

Belarus Rivers Runoff: Current State, Prospects

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Abstract : The territory of Belarus is studied quite well in terms of hydrology but runoff fluctuations over time require more detailed research in order to forecast changes in rivers runoff in future. Generally, river runoff is shaped by natural climatic factors, but man-induced impact has become so big lately that it can be compared to natural processes in forming runoffs. In Belarus, a heavy man load on the environment was caused by large-scale land reclamation in the 1960s. Lands of southern Belarus were reclaimed most, which contributed to changes in runoff. Besides, global warming influences runoff. Today we observe increase in air temperature, decrease in precipitation, changes in wind velocity and direction. These result from cyclic climate fluctuations and, to some extent, the growth of concentration of greenhouse gases in the air. Climate change affects Belarus's water resources in different ways: in hydropower industry, other water-consuming industries, water transportation, agriculture, risks of floods. In this research we have done an assessment of river runoff according to the scenarios of climate change and global climate forecast presented in the 4th and 5th Assessment Reports conducted by Intergovernmental Panel on Climate Change (IPCC) and later specified and adjusted by experts from Vilnius Gediminas Technical University with the use of a regional climatic model. In order to forecast changes in climate and runoff, we analyzed their changes from 1962 up to now. This period is divided into two: from 1986 up to now in comparison with the changes observed from 1961 to 1985. Such a division is a common world-wide practice. The assessment has revealed that, on the average, changes in runoff are insignificant all over the country, even with its irrelevant increase by 0.5 - 4.0% in the catchments of the Western Dvina River and north-eastern part of the Dnieper River. However, changes in runoff have become more irregular both in terms of the catchment area and inter-annual distribution over seasons and river lengths. Rivers in southern Belarus (the Pripyat, the Western Bug, the Dnieper, the Neman) experience reduction of runoff all year round, except for winter, when their runoff increases. The Western Bug catchment is an exception because its runoff reduces all year round. Significant changes are observed in spring. Runoff of spring floods reduces but the flood comes much earlier. There are different trends in runoff changes in spring, summer, and autumn. Particularly in summer, we observe runoff reduction in the south and west of Belarus, with its growth in the north and north-east. Our forecast of runoff up to 2035 confirms the trend revealed in 1961 - 2015. According to it, in the future, there will be a strong difference between northern and southern Belarus, between small and big rivers. Although we predict irrelevant changes in runoff, it is quite possible that they will be uneven in terms of seasons or particular months. Especially, runoff can change in summer, but decrease in the rest seasons in the south of Belarus, whereas in the northern part the runoff is predicted to change insignificantly.

Keywords : assessment, climate fluctuation, forecast, river runoff

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