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Assessing inflow alterations into Lake Baikal from Selenga river basin with respect to changing climate and land use conditions

Vsevolod Moreido, Andrey Kalugin, Yuri Motovilov, and Tatiana Millionshchikova
Water Problems Institute of Russian Academy of Sciences, Moscow, Russia (andrey.kalugin@iwp.ru)

The trans-boundary Selenga river basin is the largest tributary of Lake Baikal, which has been experiencing a profound increase of annual near-surface air temperature – 1.6 to 1.8^0 during the last 70 years, nearly twice as global increase. A significant drought that has been registered in the Selenga basin for the last 20 years has drawn attention of a number of hydrologists worldwide to investigate its drivers. In this study we used the ECOMAG hydrological modeling software to construct a semi-distributed data-driven hydrological model that accounts for weather forcing, hydrological soil properties and land-use conditions to assess runoff generation in the river basin and its current and future response to climate and land-use alteration. Due to lack of daily weather observation data, the model was driven with EWEMBI weather dataset for calibration and validation purposes. To investigate the possible impact on runoff due to climate change in the XXI century we used an ensemble of 7 GCMs from CMIP5 experiment operating according to 4 IPCC greenhouse gas RCPs. To account for possible land-use changes we used HYDE dataset for the years 1990–2100. The modeling results show that the current drought conditions may be prolonged and intensified according to the most severe RCPs. At the same time, land-use conditions appear to have limited influence on the runoff generation for this area is not subject to heavy irrigation-intensive agriculture.