LOCAL **RISK ATLAS** CAN HELP GOVERNMENT PLANNING

CHRISTINE COLVIN, DAVID LE MAITRE, DALEEN LOTTER

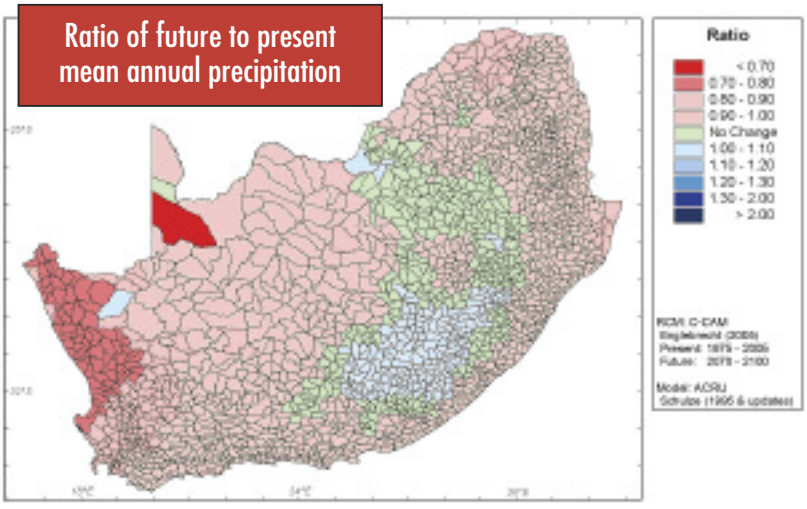
South Africa is a dry country with a mean annual rainfall of about 490 mm (half the world average) of which only 9% is converted to river run-off. The overall impact of climate change on water resources is uncertain, and will vary significantly from place to place within South Africa. The Department of Science and Technology commissioned the CSIR to project manage a SA Risk and Vulnerability Atlas; with key inputs from South African institutions and research groups. This could be an important tool to help local government plan for the most serious risks they face locally.

Expectations are that the whole country will get hotter, particularly inland. This will result in greater evaporative losses from dams, more evaporation from the landscape and a greater risk of algal blooms. Blue-green algae, also called cyanobacteria, are more likely to bloom in warmer water and the toxic and clogging effects of these blooms could have a serious effect on drinking water supply and irrigated agriculture.

We already have maps at a national scale of some of the predicted water resource impacts of climate change (Schulze et al, 2005). Figure 1 shows where rainfall will increase (blue) – in Lesotho and parts of North West and the Eastern Cape Drakensberg – and decrease (pink-red) in most of the rest of the country. Work by the South African Weather Bureau shows that we are already seeing decreases and increases in long-term rainfall trends, which correlate well to these predicted changes (Kruger, 2006).

The nature of rainfall is also expected to change, and we will see an increase in extreme events such as droughts and floods. This will require better disaster management and may have unexpected consequences for available water resources. Sediment erosion may increase and dams are likely to silt up more quickly. Groundwater recharge in semi-arid areas is driven by extreme rainfall events, so if these become more frequent, groundwater recharge may increase.

Figure 1: Predicted future changes in precipitation. (Schulze et al, 2005)



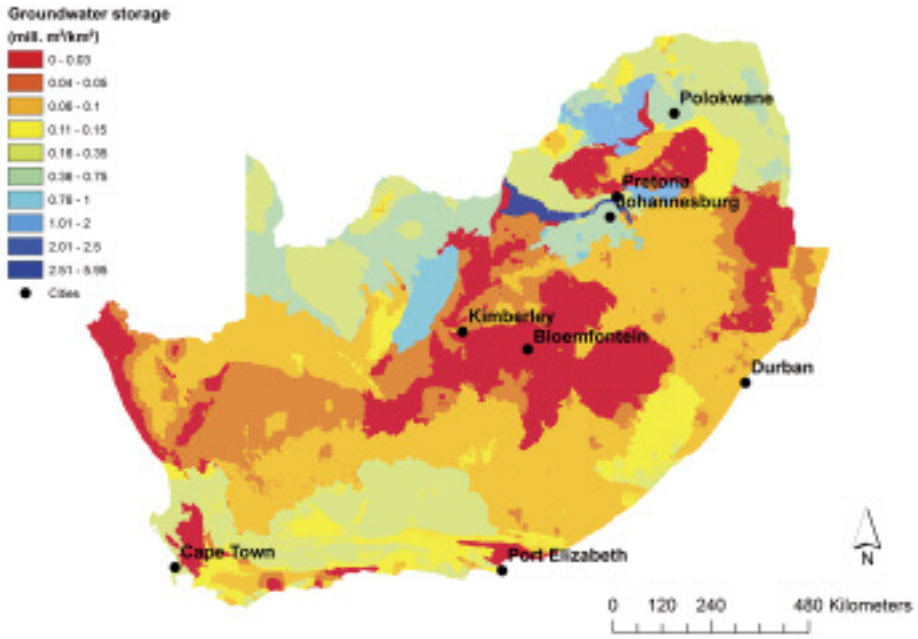
However, we may also see threshold effects with some resources. The rate of groundwater recharge declines exponentially below 500 mm per annum rainfall, so a slight decrease in rainfall could mean a more dramatic decrease in groundwater recharge and less water available in wells and boreholes. These poorly understood non-linear feedbacks in the climate-water system are called 'tipping points' because they can result in dramatic, irreversible changes.

One of the key adaptation strategies for many municipalities will involve better, drought resistant water storage. Currently, South Africa has fairly low levels of per capita storage and we have typically relied on large and medium scale surface water dams. These dams are going to become more vulnerable to losses from evaporation, siltation and contamination from algal blooms and water suppliers will need to diversify their water storage strategies. Most water stored naturally in catch-

David le Maitre

Christine Colvin

Figure 2: Groundwater storage millions of m^3/km^2 (DWAF, GRA 2005)



THE SOUTH AFRICAN RISK AND VULNERABILITY ATLAS

The atlas is aimed at equipping decision-makers with information on the impact and risk associated with global change in the region. It will provide easily understood global change sensitivity and vulnerability information at regional, national, provincial and municipal levels. The atlas will provide an electronic geographical information system and will involve local researchers from various disciplines to continuously update the content with new research. It will capture data related to aspects such as groundwater, surface water, forests, biodiversity, human health, crops, demographics, economics and social dimensions.

The SARVA project is funded by the Department of Science and Technology and is project managed by the CSIR, with key content and technological inputs from South African institutions and research groups.

ments is stored in aquifers underground; therefore groundwater can provide an important buffer against more uncertain rainfall in the future. Figure 2 shows how the amount of groundwater stored in aquifers varies around the country.

The CSIR has also pioneered artificial recharge to groundwater, using aquifers as seasonal stores. This has worked well in the Cape where we have developed recharge basins in Atlantis with the City of Cape Town. Excess storm water from the winter rainy season is captured, treated and infiltrated into the coastal aquifer near the town. The Department of Water and Environment Affairs is now encouraging municipalities to set up managed recharge schemes as part of their long-term integrated water resource planning.

Adaptation to climate change will require an improved understanding of our water balance, water demand management and strengthening engineering and community-based capacity to respond to new water supply challenges.

Enquiries:
Christine Colvin
ccolvin@csir.co.za
David le Maitre
dlemaitre@csir.co.za

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