



# Transboundary water resources in southern Africa

Climate change is playing a significant role in economic and human development and security, much of it mediated through the impact of changes to water resources.

## Water and climate change

The general significance of water resources in development and security is well understood but there is still a lack of detailed information. It is likely that those areas that are already subject to high levels of rainfall variability and water stress may not cope with, or adapt to, the additional pressure of climate change, making the management of the freshwater impacts of climate change a singular development challenge.

Even without climate change, many of the region's water resources are overused, polluted and degraded. Many people living in poverty in rural and informal urban areas are already vulnerable to water-related risks, whether floods, droughts, poor water quality, or increasing water scarcity.

## What the models show

Climate change will affect different parts of the southern African region differently. The predictive models consistently show the region becoming hotter over the next 40 to 80 years. These same models show that the variability and intensity of rainfall in the region will increase. While there is room for more detail, there is broad agreement that, on average, western areas will become dryer and northeastern areas will become wetter.

## Picking up the detail

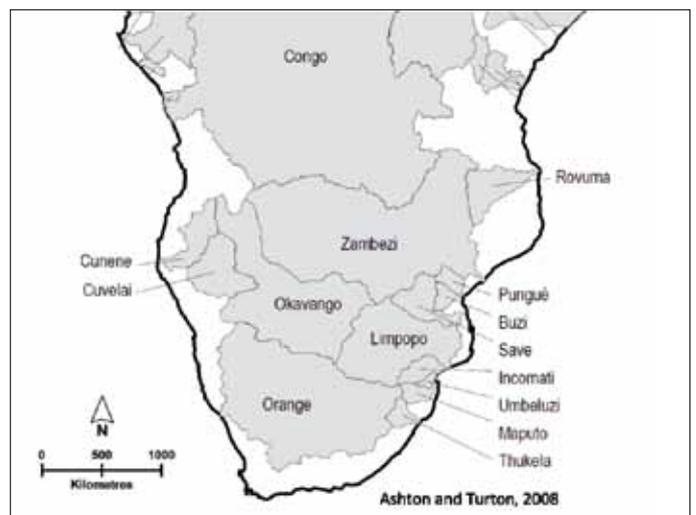
Current models show that the greatest uncertainty around rainfall, and therefore water security, is in the central band from 10° to 30° latitude (south), which contains most of the transboundary basins. This is because of uncertainty around the future dynamics of the intertropical convergence zone and cyclonic activity on the coastal plain.

### Intertropical convergence zone

This is the equatorial region where winds originating in the northern and southern hemispheres converge and which generates most of the rainfall over the river basins in the study.



*The Limpopo River Basin cuts across southern Botswana, most of the northern provinces of South Africa, southern Zimbabwe and central Mozambique. (See Case study overleaf.)*



*Transboundary basins in southern Africa, including the three river basins used as case studies: Okavango, Zambezi and Limpopo.*

|                            |                               |   |   |
|----------------------------|-------------------------------|---|---|
| <b>DEVELOPMENT FUTURES</b> | <i>Integrated development</i> | <ul style="list-style-type: none"> <li>• 6% to 8% growth</li> <li>• 0% to 10% increased rainfall</li> </ul> | <ul style="list-style-type: none"> <li>• 6% to 8% growth</li> <li>• 0% to 15% decreased rainfall</li> </ul> |
|                            | <i>Uneven development</i>     | <ul style="list-style-type: none"> <li>• 3% to 5% growth</li> <li>• 0% to 10% increased rainfall</li> </ul> | <ul style="list-style-type: none"> <li>• 3% to 5% growth</li> <li>• 0% to 15% decreased rainfall</li> </ul> |
|                            |                               | Moderately wetting  | Significantly drying  |
| <b>CLIMATE FUTURES</b>     |                               |   |   |

A climate-precipitation scenario matrix of integrated or uneven development drivers matched against wetter or dryer regional climate drivers to produce climate-development scenarios.

The Regional Climate Change Programme (RCCP) is a five-year programme (2009 to 2014) focusing on the regional impacts of climate change. The four outputs in the programme focus on the scientific basis for understanding the impact of climate change in the region. Output 1 includes water as one of four themes, the others being agriculture and food security, energy and health. A key deliverable in the water component is a strategic transboundary water resources assessment of the impact of climate change on transboundary basins, completed in 2009.

### The transboundary water resources assessment

This report looked not only at the impacts of climate change on transboundary water resources in southern Africa, but also at the development futures of the locations that generate or use water. Predictions for each country vary considerably, based as they are on national development plans, infrastructure development plans, institutional capacity and agricultural planning.

Three major river basins were examined: the undeveloped Okavango River Basin in the west, the industrial Limpopo River Basin in the south and the huge and undeveloped Zambezi River basin in the north, varying from arid to climatically variable.

Four fundamental water themes were developed and explored: environment, human security, livelihoods and economy. At regional level, these themes provide a focus for discussion around the water resource-related implications of climate change for regional/transboundary basin management.

### CASE STUDY: Limpopo River Basin

The Limpopo River Basin cuts across southern Botswana, most of the northern provinces of South Africa, southern Zimbabwe and central Mozambique and is one of the most populated river basins in Africa. The economic drivers are mining, industrial development and large urban centres. Relevant climate/development stories are the environment, flooding, rain-fed agriculture, groundwater, irrigated agriculture and urban and industrial development.

Water is already over-allocated to irrigation in the South African part of the basin, creating problems for downstream users such as Mozambique. Climate is particularly variable and irrigation is crucial to sustainable farming. The strategic imperatives in the South African area are mining and industrial development, which are less affected by possible climate change than agricultural users. Rising temperatures accelerate already declining water quality, creating a significant water quality problem throughout the South African portion, affecting all its rivers and Mozambican water users.

As yet, no transboundary agreements are in place to ameliorate the problem.

### By Arthur Chapman

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