

Assessing the costs and benefits of water use for production and the potential of water demand management in the Crocodile Catchment of South Africa

By

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EXECUTIVE SUMMARY

In South Africa, precipitation is extremely variable and water is scarce. South Africa is also a country with great welfare needs. Challenging economic development targets and plans therefore need to be implemented successfully within the constraints of limited water supply and unreliable water availability. These economic development plans are underpinned by the development and growth of economic activities such as agriculture, mining, energy production and many types of small, medium and micro enterprises, which are some of the largest water using sectors in the economy. Within these activities, increased competition places pressure on water users to keep supplying their markets with competitively priced goods, while rising costs of new water supplies puts pressure on water users to allocate sufficient water to their production processes. These market forces and the relative scarcity of water as an economic production factor, impact on financial viability and imply that the economic efficiency of water use becomes increasingly important.

The National Water Act of 1998 (NWA) is a legislative response to this situation, and promotes a radical shift towards efficiency and equity goals in water allocation. Water users who require water as an input to economic activities are consequently seriously revising their water use patterns in response to one of the major implications of the NWA and its related principal strategy: **water demand**

management. Water demand management strives to adhere to the principles of equity, social justice, economic efficiency and environmental sustainability, which are central to the NWA.

This study evaluates the costs and benefits of water use in order to simulate the effects of water demand management activities on a catchment economy. The results of a number of studies were combined to generate an economy-wide model: a Social Accounting Matrix (SAM), for the case study area and to simulate the direct and indirect effects of water demand management on the people, the economy and the natural environment in the area. Water demand management (WDM) is defined as consisting of two phases. In the first phase, goals of full cost recovery, improving water use efficiency and allocating water optimally are targeted. The second phase of WDM arrives when a situation of absolute water scarcity is reached within a catchment. In this phase water demand outweighs water supply and water has to be allocated according to its scarcity value. Water markets play a large role here.

The SAM was used to simulate the direct and indirect impacts on the economy and the environment of a number of WDM related scenarios. Water re-allocation decisions and the effects of various WDM policy instruments, such as reduction of water use subsidies and increases in water tariffs were simulated. Unintended consequences of other environmental policies on water use, in this case, carbon tax, were explored. Water scarcity predictions were done, and some of the transaction costs involved in water trading was quantified.

The study concludes with a discussion on the indirect effects on the economy, the environment and people of changes affecting the agricultural (including forestry) activities. The direct and indirect impacts of WDM policies on the economy and the environment, and the importance of environmental-economic models in water cost benefit modelling are also discussed. Implications for policy and management are highlighted.

This study shows specifically how, through modelling various scenarios, policy decisions aimed at managing specific variables (e.g. water use, carbon emissions) have an economic and environmental impact much wider than the sector in which the

policy was targeted for. Each scenario shows how a water transaction, or a change in subsidy in the agricultural (including forestry) sector, could impact on the output of other economic sectors, and therefore the economy as a whole. It is therefore evident that policy decisions, which are implemented at a macro level, and could have a major direct impact on a wider range of economic sectors, should be carefully considered as they could have large, undesirable, unintended consequences.

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ACRONYMS and ABBREVIATIONS

CMA	Catchment Management Agency
CMC	Catchment Management Charge
DWAF	Department of Water Affairs and Forestry
GDP	Gross domestic product
GGP	Gross geographic product
I-O	Input-Output
MAI	Mean Annual Increment
MAR	Mean Annual Runoff
MAP	Mean Annual Precipitation
NWA	National Water Act (No 36 of 1998)
NWPS	National Water Pricing Strategy
RANESA	Resource Accounting Network of Eastern and Southern Africa
RSA	Republic of South Africa
SAAU	SA Agricultural Union
SAM	Social Accounting Matrix
SIC	Standard Industrial Classification
VAD	Value Added
WC/DM	Water Conservation & Demand Management
WDM	Water Demand Management
WMA	Water Management Area
WUA	Water User Association