



Conference Abstract

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Competing Interest

The authors declare no competing interests.

Conference Abstract

SPATIAL DISTRIBUTION AND SUSTAINABILITY IMPLICATIONS OF THE CANADIAN GROUNDWATER RESOURCES UNDER CHANGING CLIMATE

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Ethics approval and consent to participate: No ethical approval needed for this research work.

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Abstract

Groundwater is a major and reliable source of freshwater for many regions around the world, including Canada. It supplies potable water to ~2 billion people across the globe, fulfills 40% of irrigation requirements, and maintains a healthy eco-system. The amount of annual recharge, in fact determines renewable groundwater of any region, and the rest are just exhaustible resources, which would disappear with use over time. Elaborating the same concept of groundwater sustainability, Allah Taala says in the Holy Quran, "Tell me, if all your groundwater were to disappear in the depths of the earth, who then will bring you pure flowing water? (Surah Al-Mulk: 31)". It is therefore vitally important to determine groundwater availability of any region for its sustainable management and use. Groundwater availability, utilization, sustainability, and climate change implications were assessed at regional and provincial scales of Canada. It remains an unexplored resource, estimated to be renewing between 380 and 625 km³/year. However, the provinces have initiated developing their quantitative and qualitative databases for their accurate inventory. Sustainable groundwater availability at the national scale was estimated as 19,832 m³/person/year (750 km³/year), with high regional variations ranging from 3949 in the densely populated Prince Edward Island (PEI) province to 87,899 in the thinly populated Newfoundland and Labrador (NFL). It fulfills 82%, 43%, and 14% of water requirements of the rural population, irrigation, and industry, respectively. It is the potable water source for more than 9 million people countrywide (24% of the population), and provinces of Quebec, and Ontario (1.3 million people), and PEI (0.15 million people) particularly depend on it. Groundwater is mostly a free or nominally charged commodity, but its utilization

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was found to be well under sustainable limits (40% of recharge) at the provincial scales, i.e., under 4% for all the provinces except New Brunswick (NB), which also had just 8% extraction of sustainable availability. Nevertheless, localized issues of quantitative depletion and qualitative degradation were found at scattered places, particularly in Ontario and Quebec. Climate change impacts of warming and changing precipitations on groundwater underscored its stability with some temporal shifts in recharge patterns. In general, increased recharge in late winters and springs was observed due to reduced frost and more infiltration and was somewhat decreasing in summers due to more intense rainfall events.

Key words: Spatial, Sustainability, Climate



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