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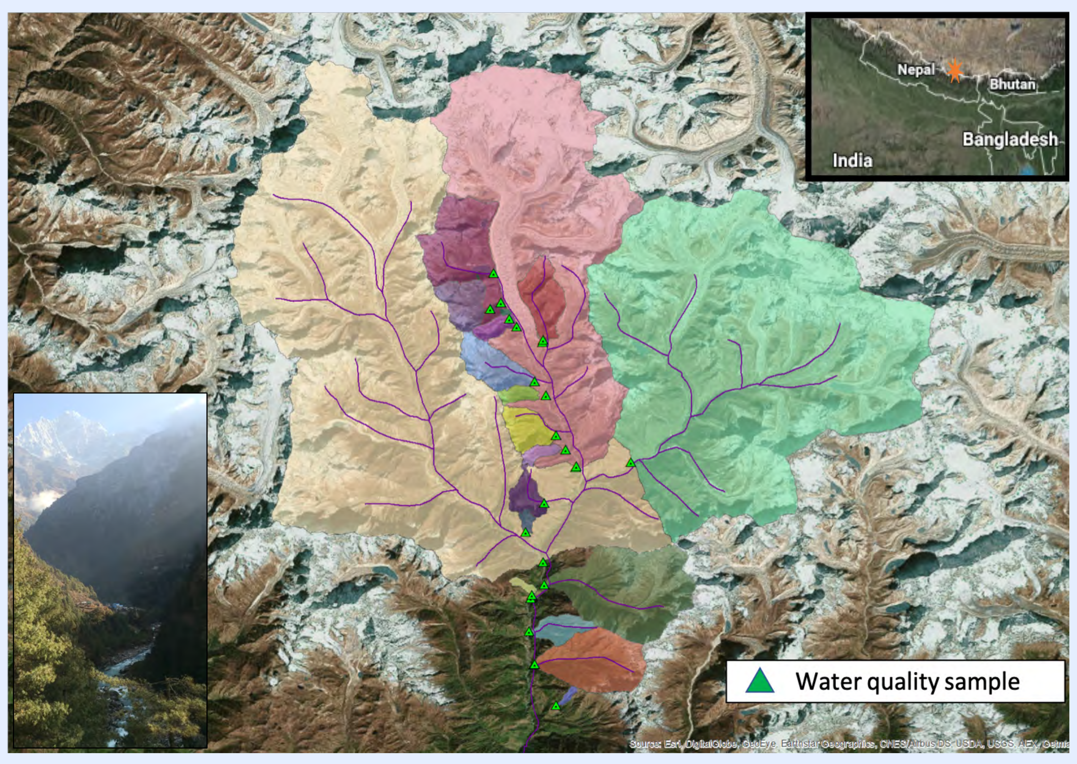
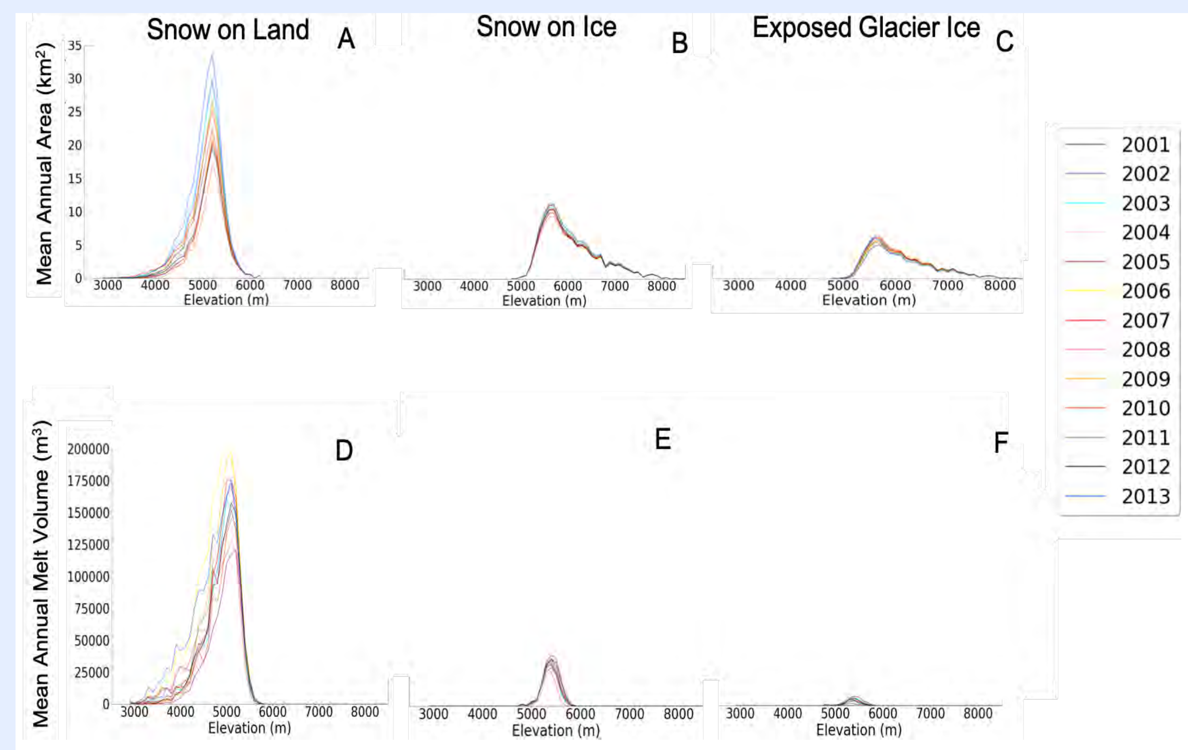
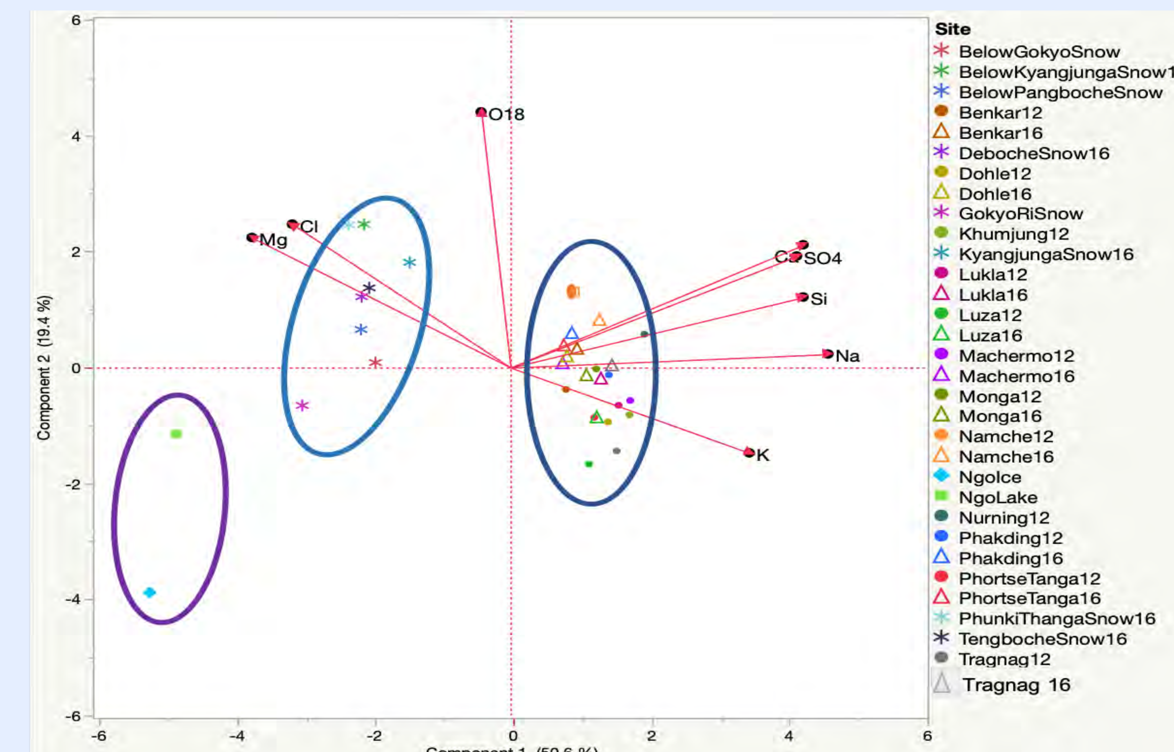
How does variation in contributions of snow and ice melt influence high alpine water quality?



Dudh Koshi River Basin, Nepal.
2012 and 2016 dry season water sampling locations marked with green triangles.

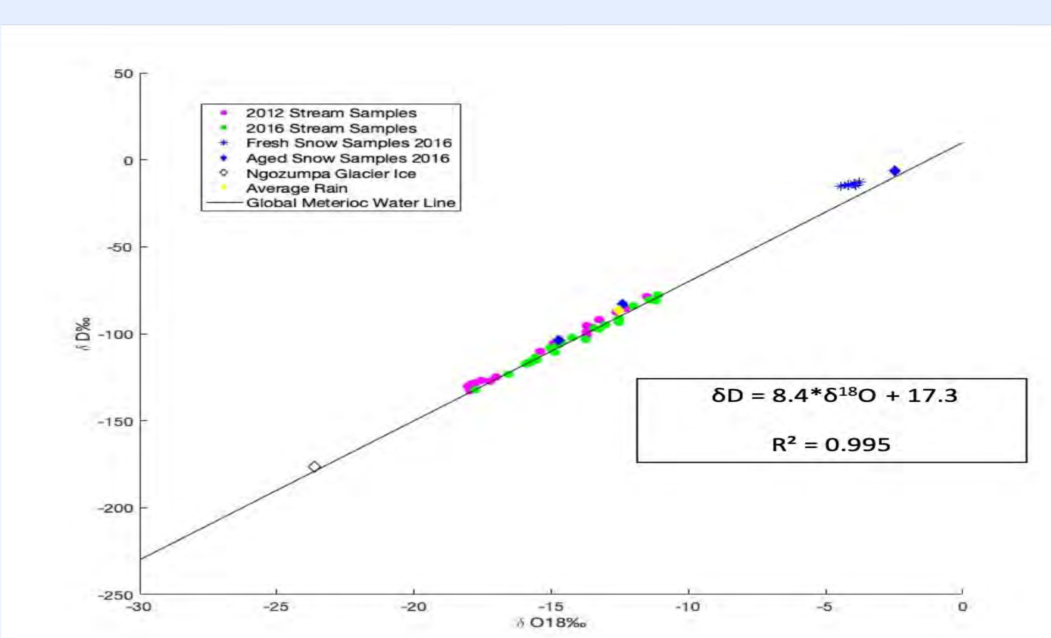


Relative areas of snow on land, snow on ice, and exposed glacier ice estimated from MODIS-derived products are used as inputs to a temperature index model forced with reanalysis temperatures to yield melt water volumes contributing to river flow. **Annual contributions of melt are dominated by SOL, followed by SOI and EGI.**

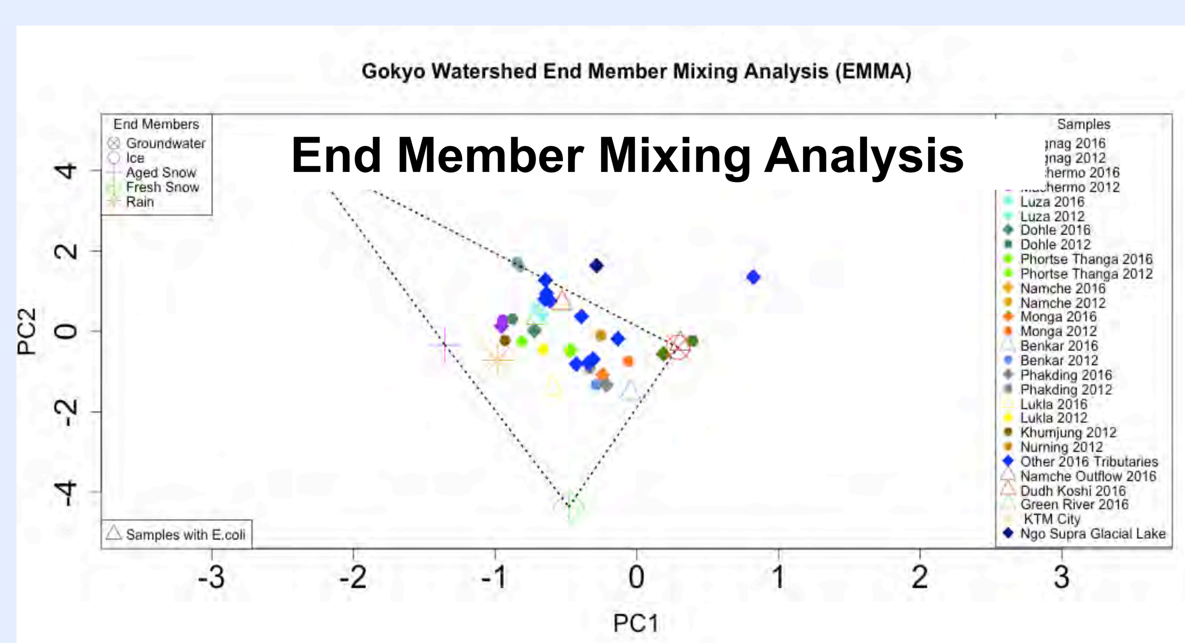


Principal components analysis of 2012 and 2016 water chemistry. Primary Component: **Weathering of major ions (50.6%);** Secondary Component: **Snow and δ^{18}O suggest atmospheric deposition (19.4%)**

Years with more base glacial melt may lead to higher concentrations of naturally occurring elements, such as Arsenic, due to less dilution.



δD and δ^{18}O values for all water, snow and ice samples, n = 52. **Stream samples appear to be a mixture of ice, snow, and rain.**

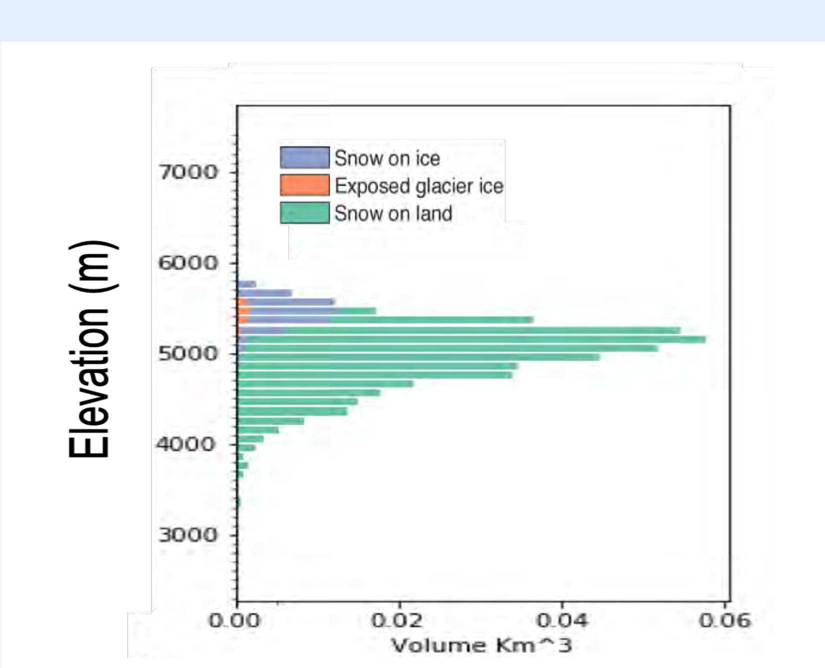


Samples cluster between groundwater and aged snow. **Chemical signal in dry season samples follow melt model results of SOL. SOL recharges the groundwater.** Triangles refer to streams with high E.coli.

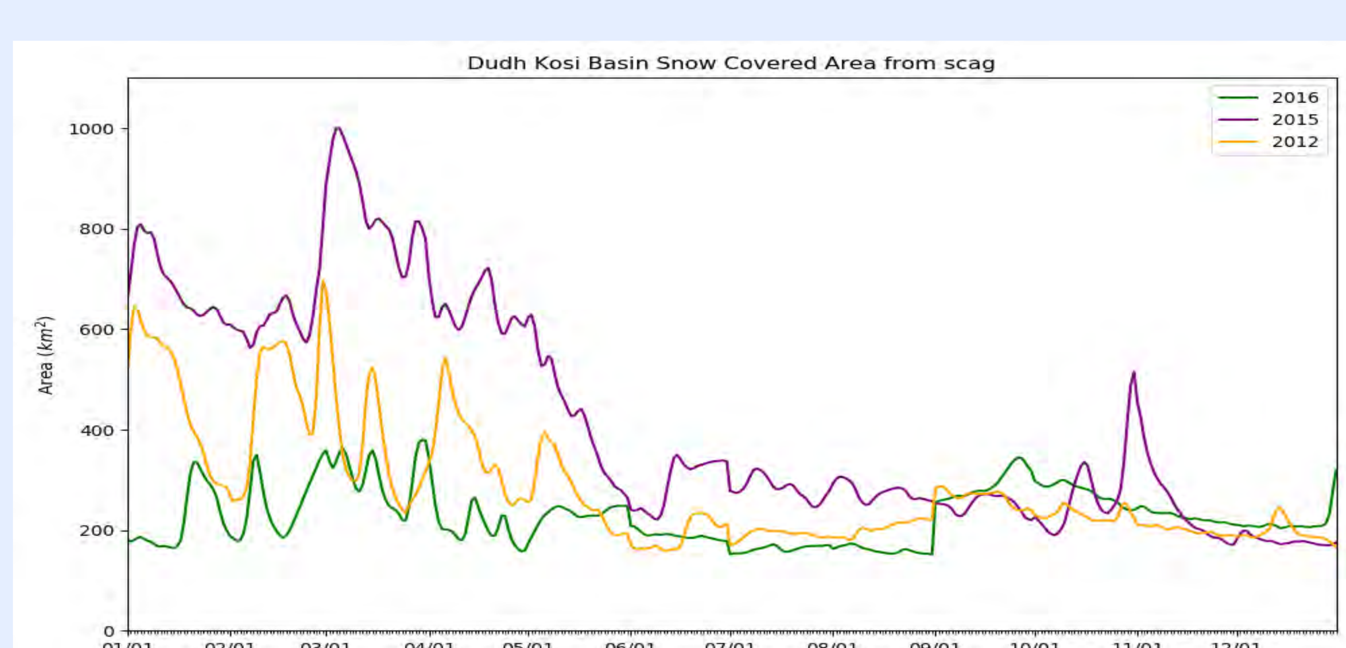
Year	Site	Arsenic (µg/L)
2012	Machermo	10.7 µg/L
2012	Luza	16.7 µg/L
2012	Dohle	12.6 µg/L
2012	Phortse Thanga	19.0 µg/L
2016	Ngozumpa supra-glacial melt	29.4 µg/L
	WHO Guideline	10 µg/L

Arsenic concentrations in surface waters in the Dudh Koshi River Basin.

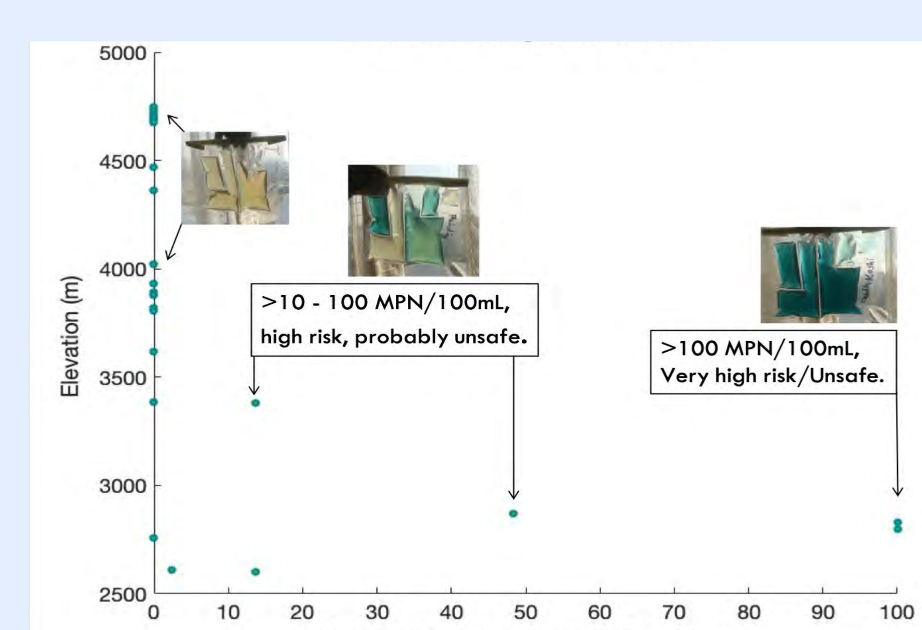
Years with more snow on land may lead to contamination of surface drinking water, based on field measurements of *E. coli*.

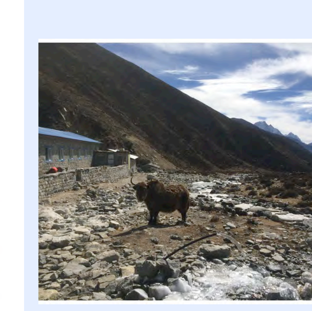


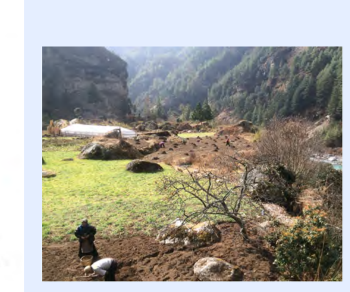
2012 melt volume contributions by elevation for the Dudh Koshi Basin.



Spatially and temporally complete MODIS Snow Covered area and grain size (Painter et al., 2009). **Overall, more snow in 2016, than in 2012, especially in dry season.**







Results from Compartment Bag Test for *E.coli*, an indicator bacteria of fecal contamination. **Contamination as elevation decreases; r^2 = 0.29.**

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