

Groundwater resources vulnerability due to melting glaciers in the Talgar alluvial fan, northern Tien-Shan

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Alluvial fans on the mountain slopes in Central Asia are an important source of the groundwater, due to their capacity of storing large quantities of the fresh groundwater and due to the fact that most urban centres are situated in the mountainous terrain or along mountain slopes. The groundwater resources in the alluvial fans are replenished by the infiltration from the rivers, which drain the mountain catchments and by infiltration from the precipitation, and released on their lower reaches as a series of seasonal springs or infiltrated into the lower lying aquifers. The rivers with their catchments in the mountainous terrain are fed by the precipitation (with the peak in May-June due to snow melt) and glacier melt. The glacier meltwater constitutes up to 90% of the river runoff in July-August, due to peak in glacier melt and low precipitation, providing much needed freshwater for agriculture in the dry season.

In this study an attempt to quantify the importance of the glacier meltwater on the groundwater resources through groundwater modelling in the Talgar alluvial fan, Ili-Alatau mountain range has been performed.

The results suggest that glacier meltwater is a substantial portion of the groundwater resources in the Talgar alluvial fan, with up to 30m drop of the groundwater level, if the glaciers disappear, endangering existing groundwater supply. The transient simulations suggest that disappearance of the glaciers and highly variable annual precipitation would result in highly fluctuating groundwater levels, as well as disappearance of most of the springs at the foot of the alluvial fan. These results are especially relevant for the northern Tien-Shan, where glaciers have been rapidly retreating over last 50 years, and some of the glaciers could disappear in next decades.