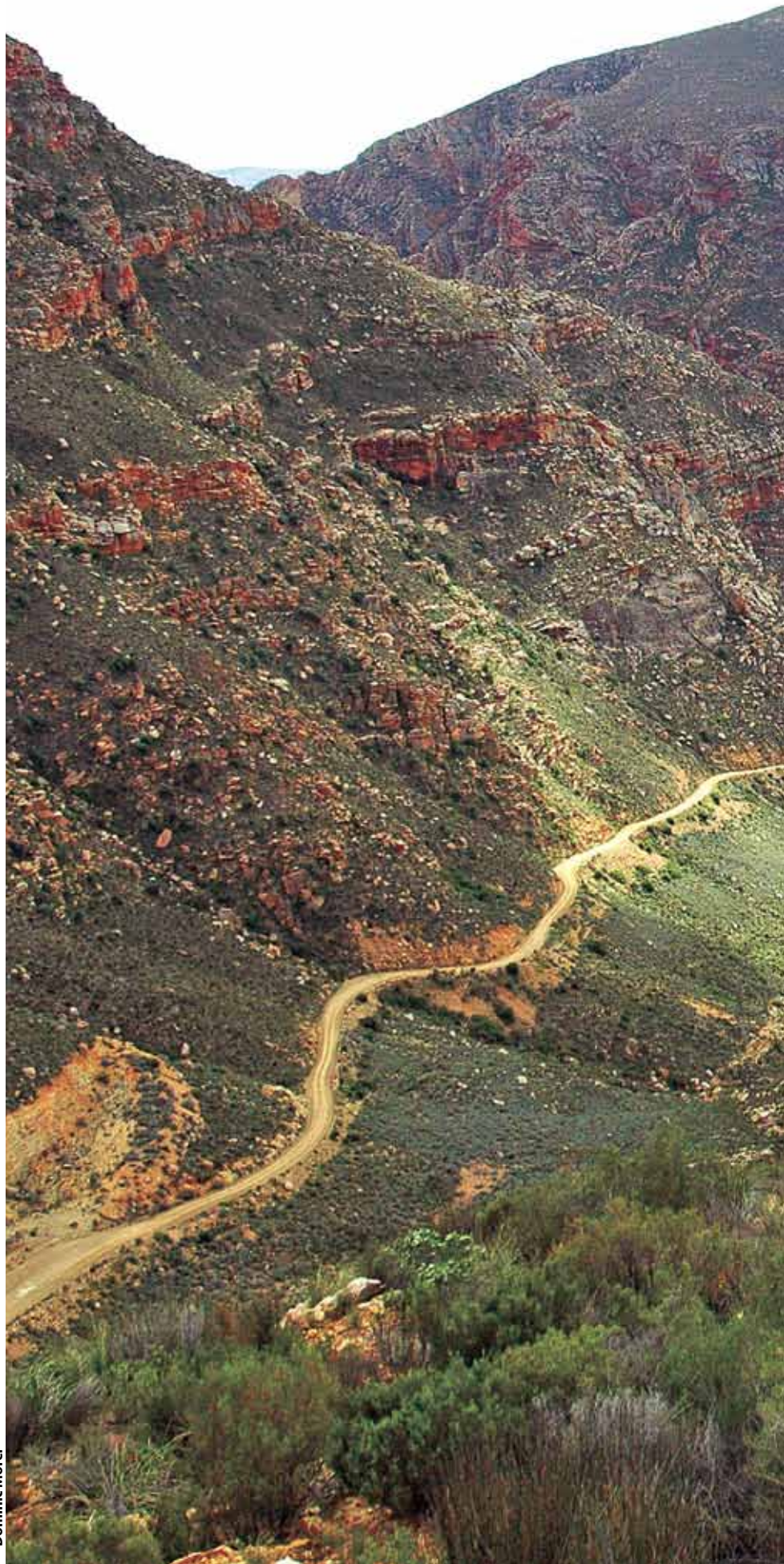


Calls to Improve Water Management in Klein Karoo

*Water resources in the Klein Karoo are reaching a state of severe stress and immediate action is required to ensure adequate water resources remain for the future use of man and the environment. This is according to researchers at CSIR's Natural Resources & the Environment.
Compiled by Lani van Vuuren.*





The Klein Karoo is a long valley bordered by the Swartberg and the Langeberg Mountains in the Western Cape. While the mountains have a relatively high rainfall, the Klein Karoo falls in a rain shadow and only receives 150 mm to 350 mm of rain a year.

The Klein Karoo is an east-west oriented valley in South Africa, located between roughly parallel mountain ranges running along the coast of the Western Cape. In this semi-arid area freshwater is a critical constraint to future economic development. While the mountains have a relatively high rainfall, the Klein Karoo falls in a rain shadow and only receives 150 mm to 350 mm of rain a year.

Despite the importance of water in this area it is difficult to find information on the state of surface and groundwater resources in the Klein Karoo. A CSIR study, led by Dr David le Maitre and published in the January/February 2009 edition of the *South African Journal of Science*, highlighted some key issues affecting the state of natural resources in the region.

There are few perennial rivers in this region, the largest being the Gouritz River, which originates in the Greater Karoo and enters the Indian Ocean at Gouritzmond. The river drains an area of

45 702 km² and is about 260 km long. Its major tributaries are the Groot, Gamka and Olifants rivers. The river and its main tributaries were the focus of the study.

Agriculture is by far the biggest water user in the region (up to 90% in one tributary catchment). Principal land uses in the Klein Karoo include irrigation farming for fodder crops, fruits, vines on alluvial deposits of the floodplains and extensive grazing by small stock and ostrich on the footslopes.

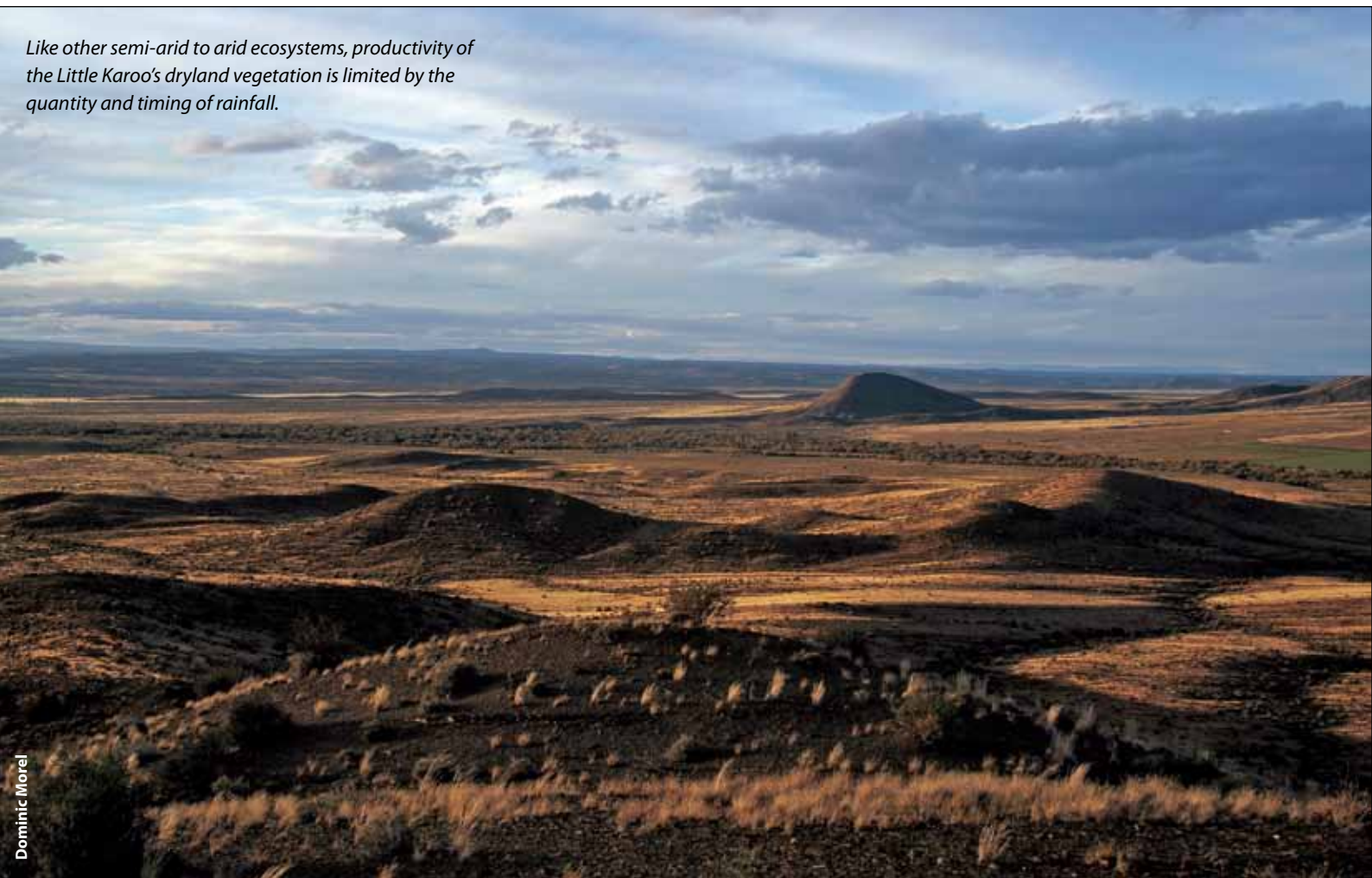
The area has been settled by Europeans since the early 1800s and there is evidence that human activities, particularly overgrazing of drylands and cultivation of alluvial areas, have resulted in hydrological and vegetation changes over large areas of the Klein Karoo. Many of the impacts arise from soil compaction as a result of trampling, which destroys the vegetation and reduces water infiltration.

This means that, when it rains, water flows over the ground rapidly, often

forming channels, which erode the topsoil and increase the silt loads and peak flood volumes in the rivers. Regrowth of vegetation is slow and, even once farms are abandoned, the knock-on impacts on rivers continue. In addition to undergoing physical and chemical changes, the large rivers are increasingly subjected to more extreme and episodic flows due to a combination of increased surface runoff from hillslopes and decreased interflow and groundwater recharge to rivers. Alien vegetation, particularly black wattle and Spanish reed, also reduces the flow and water availability.

Groundwater is an important water source in the area. For example, the Klein Karoo Rural Water Supply Scheme, abstracts groundwater from the Table Mountain Group aquifers to supply the Dysseisdorp to Calitzdorp area. The Klein Karoo is the most sparsely populated region in the country and urban water use for municipalities and industries is generally low.

Like other semi-arid to arid ecosystems, productivity of the Little Karoo's dryland vegetation is limited by the quantity and timing of rainfall.



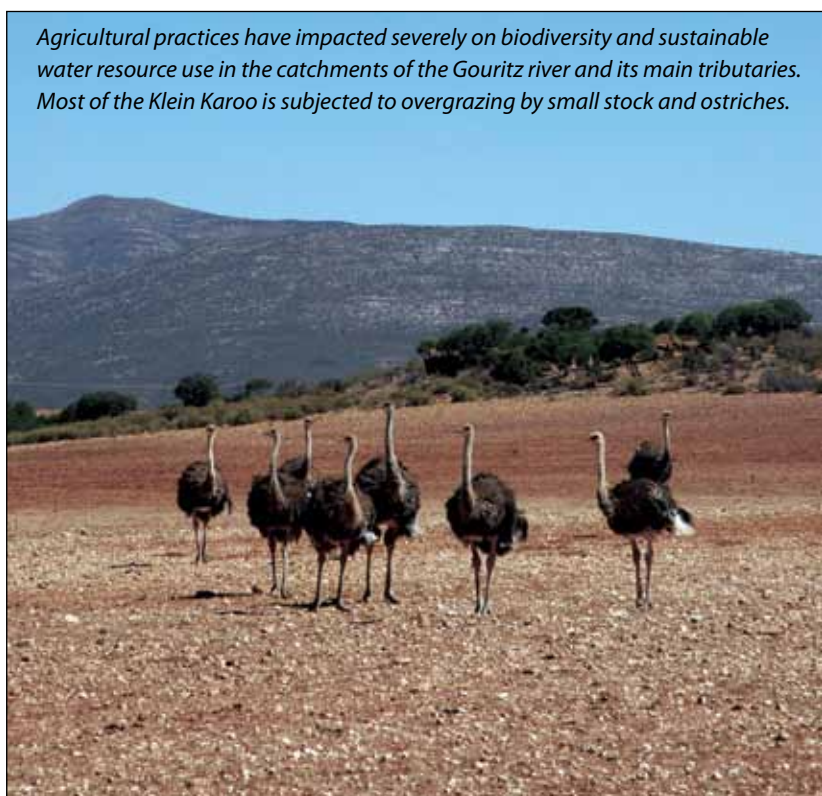
An assessment by the Department of Water & Environmental Affairs shows that the current demand for water in the Gouritz River catchment and those of its main tributaries is 182 million m³/year, which exceeds the available yield. With water demand projected to increase even further change in the approach to water management is required, including improving the efficiency of irrigation and land restoration to improve water infiltration and soil erosion say the researchers.

According to the authors, the high levels of existing demand and use in the region are particularly concerning because of government's present drive to establish new irrigation schemes for formerly disadvantaged farmers and develop the resource base for rural communities. Irrigation farming is seen as the only form of agriculture that is currently economically viable and could be used for this purpose.

"As irrigation is the major water user it is clear that there will have to be a strategy aimed at improving water-use efficiency." One suggestion to achieve this are to ensure that the most efficient technologies are used in both water delivery and application to maximise crop yields while minimising the volume of return flows, and thus, salinisation caused by irrigation. The possibility of changing to crops with a higher water-use efficiency and value should also be assessed.

Also, although water consumption by urban areas is small, the authors say that upgrading of urban water service infrastructure to reduce water losses (through, for example, leakages) could be beneficial at the local scale as well as reduce the volume of water that requires treatment. In addition, making use of managed aquifer storage, including artificial recharge, could reduce water loss through evaporation compared with storage dams.

Another measure advocated is implementing alien vegetation control,



Dominic Morel

Agricultural practices have impacted severely on biodiversity and sustainable water resource use in the catchments of the Gouritz river and its main tributaries. Most of the Klein Karoo is subjected to overgrazing by small stock and ostriches.

particularly in the rivers on the northern slopes of the Outeniqua Mountains and foothills of the Swartberg. Lastly the authors suggest effective landcare programmes exploring the synergies between improving water infiltration, reducing soil erosion and vegetation or crop productivity at small scales, and decreasing sediment loads and increasing sustainable yields at the scale of water supply schemes.

The authors emphasise that although these measures are beneficial and necessary, they are not sufficient. "We believe that it is time to change to a water management approach that is designed to anticipate and manage the inherent variability in water resources in the Klein Karoo, thereby placing the region on a path to sustainable development. The people of the region need to recognise that it is not enough to look at water resources in isolation from land-use practices and human behaviour."

"There needs to be a fundamental rethink of the way the land and water resources of the Klein Karoo are being managed,"

they continue. "This rethink needs to be based on the fact that rainfall is highly variable in space and time with marked multi-year dry and wet cycles superimposed on shorter cycles. The variability in rainfall drives land productivity and the water resources available for irrigation, and thus the economy."

According to the authors the focus should steer away from the use of technology to fix the problem (for example, building more dams) with more attention being paid to living habits within the constraints of the natural systems (rather than despite them). "A good question to start the dialogue might be: If we plan to bequeath our descendants the Klein Karoo, what should we start doing now so that they can inherit it as we would like it to be?"

Whatever action is taken steps should be taken immediately not only for the future of the people of the Klein Karoo and their livelihoods but also for the environment, which provides the ecosystem services on which their livelihoods and well-being depend. 