Simulating Hydro-Economic Impacts of Potential Water Rights Trade in the Lake Naivasha Basin

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Abstract

The Lake Naivasha Basin in Kenya can be considered as an important social-ecological system which supports economic activities such as horticultural and floricultural production. These irrigation-based agrobusiness activities account for substantial amounts of water use and contribute immensely to the local and national GDP. The Lake is also designated as a Ramsar site for its international importance as a wetland, and supports fisheries, pastoralism, and power generation, and attracts tourists in considerable numbers. Demand for water use in agriculture is expected to increase due to population and economic growth in the region. All these economic and ecological characteristics are exposed to volatile water supply from precipitation in the Lake Naivasha Basin. As a result, management options that ensure the efficient use of water resources in the basin have become a high level policy priority. Market-based water allocation within the agricultural sector is a promising economic incentive, though less practised in sub-Saharan Africa, to increase water use efficiency and sustainability. In this study we attempt to analyse how potential water rights trade among water resources user associations (WRUAs) could affect resource use efficiency in the Basin. More specifically, we simulate the behaviour of WRUAs with respect to water and cropland allocation decisions by introducing tradable water rights, and analyse their potential economic impact under uncertain water availability. The Lake Naivasha Hydro-Economic Model (LANA-HEBAMO) is used to simulate potential water rights trade using a stochastic, recursive-dynamic simulation approach for future water uncertainty. Decentralised decisions by water users are modeled using the 'Multiple Optimisation Problem with Equilibrium Constraints (MOPEC) framework. Compared to aggregate optimisation, this modelling approach is more appropriate for policy simulations under missing or less effective water management institutions such as in the Naivasha Basin. The result from this policy simulation will provide important insights on the potential of tradable water rights for efficient water use and allocation from the developing countries perspective.

Keywords: Future uncertainty, Lake Naivasha Basin, water institutions, water trade simulation

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