



How do new dams impact downstream countries? – A screening approach to identify the best compromise assets and negotiate their designs

Robel Geressu (1) and Julien Harou (2)

(1) University College London, Civil Environmental and Geomatic Engineering, London, United Kingdom (rob.el.geressu.12@ucl.ac.uk), (2) The University of Manchester, Department of Mechanical, Aerospace, and Civil Engineering, Manchester, United Kingdom (julien.harou@manchester.ac.uk)

Water use rights are disputed in many transboundary basins. Even when water projects can benefit all, agreeing on cost and benefit sharing can be difficult where stakeholders have conflicting preferences on the designs and use of proposed water infrastructures. This study suggests a combination of many objective optimization and multi-criteria ranking methods to support negotiations regarding designs of new assets. The method allows competing users to assess development options based on their individual perspectives and agree on designs by incorporating coordination strategies into multi-reservoir system designs. We demonstrate a hypothetical negotiation on proposed Blue Nile reservoirs. The result form a set of Pareto-optimal designs i.e. reservoirs, storage capacity and their operating rules, and power trade, cost sharing and/or financing coordination strategies, which maximize benefit to all countries and show which trade-offs are implied by which designs. The approach fulfils decision-maker's desire to understand a) the critical design parameters that affect various objectives and b) how coordination mechanisms would enable them to incur benefits from proposed new dams.