



Prognosis of groundwater drought occurrence in selected catchments of Slovakia

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The paper contains results on prognosis of groundwater drought occurrence in six selected catchments of Slovakia with different geological, hydrogeological and climatic conditions. Prognoses were made using BILAN model. Climatic scenarios CCCM1997, CCCM2000 (Canadian model CGCM.1 and CGCM.2 modified on conditions in Slovakia) and GISS1998 were used. Groundwater drought occurrence was assessed for time-frames 2030 and 2075. Each year of the whole assessed period of 24 years (1982-2005) was classified according to the water bearing degree of the stream taking into account the yearly precipitation amounts (Majercakova, et al., 2007). Three types of dry years – very dry, medium dry and moderately dry were defined. The prognosis values for 2030 and 2075 were compared with the reference period 1971-1990.

Chvojnica River catchment (Lopasov profile), located in Neogene sedimentary rocks is characterized by occurrence of 26 % of dry years (very dry, medium or moderately dry) within the period 1982-2005. Prognosis of the groundwater runoff changes showed not very expressive decrease, in about 3.6-4 % in comparison with the reference period. Tuzina River catchment (Tuzina profile), located in crystalline, Mesozoic and Neogene sedimentary rocks, is characterized by occurrence of 25 % of dry years. Values of the groundwater runoff would decrease not very expressively, in about 5-7 %. These two catchments were assessed using GISS1998 climate change scenario.

Groundwater changes in four other catchments were evaluated using CCCM scenarios. Topla River catchment (Bardejov profile), located in Paleogene flysh rocks, is characterized by occurrence of 58 % of dry periods. Values of the groundwater runoff would decrease importantly – in about 59-88 %. Bela River catchment (Podbanske profile), built by granitic and glaciofluvial rocks, is characterized by occurrence of 13 % of dry periods. Values of the groundwater runoff would decrease in about 42-63 %. Boca River catchment (Kralova Lehota profile), built by crystalline and Mesozoic rocks, is characterized by occurrence of 13 % of dry periods and values of the groundwater runoff would decrease in about 49-77 %. Litava River catchment (Plastovce profile), built by volcano-sedimentary complex, is characterized by occurrence of 46 % of dry periods. Values of the groundwater runoff would decrease in 29-55 %.

Quite expressive decrease of groundwater runoff was documented in all catchments for both periods of 2030 and 2075. At the same time, increase of the precipitation in about 0.2-19 %, air temperature in about 16-40 % and very mild decrease of the air humidity in about 0.7-2 % for 2030 was calculated. The application of the CCCM1997 scenario for the 2075 resulted in some cases in prognosis of precipitation amounts decrease in 1-6 %. The highest percentage of dry period occurrence was documented in Topla River catchment, in which also the highest decrease of the groundwater runoff was prognosed.

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