



Enhancing Water Security through Restoration and Maintenance of Ecological Infrastructure: Lessons From the uMngeni River Basin, South Africa

Graham Jewitt^{1,2,7}, Catherine Sutherland³, Sabine Stuart-Hill^{2,4}, Jim Taylor^{2,5}, Susan Risko², Patrick Martell³, and Michelle Browne⁶

¹IHE Delft Institute for Water Education, IHE Delft Institute for Water Education, Dept. of Water Resources and Ecosystems, Delft, Netherlands (g.jewitt@un-ihe.org)

²Centre for Water Resources Research, University of KwaZulu-Natal, South Africa

³School of Development Studies, University of KwaZulu-Natal, South Africa

⁴University of Koblenz-Landau, Germany

⁵Wildlife and Environment Society of South Africa

⁶Institute for Natural Resources, South Africa

⁷Department Water Management, Faculty of Civil Engineering and Geosciences, Delft University of Technology, Netherlands

The uMngeni River Basin supports over six million people, providing water to South Africa's third largest regional economy. A critical question facing stakeholders is how to sustain and enhance water security in the catchment for its inhabitants. The role of Ecological Infrastructure (EI) (the South African term for a suite of Nature Based Solutions and Green Infrastructure projects) in enhancing and sustaining water and sanitation delivery in the catchment has been the focus of a project that has explored the conceptual and philosophical basis for investing in EI over the past five years.

The overall aim of this project was to identify where and how investment into the protection and/or restoration of EI can be made to produce long-term and sustainable returns in terms of water security assurance. In short, the project aimed to guide catchment managers when deciding "what to do" in the catchment to secure a more sustainable water supply, and where it should be done. This seemingly simple question encompasses complexity in time and space, and reveals the connections between different biophysical, social, political, economic and governance systems in the catchment.

Through the study, we highlight that there is an interdependent and co-constitutive relationship between EI, society, and water security. In particular, by working in spaces where EI investment is taking place, it is evident that socio-economic, environmental and political relations in the catchment play a critical role in making EI investment possible, or not possible.

The study inherently addresses aspects of water quantity and quality, economics, societal interactions, and the governance of natural resources. It highlights that ensuring the availability and sustainable management of water resources requires both transdisciplinary and detailed

biophysical, economic, social and development studies of both formal and informal socio-ecological systems, and that investing in human resources capacity to support these studies, is critical. In contrast to many projects which have identified this complexity, here, we move beyond identification and actively explore and explain these interactions and have synthesised these into ten lessons based on these experiences and analyses.

- 1 - People (human capital), the societies in which they live (societal capital), the constructed environment (built capital), and natural capital interact with, and shape each other
- 2 - Investing in Ecological Infrastructure enhances catchment water security
- 3 - Investing in Ecological Infrastructure or Built/Grey infrastructure is not a binary choice
- 4 - Investing in Ecological Infrastructure is financially beneficial
- 5 - Understanding history, legacy and path dependencies is critical to shift thinking
- 6 - Understanding the governance system is fundamental
- 7 - Meaningful participatory processes are the key to transformation
- 8 - To be sustainable, investments in infrastructure need a concomitant investment in social and human capital
- 9 - Social learning, building transdisciplinarity and transformation takes time and effort
- 10 - Students provide new insights, bring energy and are multipliers