Geophysical Research Abstracts
Vol. 12, EGU2010-4337, 2010
EGU General Assembly 2010

Hydropower-to-environment water transfers in hydropower-dominated river basins

Amaury Tilmant (1,2), Lindsay Beevers (1), and Bonje Muyunda (3)

(1) UNESCO-IHE, Netherlands (amaury.tilmant@me.com), (2) Swiss Federal Institue of Technology, Zurich , (3) Zesco, Zambia

Allocating water between different users and uses, including the environment, is one of the most challenging tasks facing water resources managers and has been at the heart of the development of Integrated Water Resources Management (IWRM). In large hydropower-dominated river basins, reservoirs are mainly operated so as to maximize revenues from energy generation regardless of the consequences of reduced flow fluctuation on downstream ecosystems. There is growing consensus worldwide that in hydropower dominated river basins, the allocation of water can no longer be only driven by energy demand; rather a balance must be found between hydropower and the environment. To address this issue, we propose a new analytical framework which incorporates the results of environmental valuation studies into a multipurpose multireservoir operation model to determine the trade-off relationship between hydropower generation and ecological preservation. Instead of imposing minimum flow requirements, the approach rather builds simple demand curves for environmental goods and services, which are then imposed to the system at particular locations. Since the environmental, especially wetland, valuation studies are inherently imprecise, a sensitivity analysis is carried out whereby reservoir release policies are determined for a set of discrete values put on environmental flows. The trade-off relationship provides a concise way of exploring the extent to which hydropower generation must be sacrificed in order to restore flow fluctuation throughout the basin. The proposed framework is illustrated with the multireservoir system in the Zambezi basin.