



Integrating science, policy and stakeholder perspectives for water resource management

Emily Barbour (1), Andrew Allan (2), Paul Whitehead (3), Mashfiquis Salehin (4), Attila Lazzar (5), Michelle Lim (6), and Md. Munsur Rahman (7)

(1) School of Geography and the Environment, University of Oxford; emily.barbour@ouce.ox.ac.uk, (2) Centre for Water Law, Policy and Science, University of Dundee; A.A.Allan@dundee.ac.uk, (3) School of Geography and the Environment, University of Oxford; paul.whitehead@ouce.ox.ac.uk, (4) Institute for Water and Flood Management, Bangladesh University of Engineering and Technology; mashfiquissalehin@iwfm.buet.ac.bd, (5) Engineering and the Environment, University of Southampton; A.Lazar@soton.ac.uk, (6) Centre for Water Law, Policy and Science, University of Dundee; m.lim@dundee.ac.uk, (7) Institute for Water and Flood Management, Bangladesh University of Engineering and Technology; mmrahman@iwfm.buet.ac.bd

Successful management of water resources requires an integrated approach considering the complex relationships between different biophysical processes, governance frameworks and socio-economic factors. The Ecosystem Services for Poverty Alleviation (ESPA) Deltas project has developed a range of socio-economic scenarios using a participatory approach, and applied these across different biophysical models as well as an integrated environmental, socio-economic model of the Ganges-Brahmaputra-Meghna (GBM) Delta. This work demonstrates a novel approach through the consideration of multiple ecosystem services and related socio-economic factors in the development of scenarios; the application of these to multiple models at multiple scales; and the participatory approach to improve project outcomes and engage national level stakeholders and policy makers.

Scenarios can assist in planning for an uncertain future through exploring plausible alternatives. To adequately assess the potential impacts of future changes and management strategies on water resources, the wider biophysical, socio-economic and governance context needs to be considered. A series of stakeholder workshops have been held in Bangladesh to identify issues of main concern relating to the GBM Delta; to iteratively develop scenario narratives for business as usual, less sustainable, and more sustainable development pathways; and to translate these qualitative scenarios into a quantitative form suitable for analysis.

The combined impact of these scenarios and climate change on water quantity and quality within the GBM Basin are demonstrated. Results suggest that climate change is likely to impact on both peak and low flows to a greater extent than most socio-economic changes. However, the diversion of water from the Ganges and Brahmaputra has the potential to significantly impact on water availability in Bangladesh depending on the timing and quantity of diversions. Both climate change and socio-economic scenarios are likely to impact on water quality.

This work provides the foundation for investigating the effects of different policy and management interventions in coastal Bangladesh, and exploring trade-offs between different water resource objectives, and other ecosystem, social or economic objectives.