographical areas. The benefits also appear to be substantially less than

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anticipated (Bowman et al., 1994), and it could distract farmers from long-term drought management planning.

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