



Modelling climate change impacts on water resources of dams

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This study aims to assess the effects of climate change mediated through the watersheds of global dams on water resources delivered to those dams. Dams and reservoirs play an important role in social and economic development as they supply water, generate energy, and provide security and consumption needs. However, as of yet, there is no definitive geo-referenced spatial database with which it is possible to model impacts of land use and climate changes on water supplies. Part of this study has been dedicated to the further development of such a database. The global spatial dam database (Mulligan et al., 2009) has been developed by digitising visible dams in Google Earth with a so-called GEOWIKI approach. With this database, watersheds for dams around the world are extracted using GIS techniques.

With dam watersheds making up around 18% of global land mass, the impacts of climate change can have profound impacts on the water resources delivered to dams. Using climate model projections from the IPCC AR4 (IPCC, 2007) downscaled by CIAT (CIAT, 2010), a global assessment is made of climate change impacts on dam watersheds. The FIESTA spatial hydrological model (Mulligan and Burke, 2005) is then used to simulate the hydrological impacts of a range of climate model projections on a series of major dams in different climate regions around the world to evaluate directional changes in water and sediment supply and their implications for Hydro Electric Power generation and water resource availability. FIESTA is a process based spatial hydrological model developed for mountainous regions that models aboveground components of the hydrological cycle. The model has most recently been applied in a CGIAR Challenge Programme on Water and Food (CPWF) project in the Andes region (Mulligan et al., 2010) and makes use of freely available datasets sourced from the SimTerra database (Mulligan, 2009). This database holds global environmental datasets tiled to a standard grid and file formats at 1km and 100m resolution.

References:

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