Agricultural Economics Society

97th Annual Conference 2023

Full Programme

The University of Warwick

Check out our Twitter account @AgEconSoc. Feel free to Tweet your experiences at the Conference using #AES_2023.

WARWICK
THE UNIVERSITY OF WARWICK

JAE Journal of Agricultural Economics

EuroChoices

Hydroeconomic Modelling for irrigated Agriculture Water Use in the Riviersonderend-Berg River Basin, South Africa

Ifedotun Victor Aina [a,b,*], Djiby Racine Thiam [a,b] and Ariel Dinar [c]

[a]School of Economics, University of Cape Town, Rondebosch, South Africa
[b]Water and Production Economics Program, University of Cape Town, Rondebosch South Africa
[c]School of Public Policy, University of California, Riverside, USA

Abstract

This paper presents the development of an integrated hydroeconomic model for a large water system in which urban and agricultural sectors are the dominant water users, and climate change presents a major environmental challenge. The purpose of this model is to analyze the potential effects of different institutional scenarios and policy interventions on the environment and the regional economy, under varying water availability conditions. Our approach involves replicating base water use and environmental flow conditions in order to build the capacity to adapt to future climate-related water stresses. The modelling framework integrates hydrology, economics, climate stress, infrastructure constraints and institutional water supply decisions to address water stress variability. We analyze the effects of two water allocation policies, namely, water markets and proportional sharing. The results show the enhancement of economic benefits that can be achieved when high-valued water users are prioritized in the study area. We find that irrigated regions growing large quantities of higher valued crops such as fruit trees, maize and tobacco bear a smaller percentage of shortages than those with lower-valued crops as climate stress intensifies. This study informs strategies for water resource management in South Africa and many arid regions, given the imminent climate change impacts on water availability in coming decades.

Keywords: Hydroeconomic modelling, climate adaptation, water policy, urban water demand, agricultural water demand

JEL Codes C61, N54, Q15, Q25, Q54, Q58

* Corresponding author Email: anxife002@myuct.ac.za (Aina, Ifedotun Victor)