A SOCIAL-ECOLOGICAL SYSTEMS PERSPECTIVE ON WATER MANAGEMENT IN SOUTH AFRICA

by

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A social-ecological systems perspective on water management in South Africa

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Abstract

Conventional approaches to water management have traditionally treated social systems and ecosystems as distinct, and to a large degree have failed to achieve outcomes that are simultanously efficient, equitable, and sustainable. Perhaps nowhere has the need to reform the way water is managed and even conceived been more apparent than in South Africa in the last decade, where a tremendous opportunity for change has been created in the form of the National Water Act of 1998. In this thesis I propose that water management in South Africa – which encompasses its water resources, ecosystems and their services, people they support, and institutions that govern them – is a social-ecological system: a coupled, inseparable system of human beings and nature. Using a combination of approaches, I demonstrate that a social-ecological systems perspective is needed to understand the true nature of these challenges. First, drawing from the experience of the Southern African Millennium Ecosystem Assessment (SAfMA), I construct and apply a framework for evaluating past water management responses. Second, I review a scenario planning exercise as an approach for identifying robust decisions amid high levels of uncertainty about future ecosystem services. Third, I use an agent-based model to explore the evolution of decision-making and learning by water managers under alternative paradigms. Lastly, I compare the ability of two existing frameworks to increase understanding of resilience as it applies to South African water management. Results of this work indicate that: congruence of impacts, awareness, and power is key to achieving effective water management in South Africa; future water management planning needs to take account of cross-scale trade-offs; decentralisation holds most promise when supported by a national policy framework but which allows for local learning; learning may be constrained by temporal variability, water stress, access to learning

networks, and use of inappropriate indicators; and the concept of resilience may provide a mechanism for uniting social and ecological research on water management. As most past water management failures have resulted from a misunderstanding of social-ecological system dynamics, work of this kind can make a significant contribution at this pivotal point in South Africa's water management history.

Declaration

I, the undersigned, hereby declare that this thesis, submitted for the degree of Doctor of Philosophy (Environmental Ecology), is my own and original work except where acknowledged. This work has not been submitted for a degree at any other tertiary institution.

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Erin L. Bohensky

Disclaimer

This thesis consists of a series of chapters that have been published in, or prepared for submission to, a range of scientific journals. As a result formatting styles differ and overlap may occur to secure publishable entities.

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