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## Comparative assessment of river flow regime alteration in diverse environment: cases from pan-Arctic and arid semi-arid regions

Sahand Ghadimi<sup>1</sup> and Ali Torabi Haghghi<sup>2</sup>

<sup>1</sup>Water, Energy, and Environmental Engineering Research Unit, University of Oulu, P.O. Box 4300, FIN-90014, Oulu, Finland

<sup>2</sup>Water, Energy, and Environmental Engineering Research Unit, University of Oulu, P.O. Box 4300, FIN-90014, Oulu, Finland

River flow regimes are significantly altered by anthropogenic regulation activities, such as dam reservoir and hydropower. Such activities modify river flow regime, integrating three primary attributes (magnitude, timing, and monthly variability). However, these impacts are different in diverse environments according to the climate and land use. This study aims to investigate such impacts in cold climate sub-Arctic and arid semi-arid examples. First, the post and pre impact periods are set based on the changing point resulted from Pettitt test. Then the long-term monthly average of flow in the two pre and post impact periods will be assessed for each station to illustrate the form of influences in monthly hydrographs. After that, the River Impact index (RI) is employed to investigate the level of flow regime alteration and address those flow attributes that are impacted differently in different cases. The RI index is quantified by developing the respective impact factors MIF (Magnitude Impact Factor), TIF (Timing Impact Factor) and VIF (Variation Impact Factor) where  $RI = MIF \times (TIF + VIF)$ . The preliminary results show that in arid and semi-arid cases with intensive agriculture and hydrosystem development (such as Karkheh and Sefidrud in Iran), magnitude has altered more than the other attributes, while, in sub-Arctic cases such as (Ob, Yukon, Mackenzie), river regulation mainly impacts the timing and variability. This can highlight the role of mid-basin tributaries which naturally regulate the magnitude of flow in the sub arctic watersheds where land use change is not significant, in contrast with the other cases in arid and semi-arid regions.