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RIVER RIONI HYDROLOGIC STUDY FOR PORT OF POTI CLIMATE IMPACT ASSESSMENT

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ABSTRACT: The Rioni River is the largest river in Western Georgia, and consists of 51 major sub-watersheds. It originates in the glaciated is Caucasus Mountains in the north. The river delta is located near the Port of Poti, a major Georgian port on the Black Sea. As a part of the planned port expansion, the Climate Change Impact Assessment (CCIA) study was conducted to determine the historic and potential evolution of the Port in relation to sediment transport near the River Rioni delta. The River Rioni hydrology study is the part of this CCA study and addressed the impacts associated with climate change (on precipitation, temperature, and snowmelt runoff) and the impacts from planned hydropower projects that would affect both flows and sediment transport in the Rioni River.The main objective of hydrologic study was to develop a hydrologic model of the Rioni watershed that would predict River Rioni flows at the Port of Poti as a function of the watershed land use/land cover, soil data, precipitation, temperature, existing Rioni dams and planned dams (Namakhvani Cascade). No previous existing hydrologic model was developed on this watershed; and limited data was available to develop the model. The meteorological data was obtained from published Russian literature; digital elevation and land use data was obtained from ENVIROGRIDS; watershed soils data were obtained from the Republic of Georgia; the author obtained additional information working with a local sub-consultant in Georgia.The River Rioni hydrologic model was developed utilizing HEC-GeoHMS geospatial analysis to develop GIS-based hydrologic parameters. The hydrologic model was calibrated to the flood flow peaks derived at the Poti stream gauge for high flood events. The model was then used in the climate impact analysis for four different scenarios, associated with average conditions (summer and winter) and extreme conditions (very hot summer and very wet winter) to estimate increases in Rioni flows and sediment transport to the port. The model was revised to include the planned future dams and to determine the combined (cumulative) impacts on the sediment transport in the river to the port.

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