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Informing trade-offs in the water-energy-food nexus in the Lower Shire Basin, Malawi.

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Water, energy and food are indivisibly linked, and, particularly in southern Africa, the links to climate are strong. Decisions on water allocation for subsistence agriculture, commercial agriculture, hydropower and the environment requires an assessment of trade-offs and synergies. Malawi is one of the world's least developed countries with an economy heavily reliant on agriculture but, at the same time, the country is reliant on hydropower which can only supply 30% of the country's energy demands at its current capacity. The Government of Malawi has ambitious future plans of expanding both hydropower and irrigated agriculture in the Lake Malawi catctment and Shire River Basin. Such expansion implies increasing, and potentially competing, demand for water resources for anthropogenic activities and an important wetland ecosystem; the Elephant Marsh in the Shire River Basin. Declining water levels of Lake Malawi and changing rainfall patterns possibly linked to climate change, combined with increased demand, are likely to exacerbate food security issues and economic growth in the country.

Proposed expansion of irrigation under the Shire Valley Irrigation Project (SVIP) will provide irrigation for a mix of sugarcane and other cash and food crops on over 42000ha. This expansion requires an additional diversion of 37m3/s of water from upstream of the Kapichira power station. Hydrological data indicates that variations in the Lake Malawi water levels, and consequently the volume of the Shire River would constrain the availability of water for current power irrigation requirements, and , much less the expansions proposed under the SVIP. This means that trade-off options to fairly distribute water for food, energy and human consumption need to be considered to assess whether proposed development plans in Malawi are feasible. A lake-basin model for the Lake Malawi-Shire River Basin region was developed using the Water Evaluation And Planning model to analyse trade-offs between competing demands for water resources under changing conditions, and inform (sustainable) planning processes in Malawi. Results from the trade-off study are presented.