

# ERSA Research Brief

2016

## Confronting South Africa's Water Challenge: A Decomposition Analysis of Water Intensity

By Marcel Kohler

### Introduction

In the face of South Africa's growing water scarcity, water conservation and the effective management of water use should be priority focus areas of water policy in the country. There exists an urgent need to introduce market based incentives to optimise the allocation of scarce water resources between competing uses. These economic incentives should target water-stressed areas with the objective of encouraging a shift of water use from economic activities with low water efficiency values to activities with high water efficiency values.

Unfortunately, under South Africa's previous water legislation, the pricing of water did not take into account either the real cost of managing water, the cost of water supply or the scarcity value of water. The capital costs of government water schemes supplying mainly agricultural water users (and many urban bulk water suppliers and industrial users) were either financed or heavily subsidised by the government. Additionally, operation and maintenance costs were often not fully recovered from these water users.

Ultimately the management of South Africa's water resources should involve using information obtained from an analysis of water use intensity to design and develop policies to help allocate water to its most productive use, whilst maintaining ecosystem functions, human well-being and social equity. The difficulty lies in the implementation of policies that encourage users of water within the country to use water in a manner reflective of its scarcity value. Such policies will help South Africa achieve the required water savings with minimal disruption to the economy. The set of policy solutions includes both technical improvements to increase supply as well as measures to reduce the intensity of water use.

### Results

The regression analysis undertaken as part of the study on economy wide water use intensity has shown that in the long run, water use in the economy of South African is related to the capital stock. It appears that the rise in the water to output ratio in the mid-1980s and early 1990s was due almost entirely to falls in output. (The regression result for the intensity (technical) effect equation picks up this relationship via capacity utilization, which was low in this period.) If as the regressions analysis suggests, namely that water use generally reflects the level of capital stock, this would support the view that the fixed component of water use is relatively high. In other words water use in economic activities is related to the machinery, equipment and infrastructure that is in operation, rather than being simply a function of the output that is being generated. An interesting feature of the long run equation is the coefficient on the capital stock, which at 0.963,

is less than 1. This implies that a 1 percent rise in the capital stock will be accompanied by a 0.96 percent rise in water use. The analysis indicates that the capital stock is getting more water efficient over time, but that this change is gradual. The study thus suggests that in the longer run it is the relationship between water and the economy's capital stock that has to be changed, if South Africa is to become more water wise. The regression analysis furthermore suggests that monitoring South Africa's water/output ratio, and drawing strong conclusions from this regarding changes in water use intensity, is fraught with difficulties.

### **Policy Recommendations**

The study recognizes that markets and water prices are not necessarily the ideal mechanism for distributing an essential good such as water. Water authorities in South Africa may have sound reasons for using other allocation mechanisms which include the need to ensure that ecosystems have adequate water to function and deliver services. Only after adequate water resources are made available to meet basic human needs and to safeguard ecosystem health should water be allocated for other uses within the economy based upon the concept of water productivity. It is recognised though that regulatory mechanisms including: monitoring, volumetric metering and enforcement of legal limits on water use and pollution are often costly and varies in its efficacy due to inaccurate information between regulators and water users. The study supports the use of a combination of approaches to water resource management, including information-based tools such as labeling and the education of producers and consumers. Operating together, the mixture of water resource management tools should incentivise innovation and the adoption of new processes and technologies, reducing the intensity of water use across all sectors of the economy, thereby assisting policy makers to decouple water use and its impact on South Africa's economic growth.