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Summary

Water security means having sufficient water, in quantity and quality, for the needs of humans (health, livelihoods and productive economic activities) and ecosystems, assessed by the capacity to access and use it, solve trade-offs, and manage water-related risks, including floods, droughts and pollution (Mason and Calow, 2012)¹. According to Vörösmarty et. Al. (2010)², nearly 80% of the world's population is exposed to high levels of threat to water security.

Although many existing case studies are intriguing, green-grey analysis (GGA) is in still its infancy and has yet to permeate public infrastructure investment decisions. While calculating the costs and benefits of grey infrastructure is relatively straightforward, placing analysis of green infrastructure costs and benefits on equal footing has not yet been formalized.

In this context, the present research proposal intends to develop a temporal and spatial green-grey investments modelling in order to optimize the water security actions in a river basin. The modelling will consider dynamic optimization and control theory. The objective is to minimize the costs of non-increasing threats to water security, choosing the optimal economic combination of investments in green and grey infrastructure. The proposal considers the application of the methodology in a Brazilian river basin and in an Australian watershed also.

¹Mason, N. and Calow, R., Water security: from abstract concept to meaningful metrics: an initial overview of options. Working Paper 357. Results of Overseas Development Institute research presented in preliminary form for discussion and critical comment. London, 2012.

²Vörösmarty, C. J., McIntyre, P. B., Gessner, M. O., Dudgeon, D., Prusevich, A., Green, P., Glidden, S., Bunn, S. E., Sullivan, C. A., Liermann, C. R. and Davies, P. M. Global Threats to Human Water Security and River Biodiversity. In: Nature, Vol. 467, doi:10.1038/nature09440, 2010.

Research Expertise

- Water resources planning and management
- Spatial analysis of socioeconomic and sanitation indicators
- Hydrology