

Indigenous knowledge systems

What can we learn from Karoo farmers about coping with drought?



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Drought is an ever-present threat to the agricultural sector, and is likely to increase in some areas due to high climatic variability and change. What coping strategies can be gleaned from Karoo farmers, who are accustomed to dealing with dry conditions? A Water Research Commission (WRC) project set out to document their knowledge. Article by Sue Matthews.

The 2009 to 2011 drought in the Central Karoo and Southern Cape caused such severe water shortages in some towns that emergency measures had to be implemented. More than 70 new boreholes were drilled, four desalination plants constructed, and innovative solutions for water reclamation put into effect (see the Water Wheel, May/June 2015). In Beaufort West, water 'loadshedding' was introduced as a rationing measure, at least five million litres of tanker water were trucked in, and a nationally broadcast publicity campaign brought donations of bottled water pouring in.

More than R570-million was made available for disaster response, and R495-million of this was used to improve urban water supply infrastructure. But what about the vast areas beyond the towns, where people earn their living from the land? Less than 13.5% of the funding was allocated for drought aid to the agricultural sector, mainly in the form of fodder relief, and that didn't start until February 2011.

Farmers were forced to cope with the situation as best they could, and many of them had prior experience of drought to

draw upon in finding ways to limit their losses. Their knowledge could surely help others in similar situations, and is particularly pertinent in light of the predicted increase in droughts in some areas due to high climatic variability and change.

A recently completed WRC project by researchers from the Cape Peninsula University of Technology (CPUT) sought to identify and capture Karoo farmers' coping practices that might inform future drought adaptation and risk management strategies. The project focused on the municipalities of Beaufort West and Prince Albert in the Central Karoo District, and Oudtshoorn in the Eden District. It involved consultation with 101 farmers and seven extension and Landcare officers, who helped identify farmers from the subsistence, smallholder and commercial groupings.

People cultivating small patches of land behind buildings were considered to be subsistence farmers, but those involved in the project were all teachers or community members who had planted vegetable gardens to benefit others. For example, a nurse began planting vegetables 20 years ago to provide

supplementary nutrition for mothers of premature babies, but over the years the project had grown into a crèche, and the vegetables are now used to feed the children as well as vulnerable members of the community.

Three types of smallholder farmers were identified. While typical smallholders own about two hectares of land and may lease additional land, in the Zoar community seven farmers practice small livestock farming as a group. Each farmer owns up to 80 goats but land, water and three permanently employed herders are shared between them. Then there are the emerging farmers who have benefitted from the government land reform programme. The eight who took part in the WRC project were granted 3 700 hectares of land, on which they rear 200 Angora goats for mohair and 300 sheep for mutton on a communal basis. Having only started farming in 2010, they could certainly learn from other farmers' experience, although they have received some training and technical assistance.

The commercial farmers were successors of family farms that had been in existence since the 1800s. Most were producing fruit such as olives, apricots and prunes for export, or meat for the local market. Due to the decline in ostrich production following the avian influenza outbreak, livestock farmers had become more reliant on sheep and goats in recent times.

In days gone by, many Karoo farmers owned another farm in a wetter area, such as the Free State, and moved their livestock between them on a seasonal basis. This provided some resilience against drought – in fact, the government gave farmers train subsidies to move livestock to unaffected areas during the Karoo's long drought in the 1960s. Those who couldn't afford other farms or transport costs destocked their land instead. This was designed as part of the coping strategies during uncertainty periods.

Nowadays, some farmers still resort to early marketing of livestock to reduce the herd size, while maintaining a breeding

stock until drought conditions abate. The first course of action, though, is to conserve grazing land by rotating livestock between fenced camps. In addition, most commercial farmers routinely grow lucerne as dry-season fodder, and store enough as hay or silage to see them through a few years of drought. If all else fails, they may purchase fodder from neighbours or from further afield, or even buy pellets specifically formulated as drought feed.

During the 2009-2011 drought, the provincial Department of Agriculture approved fodder relief vouchers for more than 2 400 farms, primarily in the Eden District. Interestingly, most Karoo farmers interviewed for the project did not consider it a drought because their farming systems were not seriously affected. These farmers did not consider it as drought but perceived it as part of the normal dry spell or cycle that they experienced throughout the year.

"The Karoo is a naturally dry area, so drought for them is something that occurs over a longer time period – three or four years," explains Principal Researcher of the project, Dr Bongani Ncube. "The Eden District is a wetter area, where the farmers are less able to cope with dry periods."

This is mainly because Karoo farmers at all levels have adapted over the long term to dry conditions. They have focussed on drought-resistant species, such as Angora goats, ostrich or springbok, and some resort to hardy saltbush, prickly pear, agave or mesquite as fodder. They depend on boreholes to tap groundwater, but have also become adept at harvesting rainwater from mountain slopes.

Farmers from the Oudtshoorn area of the Eden District typically have some livestock, but crop production is comparatively more important. Many commercial farmers have adopted modern technology such as soil-water probes, irrigation scheduling software and drip-irrigation systems, although sprinkler systems are still widely used.



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Hardy livestock species, such as Angora goats, are a common sight in the Karoo.

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Subsistence farmers who cannot afford such expensive technology use perforated tin cans or plastic bottles to supply water to root systems, and compost with manure or kitchen waste to improve soil fertility. Of course, farmers at all levels understand the importance of retaining water in the soil by mulching, and using shade-netting where practical. During droughts, they would rely more heavily on boreholes, focus on one crop, or plant and irrigate smaller areas. Fruit farmers might supply just enough water to keep their trees alive but not producing fruit, and concentrate on livestock instead.

Towards the end of the project, a workshop was held to present the findings to the provincial Department of Agriculture and its extension, Landcare and disaster risk management officers. When asked for their opinion on which strategies research should focus upon in order to improve the adaptive capacity of farmers against drought, they identified the following as priorities:

- Planting more drought-resistant fodder plant species
- Research on drought-resistant crops
- Conservation Agriculture
- Long-term early warning and accurate weather/climate forecasts.

The first two are self-explanatory, but Conservation Agriculture is essentially an approach that discourages ploughing, and would therefore be applicable primarily to crop farmers. It advocates minimising soil disturbance, ensuring permanent organic soil cover, and mixing and rotating crops.

Soil tillage, or ploughing, leads to a reduction over the long term of organic matter, which not only provides nutrients for the crop but is also vital for stabilising soil structure. Without ploughing, crop residues remain on the soil surface and provide a protective layer of mulch that reduces erosion and evaporation. Surface runoff decreases while soil porosity increases thanks to the burrowing activity of earthworms and other soil biota, both of which enhance infiltration. Another means of increasing infiltration is basin tillage, a Conservation Agriculture practice promoted to subsistence and smallholder farmers, in which crops are planted in shallow basins dug with hand-held hoes.



Principal Researcher of the WRC project, Dr Bongani Ncube, is both a lecturer within Cape Peninsula University of Technology's Department of Agriculture, and a researcher in CPUT's Centre for Water and Sanitation Research.

With regard to the last bullet, there are already a number of seasonal forecasts available for the region, and their accuracy will no doubt improve as knowledge of ocean-atmosphere interactions increase and predictive models are fine-tuned. Of course, effective dissemination and communication of early warnings is a challenge, but of more concern perhaps is uptake of the information. It takes a leap of faith for farmers to adjust their plans months in advance and risk economic hardship on the basis of a less than convincing probability for drought.

The South African Weather Service (SAWS) distributes the official Seasonal Climate Watch, which incorporates long-range forecasts by SAWS, the CSIR and the International Research Institute for Climate and Society. The early warning unit within the Department of Agriculture, Forestry and Fisheries' climate change and disaster management directorate uses this information for the National Agro-meteorological Committee (NAC) Advisory. This is relevant for the following five months and includes suggested strategies for rainfed crop production, irrigation farming, stock farming and grazing. The provincial Department of Agriculture then summarises information relevant to the Western Cape in a monthly Agri-Outlook.

Taking a more proactive approach, the Western Cape's agricultural and environmental authorities are also engaged in a collaborative endeavour with UCT's African Climate and Development Initiative, called the Smart Agriculture for Climate Resilience (SmartAgri) project, which aims to increase the agricultural sector's ability to cope with shifts in weather patterns due to climate change. It is underpinned by the concept of climate-smart agriculture introduced by the FAO in 2010, which promotes environmentally and socially sustainable ways of increasing agricultural productivity in order to meet food security and development goals, while also adapting to climate change and contributing to mitigation by reducing greenhouse gas emissions.

Furthermore, the disaster risk management section within the provincial Department of Agriculture is in the process of compiling a new Drought Plan for the Western Cape, and the research team for the WRC project is part of the group of stakeholders that will provide input on the plan. Dr Ncube

reports that they have forged close working relationships within the Department of Agriculture, from the Chief Director: Farmer Support and Development, to district managers and extension officers, and the project findings were very well received at feedback sessions. She was subsequently invited to give a presentation to a group of farmers in the Central Karoo District at Beaufort West in early June 2015.

"Feedback sessions were a fantastic opportunity, because when we presented the project findings to the extension officers they kept saying that the farmers could really use this information, particularly the new farmers who don't really know how to cope with the dry environment of the Karoo," she says. "The farmers at the Beaufort West presentation were indeed very receptive, and said they wanted more of this type of information."

"We certainly intend to do some follow-up studies, and will explore the possibilities of doing a research project in conjunction with the disaster risk management officials".

The CPUT team, together with the WRC and the Western Cape Provincial Department of Agriculture are planning to have two information sessions at different study sites before the end of September as part of information sharing and knowledge exchange with government officials and farmers.

To access the report, *Insights into indigenous coping strategies to drought for adaptation in Agriculture: A Karoo scenario (WRC Report No. 2084/1/15)* contact Publications at Tel: (012) 330-0340; Fax: (012) 331-2565; Email: orders@wrc.org.za or Visit: www.wrc.org.za to download an electronic copy.



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