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# Estimated cumulative sediment trapping in future hydropower reservoirs in Africa

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Despite a rapid economic development in Sub-Saharan Africa, almost 70% of the human population in this area remain disconnected from electricity access (International Energy Agency 2011). Mitigating climate change and a search for renewable, “climate neutral” electricity resources are additional reasons why Africa will be one key centre for future hydropower dam building, with only 8% of the technically feasible hydropower potential actually exploited. About 300 major hydropower dams with a total capacity of 140 GW are currently under construction (11.4%) or planned (88.6%) (Zarfl et al. 2015). Despite the benefits of hydropower dams, fragmentation of the rivers changes the natural flow, temperature and sediment regime. This has consequences for a high number of people that directly depend on the primary sector linked to rivers and floodplains. But sediment trapping in the reservoir also affects dam operation and decreases its life span.

Thus, the objective of this work is to quantify the dimension of sediment trapping by future hydropower dams in African river basins. Soil erosion is described with the universal soil loss equation (Wischmeier & Smith 1978) and combined with the connectivity index (Cavalli et al. 2013) to estimate the amount of eroded soil that reaches the fluvial network and finally ends up in the existing (Lehner et al. 2011) and future reservoirs (Zarfl et al. 2015) per year. Different scenarios assuming parameter values from the literature are developed to include model uncertainty. Estimations for existing dams will be compared with literature data to evaluate the applied estimation method and scenario assumptions.

Based on estimations for the reservoir volume of the future dams we calculated the potential time-laps of the future reservoirs due to soil erosion and depending on their planned location. This approach could support sustainable decision making for the location of future hydropower dams.

References

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