Impact of Glacier Melt on Hydropower Generation in the Inguri River Basin in the Caucasus (Georgia)

Teimurazi Davitashvili
Associate Professor, I.Vekua Institute of Applied Mathematics of Iv. Javakhishvili, Tbilisi State University, T'bilisi, Georgia

Abstract:

Hydropower development in Georgia is currently one of the main areas of economic development of the country. Currently, the Enguri River basin is home to the Enguri HPP, which is the largest HPP in the Caucasus, and more than 20 hydropower plants are planned/under construction in the upper gorge of the Enguri River basin in the Central Caucasus. Current climate change is causing accelerated glacier melting in the Caucasus, which significantly affects the availability of water for hydropower and drinking water supply. Thus, the long-term impact of glacier melting on hydropower generation is a complex issue and should be studied for each river basin separately (since it is necessary to analyze the sensitivity of the power system to changes in at least precipitation, temperature, and the rate of change of glacier melt). In this paper, we study the glacier dynamics in the Enguri River basin using the Open Global Glacier Model (OGGM) against the background of regional climate change. In particular, this study focuses on the seasonal, interannual and long-term OGGM forecasts and projections of some glaciers' mass balance, flow and geometric changes up to 2100 to provide scientifically sound predictions of future glacier evolution under possible regional climate change. For this purpose, a more focused analysis of glacier outline, flow line, geometric width, mass balance, thickness, surface area and volumetric changes is conducted to predict possible future glacier collapses and their impact on hydropower production in the Inguri River basins. Some results of the numerical modelling study are presented and its impact on hydropower performance is analyzed.

Acknowledgement:

This work was supported by Shota Rustaveli National Scientific Foundation Grant No. BRG-I-24-1152.