

Groundwater rise: impact of urban growth on groundwater regime in the Saratov region

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Groundwater rise is the most important problem for many towns of the Volga valley but there are special features for every site concerning its geological and hydrogeological setting. Great Saratov is located on the high west riverside (the principal part) and on the lower east riverside (Engels area), there are some differences of water balances which create the groundwater regime for every zone. Urban growth of Saratov is accompanied by large-scale importation of river water for residential, industrial and recreational use. These processes have caused groundwater level to rise up to 5-10 m within past 30 years in different parts of Saratov, and up to 5-5,5 m over most of the Engels area, where the water table depth is now less than 2 m. Special consideration of groundwater rise in Engels area shows that the principal causes of it were filling of the Volgograd in-river reservoir and irrigation around the site.

Groundwater rise monitoring is based on the analysis of complex system which is composed of several components: groundwater flow - discharge of subsurface waters - infiltration - leakage from artificial sources - evaporation. These components form the positive and negative balance points, the rate of groundwater rise depends on their relationship. The piezometric analysis is the principal tool to identify the source of water in the groundwater basin, but chemical characteristics and temperature parameters can give unvaluable data for water balance analysis.