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NATIONAL GEOGRAPHIC SOCIETY

Faculty of Geosciences
Physical Geography

Importance and vulnerability of the world's water towers

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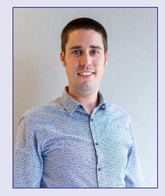

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Mountains are the water towers of the world, yet their importance and vulnerability have not been quantified at the global scale. Here, we present the first global Water Tower Index, which ranks all mountain ranges on Earth in terms of their water supplying role and the downstream dependence of ecosystems and society. For each of them, we assess its vulnerability related to multiple factors. We conclude that the most important water towers, predominantly located in Asia, are also among the most vulnerable.

Paper
Immerzeel, Lutz, et al. (2019). Importance and vulnerability of the world's water towers. *Nature*

Talk on YouTube
https://youtu.be/Va23ZITVitg

Online visualization
natgeo.com/perpetualplanet

Water Tower Index

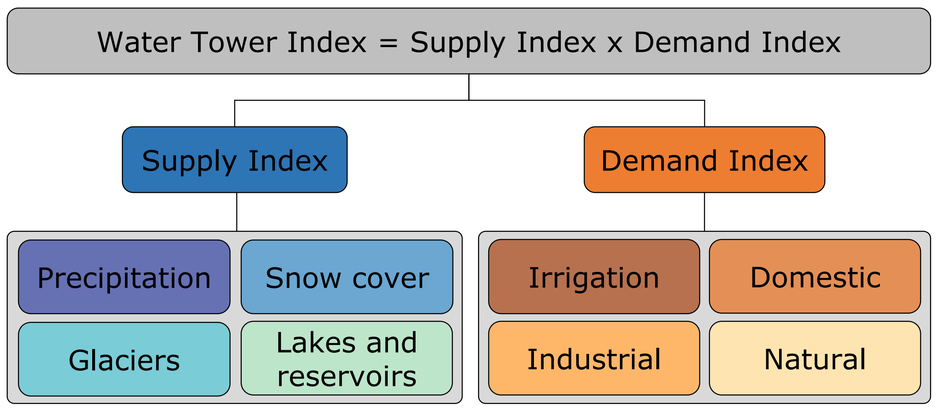

Figure: The Water Tower Index is the product of a Supply Index and a Demand Index representing the importance of a mountain range (Water Tower Unit) in terms of its water storage and the water demands it sustains. Supply Index and Demand Index consist of 4 indicators each.

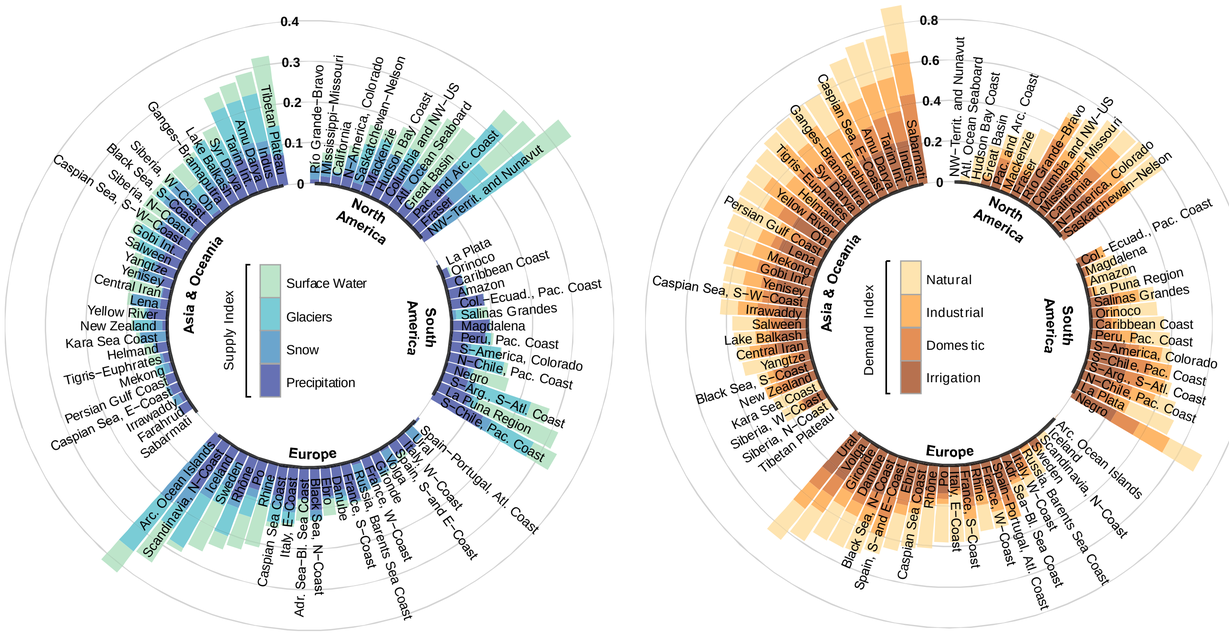

Figure: Global Water Tower Units grouped by continent and ranked by Supply Index (left) and Demand Index (right).

Water Tower Vulnerability

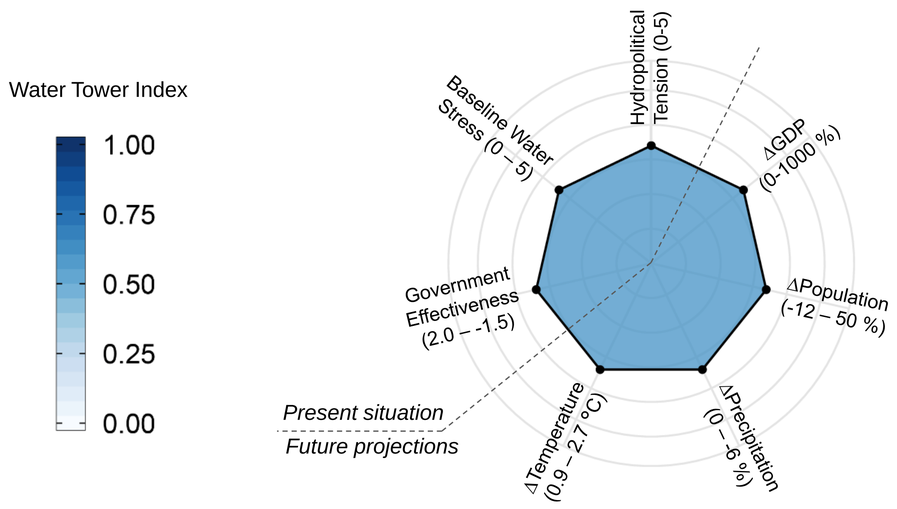

Figure: Vulnerability scores for present situation indicators and future change projections of top 5 Water Towers Units in each continent.

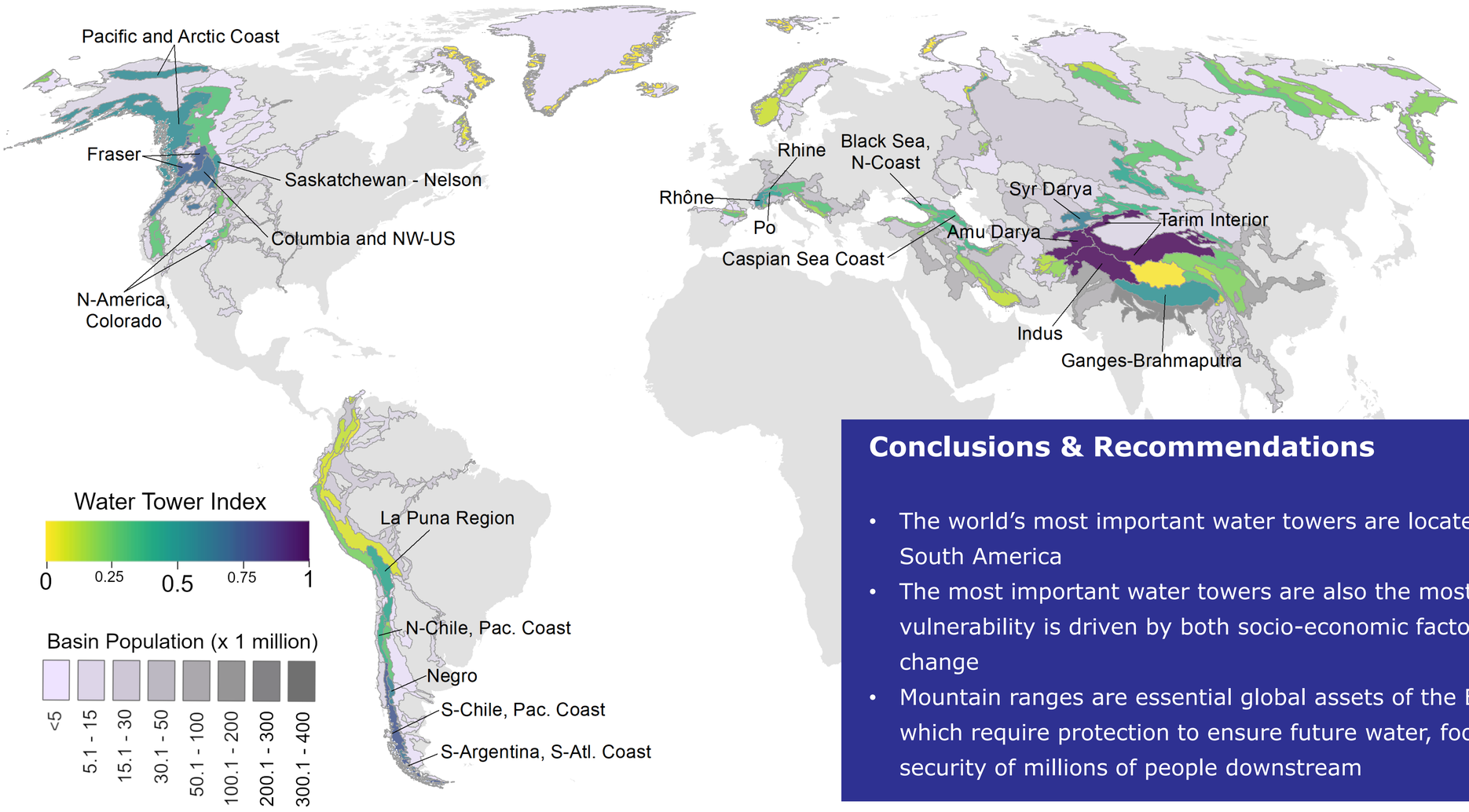

Figure: Map with 78 global Water Tower Units and and their Water Tower Index value. Population size is denoted by shading in the downstream dependent areas. The top 5 Water Tower Units per continent are labeled.

Conclusions & Recommendations

- The world's most important water towers are located in Asia and South America
- The most important water towers are also the most vulnerable. Their vulnerability is driven by both socio-economic factors and climate change
- Mountain ranges are essential global assets of the Earth system, which require protection to ensure future water, food and energy security of millions of people downstream