C03 Special Session: Ecosystems and their Services in the Nexus

SESSION CHAIR(S)
Claudia Ringler

ROOM
Saal Reger

DATE
Monday, May 19
15:30 – 17:00

INSTITUTION
CGIAR Research Program on Water, Land and Ecosystems (WLE)

1 Tracy Baker (*International Water Management Institute, Addis Ababa, Ethiopia)*
» Incorporating gendered landscapes into physically-based models via Participatory 3-D Mapping

2 Guillaume Lacombe *(International Water Management Institute, Vientiane, Lao PDR)*
» Simple power-law models to predict flow metrics for water resource and risk management along the Mekong tributaries

3 Martin Volk *(Helmholtz Centre for Environmental Research (UFZ), Department of Computational Landscape Ecology , Leipzig, Germany)*
» *Ecosystem services and river basin models*

4 Hua Xie *(International Food Policy Research Institute, Washington D.C., the United States)*
» Implications of socio-economic development and climate change on water quality – a global assessment

SUMMARY

Ecosystem services are especially important for millions living in rural communities in developing countries. Many rural communities depend directly on a range of ecosystems services for their livelihoods and well-being and, due to isolation and a paucity of resources, may have few substitutes or alternatives to the services provided by ecosystems if they are lost or degraded. However, even where "rich" in ecosystem services many of these people remain mired in poverty with few opportunities to improve their wellbeing. Economic development is needed to improve their livelihoods. This has traditionally been achieved by significantly altering ecosystems to provide food and energy services. However, these changes can affect other ecosystem services, often resulting in unintended, negative consequences for those dependent on them. Hence, in the past, poor people have often paid the price of development. A key challenge for the water-energy-food nexus is to understand exactly how ecosystem services contribute to poverty reduction and how development can be achieved in ways that are sustainable and do not undermine vital ecosystem services. This session will comprise presentations from researchers contributing to the CGIAR Water Land and Ecosystems (WLE) program, which addresses this fundamental issue.

C03 Abstracts

1 Tracy Baker, Liza Debevec, Yenenesh Abebe, Beth Cullen

Biophysical scientists struggle integrating „gendered" water uses into models, with the latter necessarily based on physical laws describing water movement through the hydrological cycle. We typically assess watershed hydrological response to land management in terms of biophysical response. We may then loosely couple this to socio-economic variables. Results often present an incomplete picture of people's needs. Traditional methods used to describe socio-economic aspects of communities are not well-suited for inclusion directly into biophysical models. Scenario development supported by socio-economic data may be employed to account for agricultural productivity, land management, and water allocation within biophysical models. To address this, a simple methodology is being tested to incorporate gendered perceptions into biophysical assessments of water resources. A small watershed (Jeldu, Ethiopia) is used as a case study to generate gender differentiated three-dimensional landscape representations that are then georeferenced into ArcGIS. A spatial analysis and interpretation of men's versus women's identification and use of water resources is carried out, and the land use maps are used as the principal land use input for the Soil and Water Assessment Tool (SWAT).

2 Guillaume Lacombe, Somphasith Douangsavanh, Richard Vogel, Matthew McCartney, Yann Chemin

Lisa Rebelo, Touleelor Sotoukee

Increasing demographic pressure, economic development and resettlement policies in the Lower Mekong Basin induce greater population dependency on river flow to satisfy growing domestic and agricultural water demands. This dependency is particularly tight in upland areas where alternative water resources (groundwater) are scarce. As a result, communities tend to live closer to rivers, and so are more vulnerable to floods. This situation requires improved knowledge of flow variability for better management of water resources and risks. Unfortunately, stream flow measurements are scarce, especially in remote areas inhabited by the poorest and most vulnerable populations. Several water resource models have been developed to simulate and predict flows in the Lower Mekong Basin. However, most of these models have been designed to predict flow along the Mekong mainstream, precluding accurate assessments in headwater catchments. In most cases, their complexity and lack of transparency restricts potential users to modelling experts, and largely excludes those practitioners working closely with affected populations. The most integrated and informative way to characterize flow, at a specific location on a river, is to compute a flow duration curve which provides the percentage of time (duration) any particular flow is exceeded over a historical period. Using hydro-meteorological records from more than 60 gauged catchments in the Lower Mekong Basin, and a 90-meter digital elevation model, we used multiple linear regressions to develop power-law models predicting flow duration curves. These simple equations allow assessment of low, medium and high flow metrics, at any point on rivers in the Lower Mekong Basin, using easily determined geomorphological and climate characteristics. We believe that this parsimonious, transparent and highly predictive tool (89% <R2< 95%) can be used by a wide range of practitioners working in the fields of livelihood, water infrastructure engineering and agriculture. Acknowledgments: this analysis has been undertaken as part of the project „Natural and Built Infrastructures: ecosystems and flow" funded by the Water, Land and Ecosystems CGIAR research program.

3 Martin Volk

This presentation will describe key ecosystem services related to water and land resources and which ones can and which ones cannot be modeled with typically available river basin models such as SWAT. The panel will discuss applicability to the case studies presented during the session and identify incipient ecosystem service protocols for such modeling system.

4 Hua Xie, Gauthier Pitois, Claudia Ringler

Water quality is affected by emissions of pollutants from various socio-economic activities and has becomes a global problem. We present first set of results from our global water quality modeling study. The study focuses on assessing impact of socio-economic development and climate change on emissions of nitrogen of phosphorous from land systems to aquatic