

**The ecological economics of inter-basin water transfers: The
Case of the Lesotho Highlands Water Project**

by

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Dedication

To my beloved husband, Nkau and lovely kids, Ntšepase and Mabilikoe

Declaration

I declare that the thesis, which I hereby submit for the degree of PhD in Agricultural Economics at the University of Pretoria, is my own work and has not previously been submitted by me for a degree at another university.

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ABSTRACT

This study developed a general framework that can be applied to integrating environmental sustainability aspects into economic development planning in the case of exploiting water resources through inter-basin water transfers (IBWT). Using the Lesotho Highlands Water Project (LHWP) between Lesotho and South Africa (SA), the study used the multi-country ecological social accounting matrix (MC-ESAM) for Lesotho and SA to integrate ecological implications of the LHWP with the economic benefits of the project. The study further used the developed MC-ESAM multipliers to analyse the impact of lost ecological services downstream the LHWP dams in Lesotho on the wellbeing of households directly affected by the project in Lesotho and the general economies of Lesotho and SA. The MC-ESAM multipliers were also used to analyse different policy scenarios aimed at compensating affected households in Lesotho for ecological losses.

The results revealed that while the LHWP has significant direct and indirect benefits in terms of social and economic development in Lesotho and SA, the project has serious unintended impacts on ecological resources and services, with resultant deleterious wellbeing implications for populations residing within the reaches of the LHWP rivers and downstream the LHWP dams in Lesotho. The results from the MC-ESAM multiplier analysis indicated that not only the income of populations directly affected by the project

in Lesotho is likely to fall, but also that of other households and social groups, as well as the general economies of Lesotho. Also, because of economic dependence of Lesotho on SA in terms of imports, SA will also loose.

The policy simulation results showed that compensating the ecological losses would greatly improve the welfare of directly affected populations and the rest of Lesotho economy. The empirical analysis and policy simulations results showed relatively small impacts in general, but were significant for groups of people directly affected by the project in Lesotho. The study demonstrated the importance of integrating ecological consequences into impact assessment of IBWT before such transfers can be implemented to ensure Pareto optimality and of considering economy-wide impacts and multi-sector, multi-country linkages associated with IBWT for a holistic impact assessment of IBWT.

Keywords: *Lesotho Highlands water project (LHWP), ecological social accounting matrix (ESAM), Interbasin water transfers (IBWT), human wellbeing, Lesotho, South Africa*

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GLOSSARY OF ACRONYMS

EIA	Environmental Impact Assessment
BOD	Biochemical Oxygen Demand
BOS	Bureau of Statistics
CGE	Computable General Equilibrium
COD	Chemical Oxygen Demand
CSIR	Center for Scientific and Industrial Research
CVM	Contingency Valuation Method
DBSA	Development Bank of Southern Africa
DWAF	Department of Water and Forestry
ESAM	Ecological social accounting matrix
GDP	Gross Domestic Product
GGP	Gross Geographic Product
IFR	Instream Flow Requirements
I-O	Input-Output
IBWT	Interbasin Water Transfers
LFCD	Lesotho Fund for Community Development
LHDA	Lesotho Highlands Development Authority
LHWP	Lesotho Highlands Water Project
LHWRF	Lesotho Highlands Water Revenue Fund
LMC and OSC	Lahmeyer Macdonald Consortium and Oliver Shand Consortium
MACROSAM	Macro-economic social accounting matrix
MEA	Millennium Ecosystem Assessment
MC-ESAM	Multi-country-Ecological social accounting matrix
MC-SAM	Multi-county-social accounting matrix
MICROSAM	Micro-economic social accounting matrix
MW	Mega Watts
NH_4^+	Ammonium ion
OVTS	Orange Vaal transfer scheme
PWV	Pretoria, Witwatersrand and Verreniging
PAR	Population at risk
RSA	Republic of South Africa
SA	South Africa
SACU	Southern African Customs Union
SAM	Social accounting matrix
SARS	South African Revenue Services
SEEA	System of integrated environmental and economic accounting
SNA	System of National Accounts
TCTA	Trans-Caledon Tunnel Authority
TEV	Total Economic Value
VAD	Value-Added
VAT	Value-Added-Tax
WTA	Willingness to Accept
WTP	Willingness to Pay