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Impacts of reduced diversions on the Upper Kotmale Project

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Hydropower has always been the major source of energy for electricity generation in the absence of coal and fossil fuel deposits in Sri Lanka. Upper Kotmale Hydropower Project, which is under construction in the Mahaweli basin, has been planned to contribute to the power requirement in Sri Lanka. The project consists of a 34 m high concrete gravity dam across Kotmale Oya at Talawakele with a pond capacity of 0.8×10^6 m^3. The original project, which consisted of diverting waters above seven scenic waterfalls namely, Ramboda upper and lower falls, Puna, Pundal, St.Clair's, St.Andrew's and Devon falls, was later reduced to obtaining water only from the Kotmale Oya to minimize impacts on the environment.

A simulation model for the Upper Kotmale Hydropower Project was developed based on System Dynamics approach to compare several different system configurations and system operation patterns. The model has been developed using the Vensim simulation environment, which facilitates use of the system dynamics modeling objects such as reservoirs, flows, feedback mechanisms and delays. The results indicate that the exclusion of diverting water of waterfalls Devon, Andrews, Puna Oya No1, Puna Oya No2, Pundal oya and Pundal falls results in the reduction of about 25% of total system hydro energy generation. Impact of water diversions from Andrews and Pundal Falls on energy output is observed to be very small. Out of the water diversions, contributions of Devon and Pundal Oya on system hydro energy production are observed to be relatively high. The model was used to study impact of several operational patterns on system output. These operation policies, which considered making different minimum releases to sustain St.Clair's water fall located downstream of Talawakele pond, has only little impact on the system out put.

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