APPLYING AN AQUIFER-YIELD CONTINUUM APPROACH TO QUANTIFY GROUNDWATER YIELD ACROSS ALBERTA

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ABSTRACT
Quantifying sustainable groundwater yield is dependent on many factors including the physical hydrogeological system and the desires of the community and stakeholders with a vested interest in the groundwater resource. The aquifer-yield continuum approach describes a range of values based on the physical system that range from non-use to maximum mining, where all available water is removed from storage. From this, the community, water managers, and local stakeholders may then consider anthropogenic factors such as impact on environmental flows, economic factors of groundwater use, and the longevity of using the resource. The Alberta Geological Survey is applying the aquifer-yield continuum concept across the province of Alberta in an effort to quantify ranges of potential groundwater yield. Aquifer yield is divided into a number of classes along the continuum, marking both physical system and social boundaries. Key hydrogeological parameters used to determine each yield value include groundwater recharge, discharge, and aquifer volume; however, the methods used to determine these parameters are highly dependent on the hydrogeological system and data availability, which vary greatly across the province. Therefore, methods to quantify groundwater yield in Alberta are modified depending on the area of interest. In west-central Alberta, the abundance of observed river flows on largely uncontrolled rivers was the main source of information on groundwater discharge (which was assumed to approximate recharge); however, in the drier east-central part of Alberta river flow data becomes sparse and evapotranspiration in riparian zones can affect estimates of groundwater discharge using river flow data. Therefore, a recharge modelling approach was utilized to estimate groundwater recharge (and assumed to approximate discharge). The results are presented in a matrix format which can be used by stakeholders as a screening tool for comparing current and future groundwater use scenarios.