



Prospective change of the Central Asian rivers runoff with glaciers feeding under different climate scenarios

N. Agaltseva

Research Hydrometeorological Institute, Uzhidromet, Uzbekistan

(natagalt@mail.ru / Phone: +998-71-234-13-56)

Several large and small Central Asian rivers with noticeable contribution of glaciers feeding have been chosen for assessing there the impact of prospective climate change. Series of performed model computations were based on using different climate change scenarios. The basic part of glaciation inside of the Aral Sea Basin is located within of watersheds Vakhsh and Panj rivers which are the main components of Amudarya river.

Applied complex of mathematical models includes the following: model of snow cover formation in the mountains, model of glaciers runoff, and model of transformation the inputted rain, ice and snowmelt volumes into rivers stream flow. Main climatic and orographic peculiarities of rivers runoff formation area located in the alpine regions of the Tien-Shan and Pamir Alai were taken into consideration in the computation procedure.

Climate changes impact to the runoff is varied by one scenario to other and that are strongly related to the variances in the expected by scenarios the precipitation rates. The evaluative calculations were completed for all three climate scenarios because the high natural variation in measured precipitation and some scenarios uncertainty.

Climate scenarios being based on models of global atmosphere and ocean circulation with help of software MAGICC/SCENGEN were designed for assessment of climate changes impact to the runoff from runoff forming zones

Climate scenarios have been designed in accordance with emission scenarios (A1,

À2, Â2) with taking into consideration of sulphate aerosols influence for three time intervals in the future (2016-2045, 2036-2065, 2066-2095) that would characterize of climate changes by 2030, 2050 and 2080

Glaciers water supplies as being most important and long term resource of fresh water are not stable. When doing the evaluation of the future glaciation reduction under warming conditions with unchanged precipitation norms it can be supposed that rate of glaciation reduction will be kept the same as during last years with high regional variation 0.2-1% per year. Glaciation reduction will originate the numerous moraine lakes and run of high risk mudflow with burst floods and burst lakes genesis.

Data on long term change of glaciers size are necessary for modeling and forecasts of water resources in the Amudarya and Syrdarya rivers basins. Numerous gaps of information for the considered area is filled via both computational methods and processing remote sensing images.

Model calculations demonstrated that in the far future, the glacial run-off will be depended on the reduction rates of mountain glaciation. The air temperature rise on 1-2°C will intensify process of ice degradation. It is known that glaciers in the Aral Sea basin lost 155.5 km³ of ice volume during 1957-80, which is equaled almost 20% of the ice reserves in 1957. Another 14% of the 1957th reserves were lost at the 2000. Glaciers there will lose additionally at least 10-15% of their initial volume by 2020.

At present, the annual glacial runoff in the Syrdarya river basin is about 8-15% of total annual runoff. Under different forecasts the increase of glacial runoff is expected up to 20%. The contribution of glacial runoff may grow up to 30-38 % for the Amudarya river basin according to the “severe” climate scenarios. At the initial period of climate warming the melting of glaciers will compensate partially decrease of total runoff, but after that start a disastrous fall of the water resources up to 30% and more.