ONLINE CONFERENCE IWRA 2020

Abstract Information for IWRA Online Conference
"Addressing Groundwater Resilience under Climate Change", 29-30 October 2020

(*) Presentation	**On-line Oral Presentation**
(*) Selected Theme	Theme 3: Contribution of Technology to Groundwater Resilience
(*) Title	***Enhancing Groundwater Resilience by Harvesting Glacial Meltwater with Managed Aquifer Recharge***
(*) Body (400 words)	**(a) Purpose or objectives and status of study or research hypothesis** 1) Examine the feasibility of managed aquifer recharge (MAR) as a tool to store glacial meltwater and early snowmelt; 2) Identify locales where this might be feasible and the pros and cons of implementation; 3) Present preliminary results from the Yakima Valley, Washington State, USA. **(b) Key issue(s) or problem(s) addressed** 1) Location of suitable MAR sites; 2) Amount of surface water available for groundwater recharge; 3) Pros and cons of approach. **(c) Methodology or approach used** 1) Hydrogeological fieldwork; 2) Computer simulation. **(d) Results and conclusions derived from the project** 1) Approach is viable in the Yakima Valley; 2) Needs to be validated in other regions. **(e) Implications of the project relevant to selected conference theme, theory and/or practice** Enhance aquifer storage providing an increased measure of groundwater resilience. Abstract In response to global warming, some mountain glaciers are melting at accelerated rates. This is not unique to exotic locales such as the Andes and Himalayas; some permanent glaciers in North America are shrinking and are *en route* to extinction. In the USA the best example of this phenomenon is Glacier National Park in Montana, which could be glacier-free by the middle of this century. In western Oregon and Washington some of the highest elevations in the Cascade Range are losing permanent glaciers. In addition, early snowmelt in the Cascades and elsewhere has the potential for harvesting. Glaciers and snowpack provide humanity and natural ecosystems with 'free storage' of freshwater and parcel out water to maintain and replenish freshwater supplies. During the warm season, glacial meltwater nourishes lower elevation ecosystems and human settlements and recharges aquifers. Replenishment of the glacier normally occurs during the cooler seasons; the cycle then repeats itself. Ideally, one would like a balance: the glacial ice melting in the summer would be replaced by cold weather precipitation. When the melting exceeds the replenishment, the equilibrium is destroyed. The volume of the glacier shrinks, and if the disequilibrium continues, the glacier will disappear entirely. Managed Aquifer Recharge (MAR) could capture 'excess' meltwater – the amount coming out of storage that is available – before the glacier disappears altogether. Early snowmelt could also be captured. Such groundwater storage would not be a permanent, sustainable solution to freshwater shortages, but might provide time to permit the development of alternatives to ensure survival of ecosystems and humans.

	The presentation will: 1) explore some of the advantages and disadvantages of subsurface storage to salvage glacial meltwater and early snowmelt; 2) speculate where such schemes might work and would be needed; and 3) discuss a recent MAR project in the Yakima River basin in Washington State, USA.
(*) Keywords	groundwater, recharge, resilience, glaciers, meltwater, snowmelt, streamflow

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