

The COMET Program

Fresh Water: Is There Enough?

Forum: First Universalist Church

Denver, CO

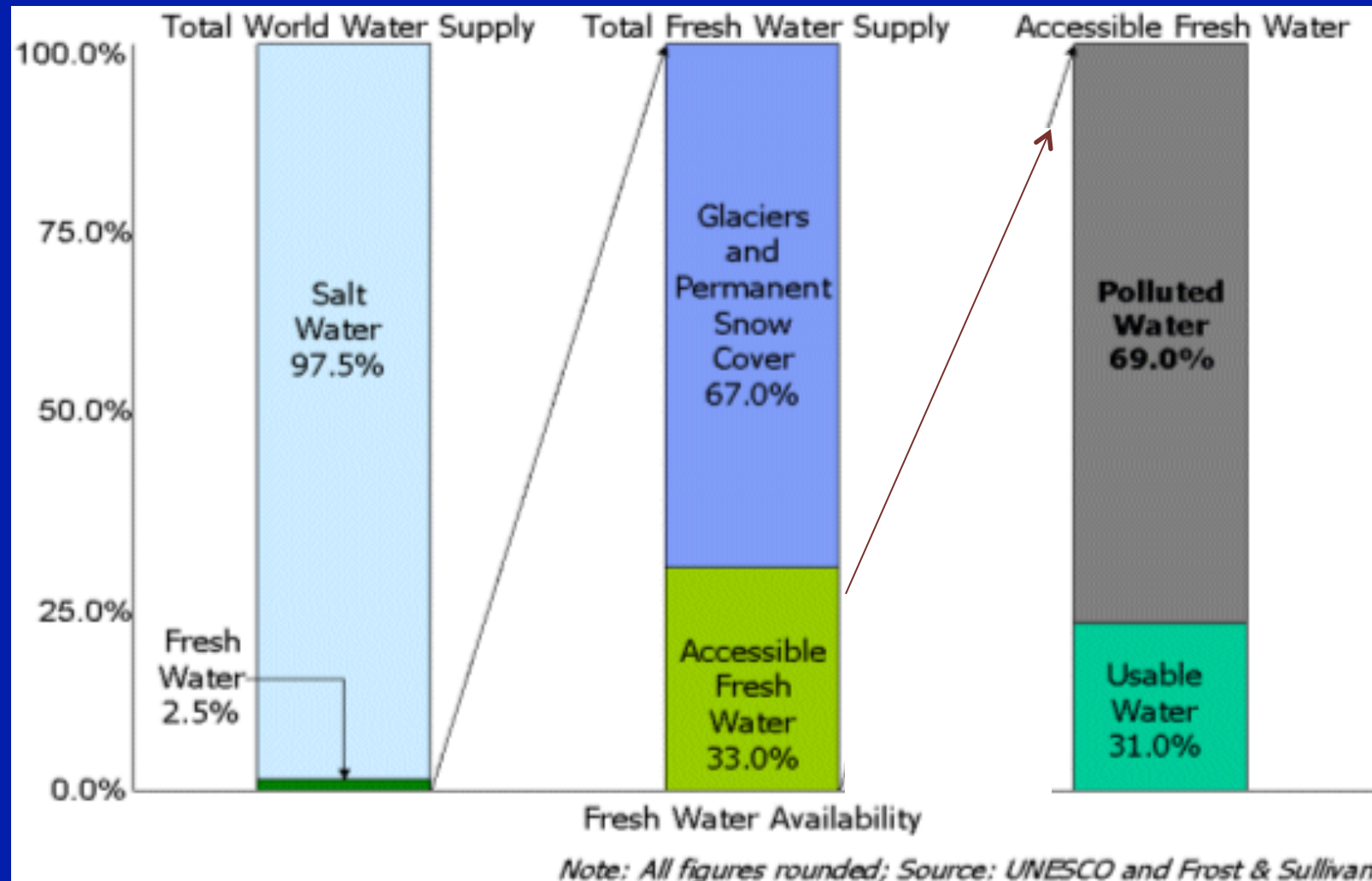
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There's lots of fresh water (in all the wrong places)

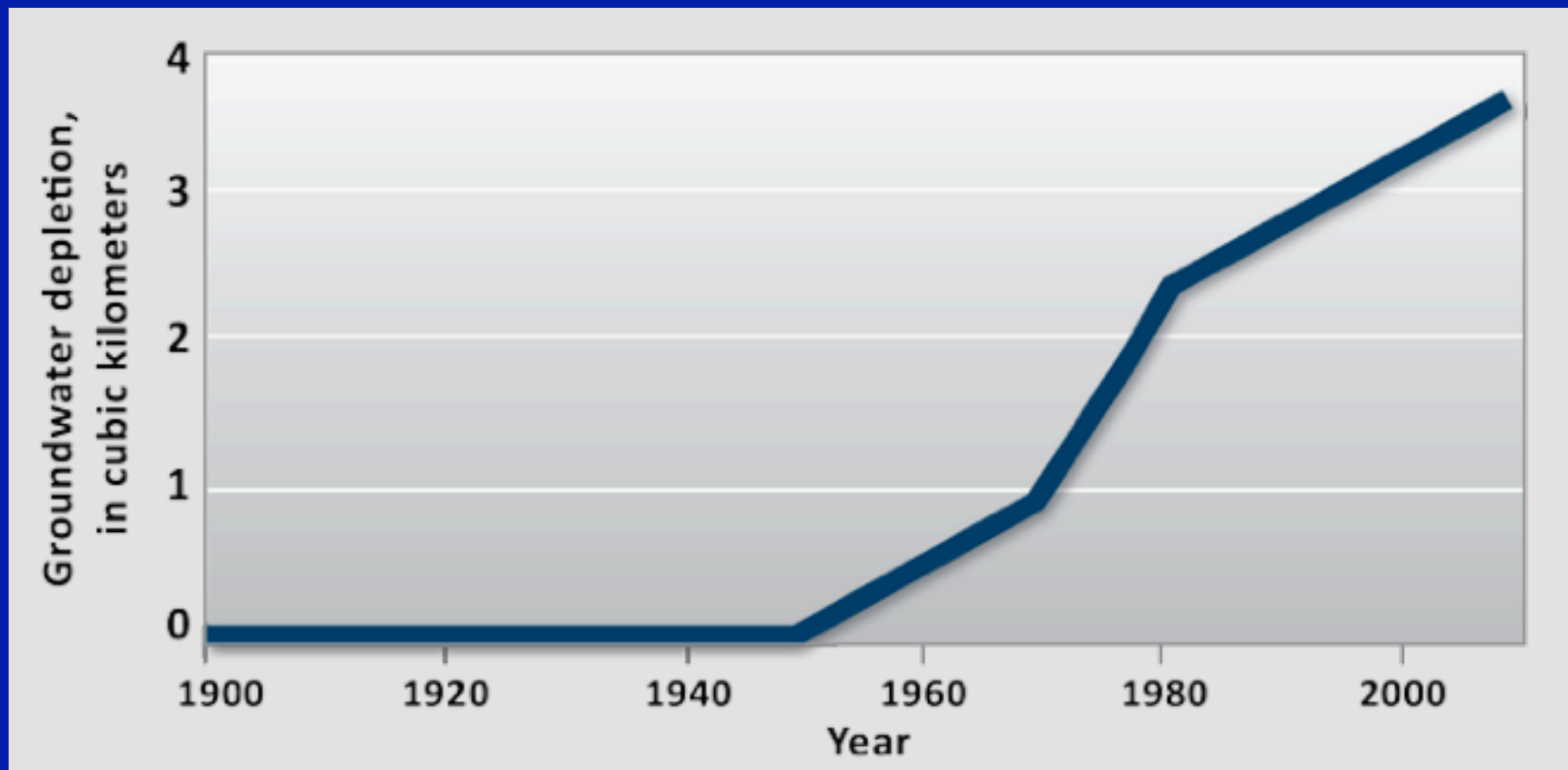


Global water supply



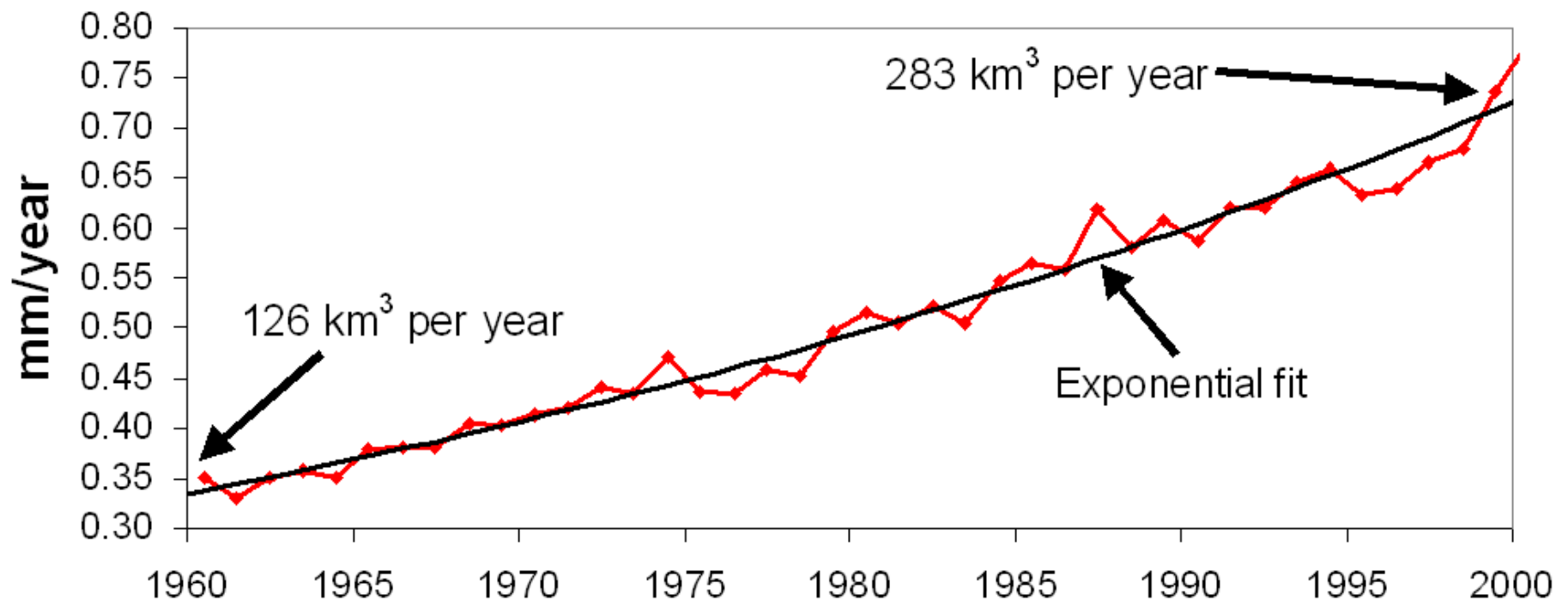
Cumulative groundwater depletion, San Luis Valley, 1900-2008.

Konikow 2013, <http://pubs.usgs.gov/sir/2013/5079/SIR2013-5079.pdf> .



Global groundwater depletion rate

Groundwater Depletion (Wada, et. al., GRL, 2010)



How long will the underground water last?

- 350 years
 - At current global usage rates
 - constant is a conservative projection
 - 100,000 km³ of freshwater underground
 - usage rate is growing exponentially
 - population is still growing (11 billion by 2100)
- groundwater replenishment helps
- changes in usage technology

USA dominates

- About 40% of the global underground water usage takes place in the USA
- My biggest concerns
 - Water supplies in India, China and Africa
 - Water wars
- All is not hopeless: See a great success story Google “rajasthan rainwater harvest”
- <http://www.ecotippingpoints.org/our-stories/indepth/india-rajasthan-rainwater-harvest-restoration-groundwater-johad.html>_

Climate change and water

Climate change will alter local hydrological cycles

Summer temps are rising in Colorado

- Snowpack (Nature's reservoirs)
- Stream flow
 - Earlier, lower, highly variable
- Precipitation
 - Heavier, more erratic
- Drought (and the resultant fires)

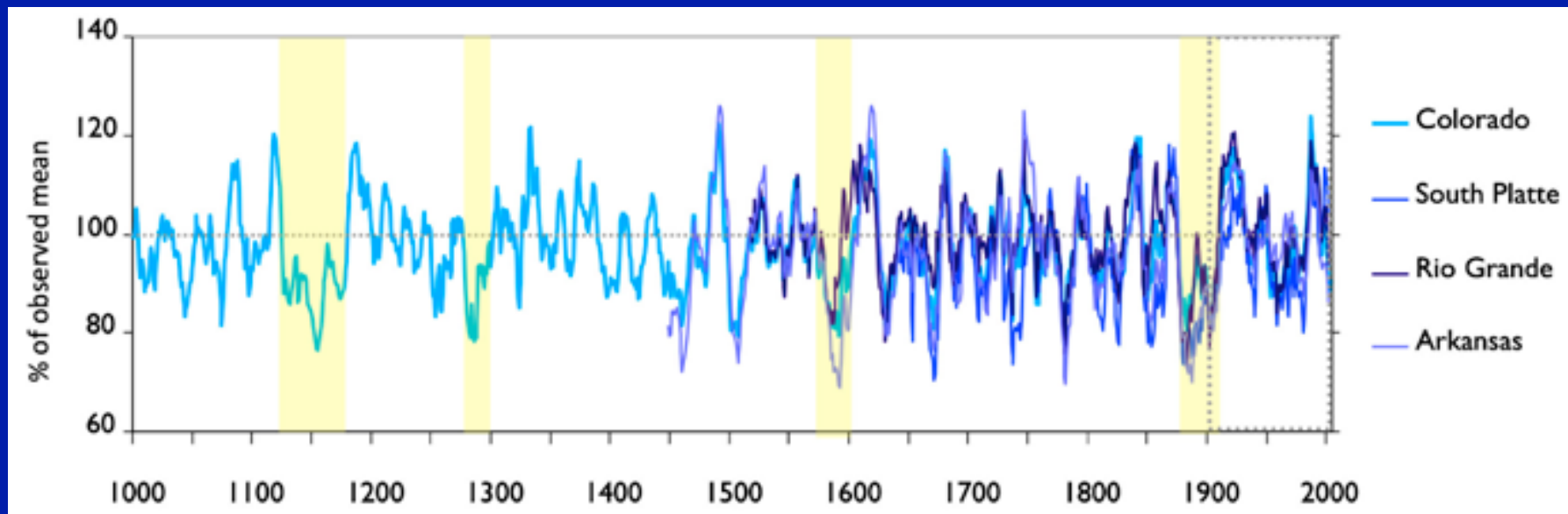
Lake Mead Levels

1999
1220 ft

2013
1060 ft

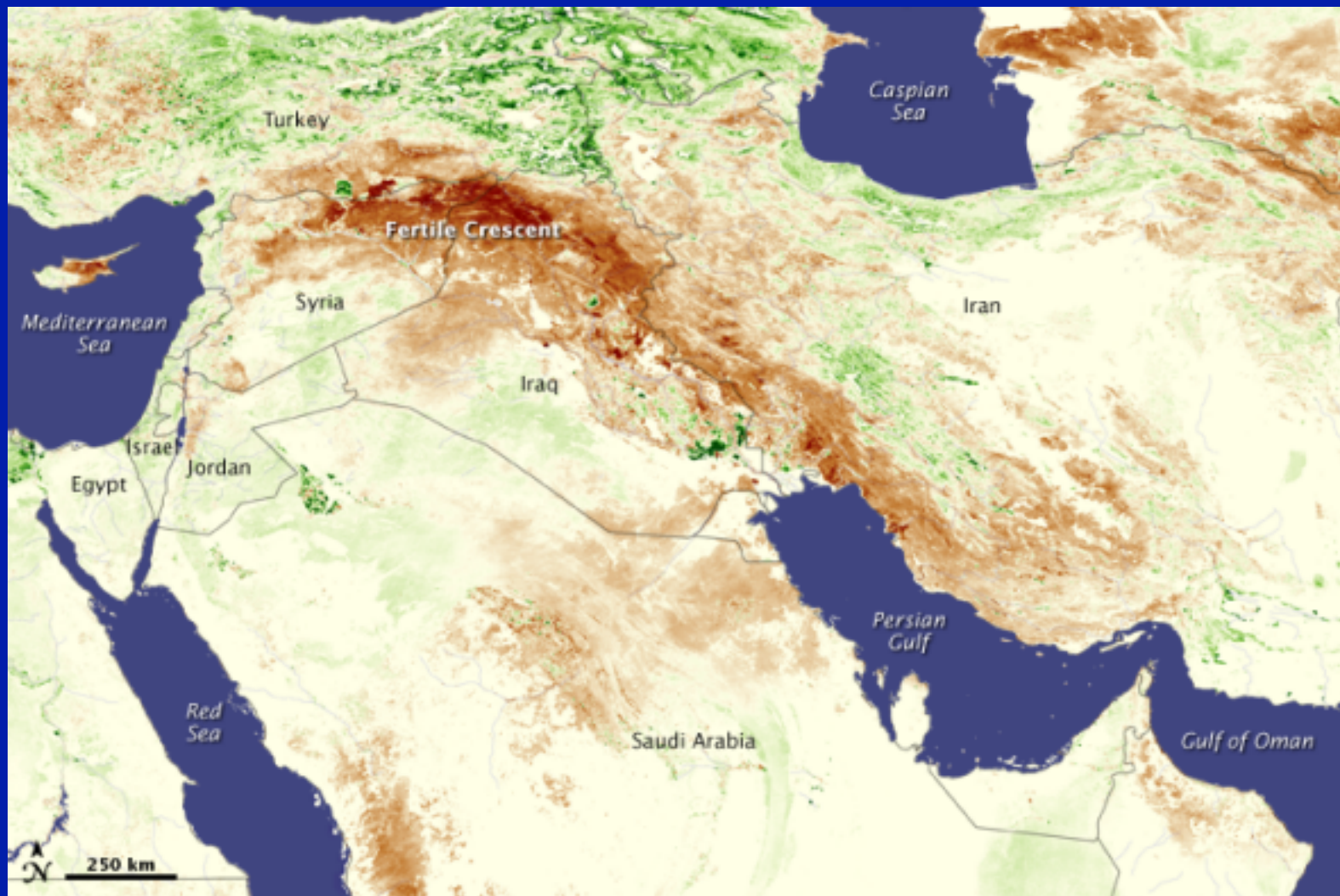


Tree ring data reveals streamflow for the past 1000 years.



All four records show that, prior to 1900, the state experienced droughts that were more severe and sustained than any modern droughts.

Drought and National Security



Conclusion

There is plenty of fresh water but it's in all the wrong places. This resource is finite and must be managed to sustain the increasing population. We must learn to deal with increasing extreme storms (insurance companies and military planners don't deny climate change).