

Student Reports

Uncertainty Analysis for Strategic Monitoring in Complex Transboundary Ecological Systems

ANNA CATHEY

The Okavango Basin is a large transboundary watershed located in southern Africa that is shared between three countries: Angola, Namibia, and Botswana. River flow in the basin originates in the Angolan headwaters, then continues through a sliver of land in arid Namibia, and finally empties into the Okavango Delta, located in Botswana. This water never finds the sea but instead spreads out over the flat alluvial fan that is the Okavango Delta and is evaporated on the border of the Kalahari desert. The Okavango Basin is one of the most pristine watersheds in southern Africa.

The transboundary nature of the basin complicates the management of the resource. This work involves a study within the framework of the adaptive management of complex transboundary hydrologic systems to identify gaps in knowledge that are important for the management of the system and then communicate this uncertainty through a participatory process. We believe that this technique will encourage management to develop strategic monitoring plans to decrease the uncertainty in the system. First, we will conduct an uncertainty analysis on the hydrologic models in the Okavango system. Second, we will involve participants throughout this process to communicate these issues of uncertainty. We have partnerships with both scientists at the University

of Botswana and with managers in the Okavango system that will facilitate these participant interactions. Finally, we will evaluate the success of the study by tracking perceptions about acknowledging uncertainty among managers and behavioral intent to develop strategic monitoring programs that decrease gaps in knowledge.

The work will produce both immediate impacts for the Okavango Basin as well as broadly applicable knowledge in the fields of uncertainty analysis and adaptive management. Theoretically adaptive management is an attractive concept. However, operationally a great deal of apprehension persists about acknowledging the uncertainty that adaptive management embraces. This research involves the development



and testing of a conceptual design that couples uncertainty analysis with a participatory process to both strategically close gaps in knowledge and promote the acceptance of uncertainty within management. The outcome of this research may extend beyond the Okavango Basin to provide a theoretically persuasive and operationally functional method for incorporating uncertainty analysis into an adaptive decision framework.

Anna Cathey is a doctoral student in the Department of Agricultural and Biological Engineering. She received funding from the NSF-funded Adaptive Management: Wise Use of Waters, Wetlands, and Watersheds (AM-W3) IGERT program.