



Land use change through damming: potential impacts on water quality and quantity in the Luanhe

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We investigate the preliminary effects of land use change through the construction of reservoirs on water quality and quantity in the Luanhe. The Luan River empties directly to the Bo Hai (sea) in North Eastern China. The Luanhe drains mostly Hebei Province however some its flow comes from Inner Mongolia. The main river originates north of Mt. Bayanguer. Average annual precipitation is around 564 mm with an annual discharge of about 147 m³/s measured at the Luanxian station. The catchment area is 44 800 km² and the main channel length is 888 km. The Luanhe and the Haihe are connected hydraulically.

The construction of reservoirs impacts the landscape by changing pasture, forest and agricultural land, river corridors and streams into a lacustrine system. The end effect is a significant change in land cover characteristics. Additional stressors such as (1) intensification of agriculture (increase in the use of fertilizers), (2) urbanisation (community waste water effluent) and climate variability present a complicated picture for water resources management in this part of the Hai he.

We investigate the influence of aforementioned factors on three reservoirs in the Luan he. A nutrient flux and flow network (NFFN) is set up to identify and follow sources, sinks and transient storage of nitrogen. Operating rules of the three reservoirs that serve the megacity of Tianjing is also assessed. We present potential impacts on general water quantity and quality of the Luanhe. First impression of risks to reservoir water quality is also provided. Output from the NFFN can form the basis of future detailed hydro-biogeochemical modelling exercise to determine the effects of future land use change scenarios on water resources in the Luanhe.