

Sustainable groundwater management

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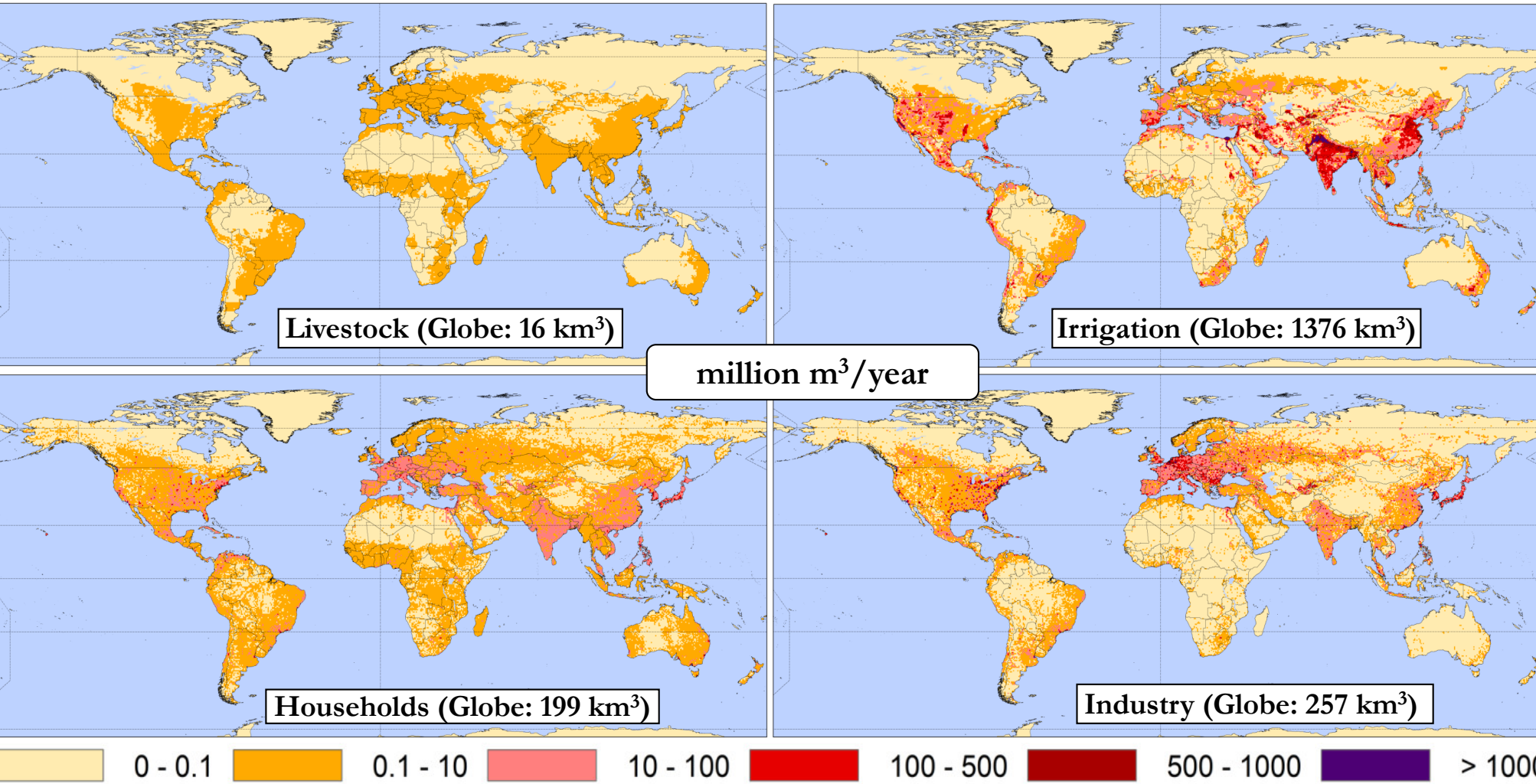
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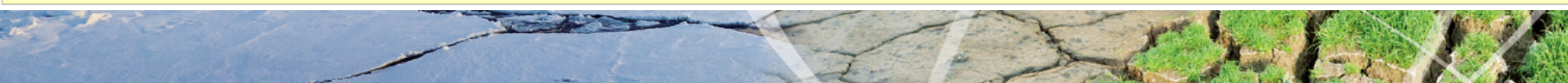
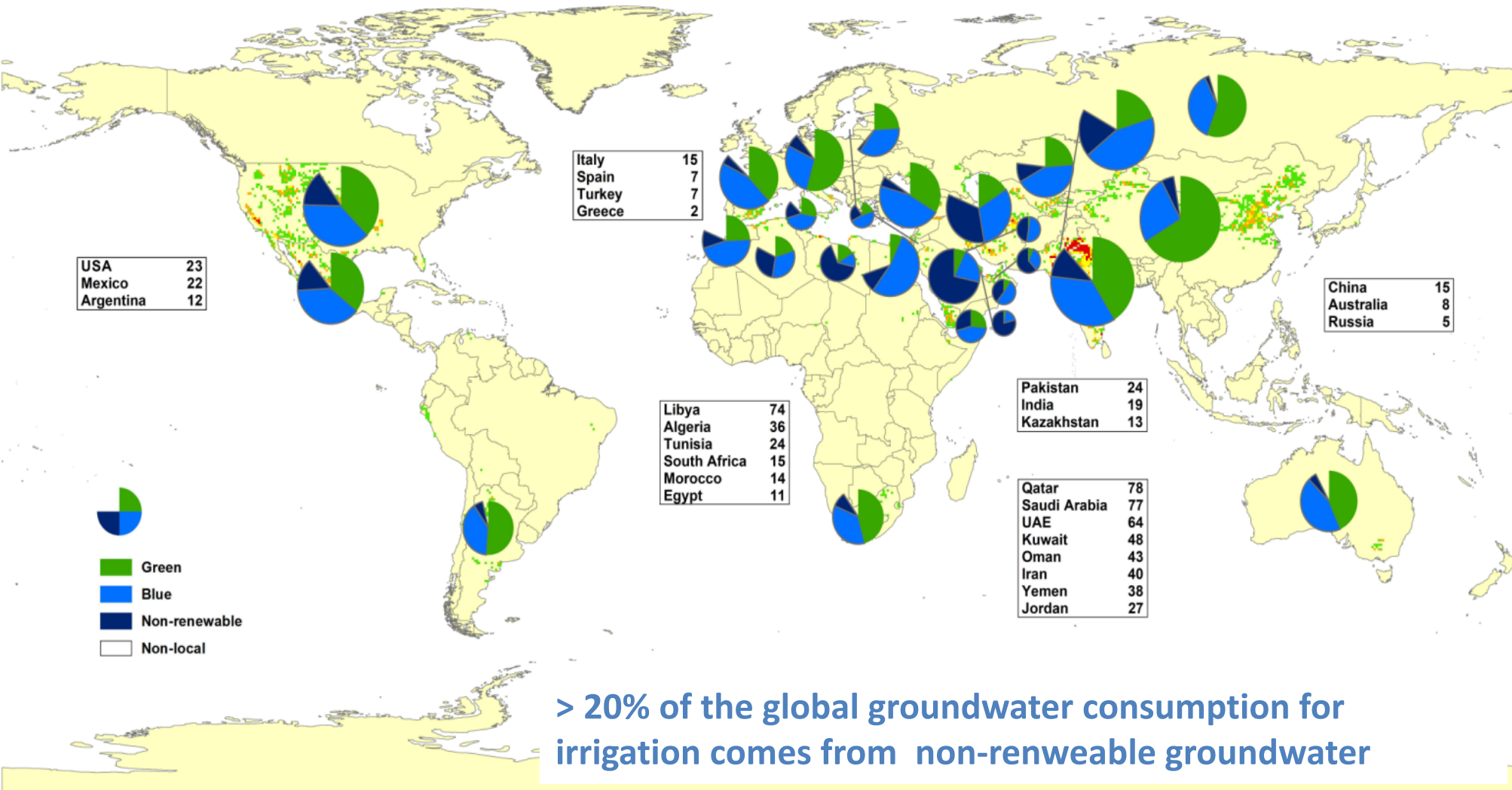
Mitigation, Monitoring, Adaptation

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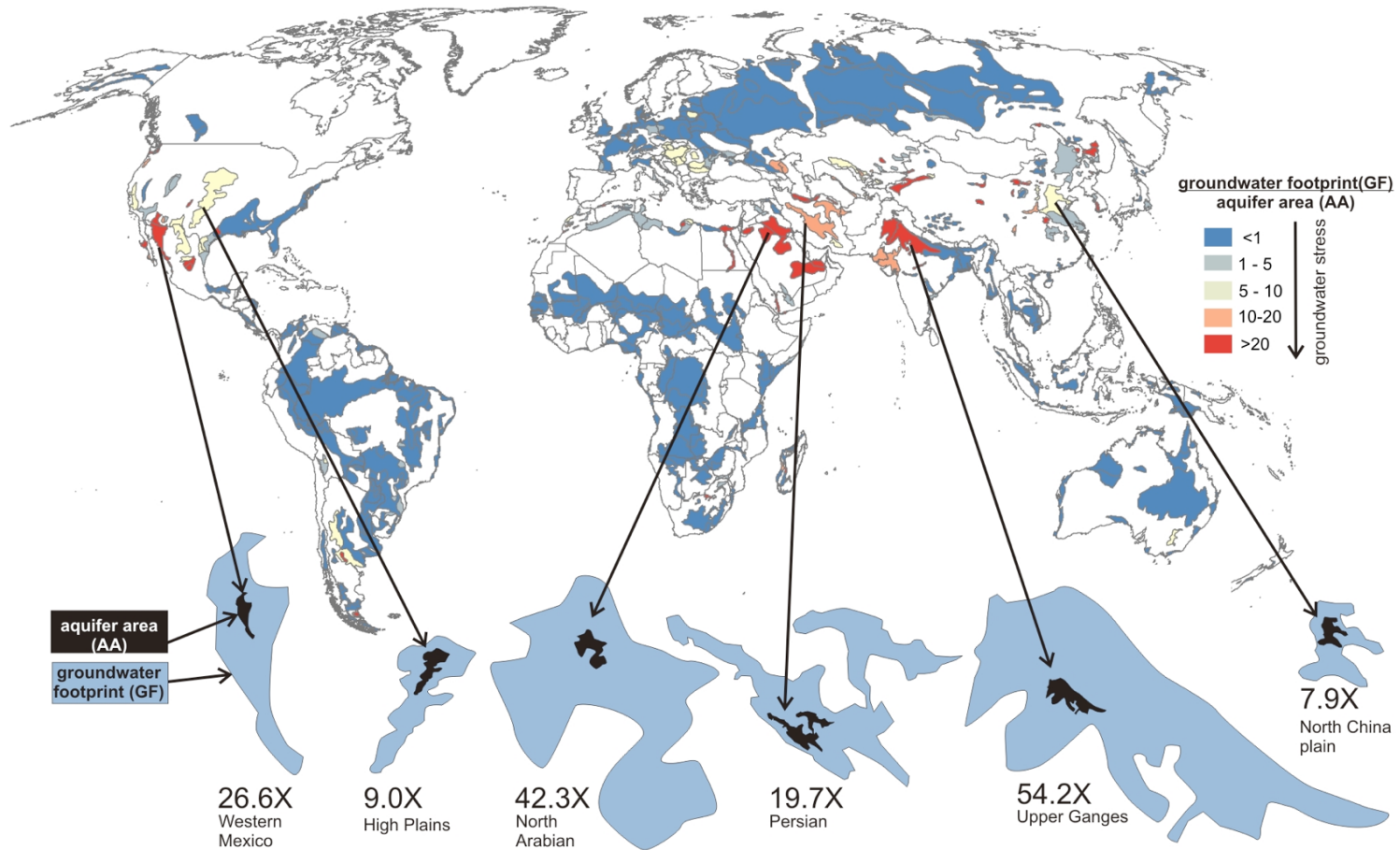
Global water demand



Non-renewable groundwater use



Groundwater depletion

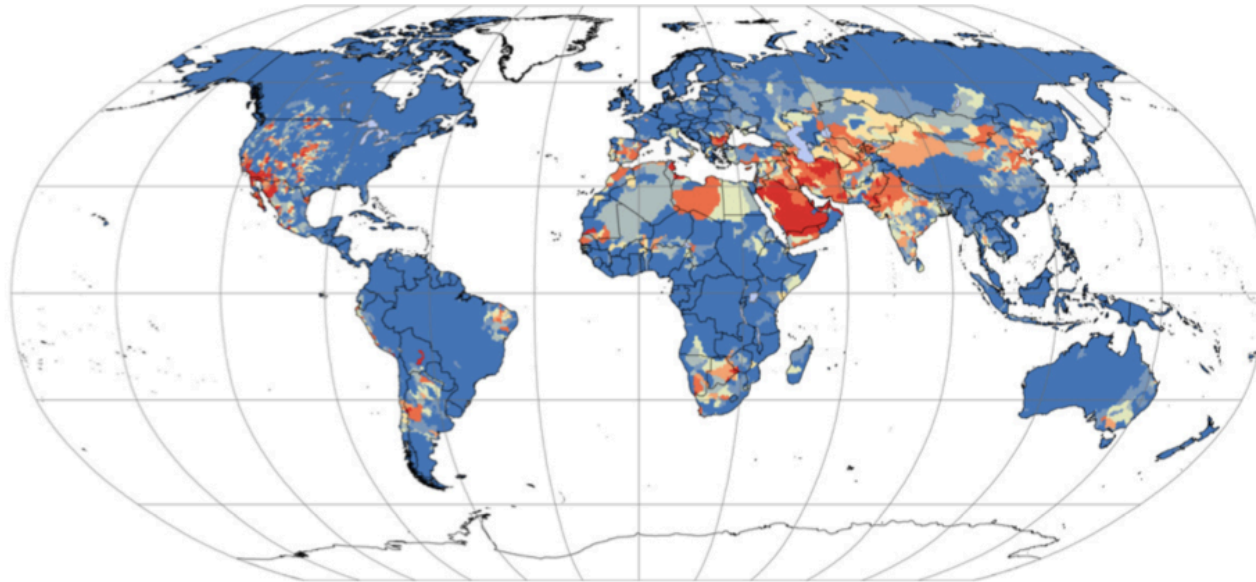


Gleeson, et al., Nature, 2012.

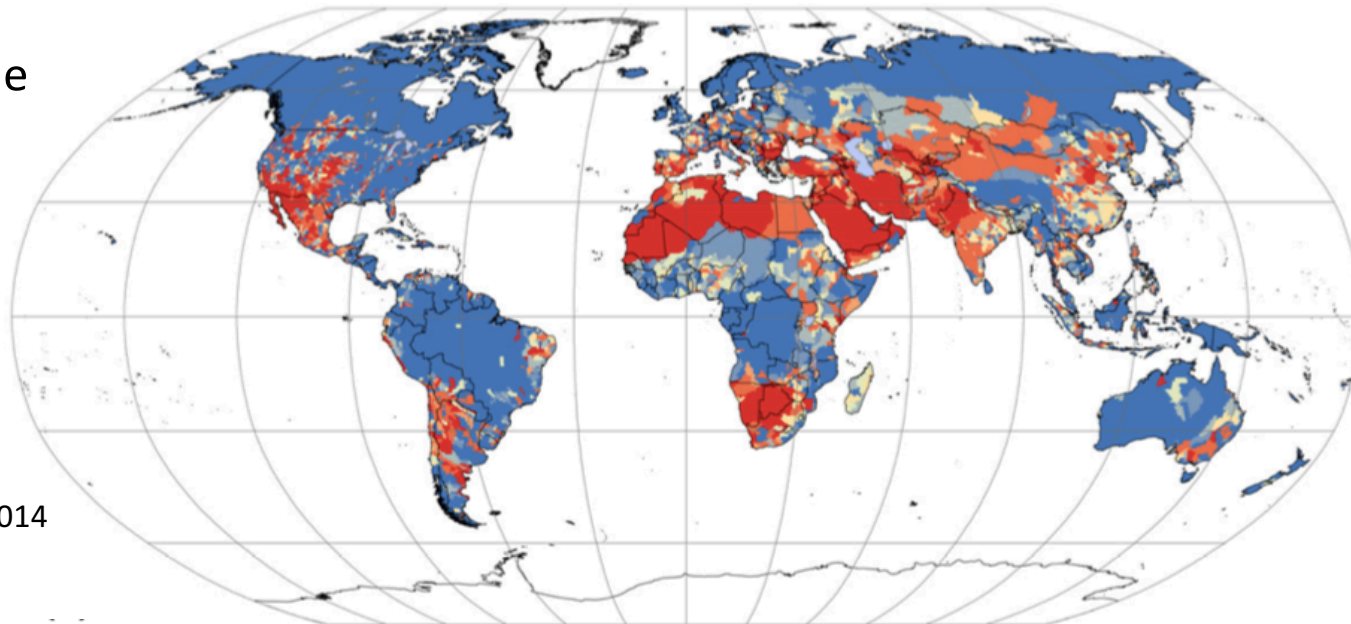
Global groundwater footprint = 3.5 times the global area of productive aquifers



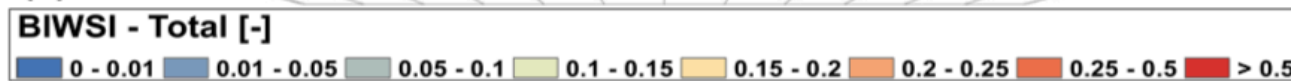
Current and future water stress



Fraction of non-sustainable water use

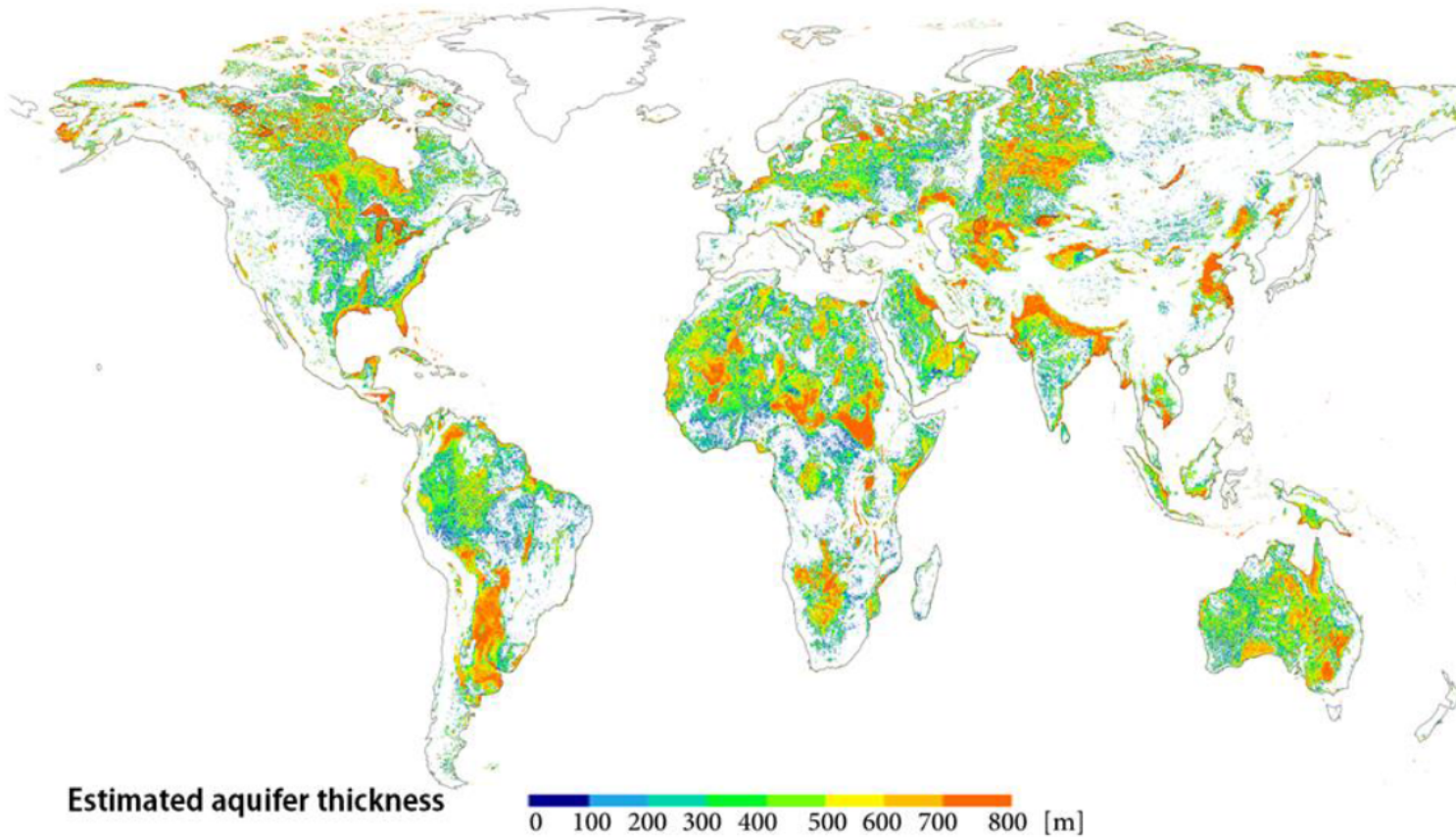


Wada and Bierkens, 2014



How much groundwater do we have?

Global estimates between 1 - 60 million km³!

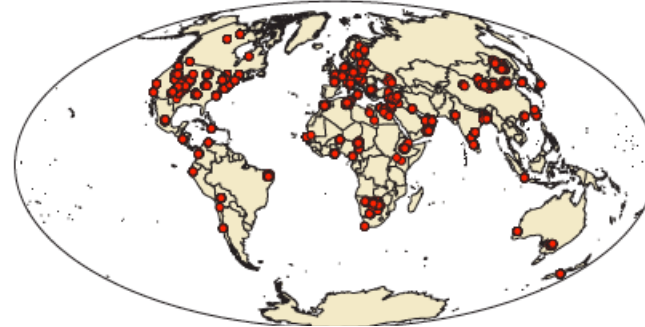
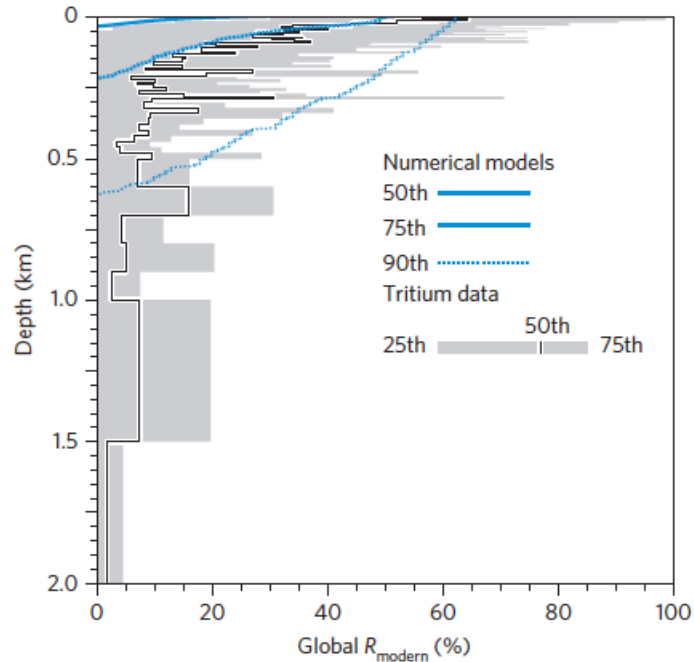


De Graaf et al., 2015

Cause: no global information on subsoil properties?

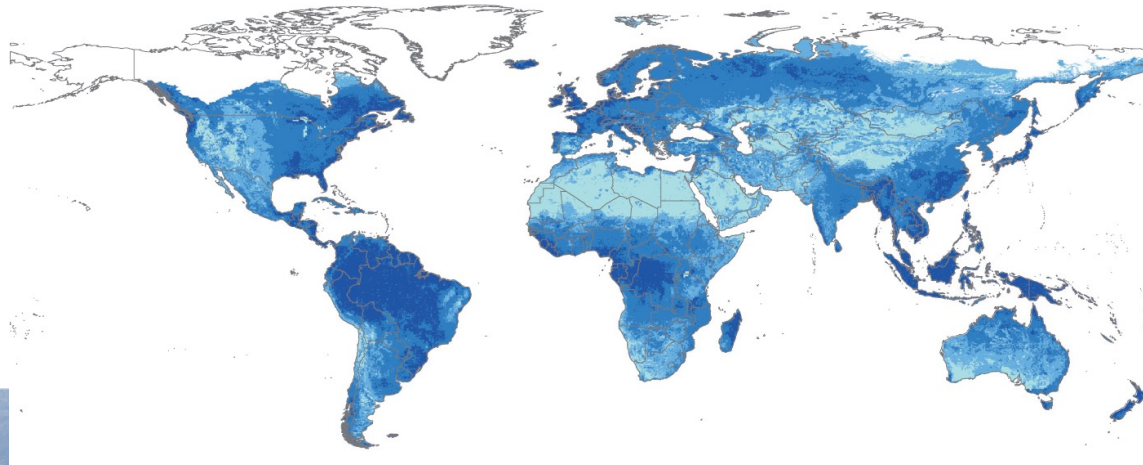


The use of isotopes



^3H (Tritium) data are used to estimate the distribution of groundwater with depth. This allows one to estimate modern groundwater (< 50 years):

- Areas with large renewable volumes
- Areas with water quality threats

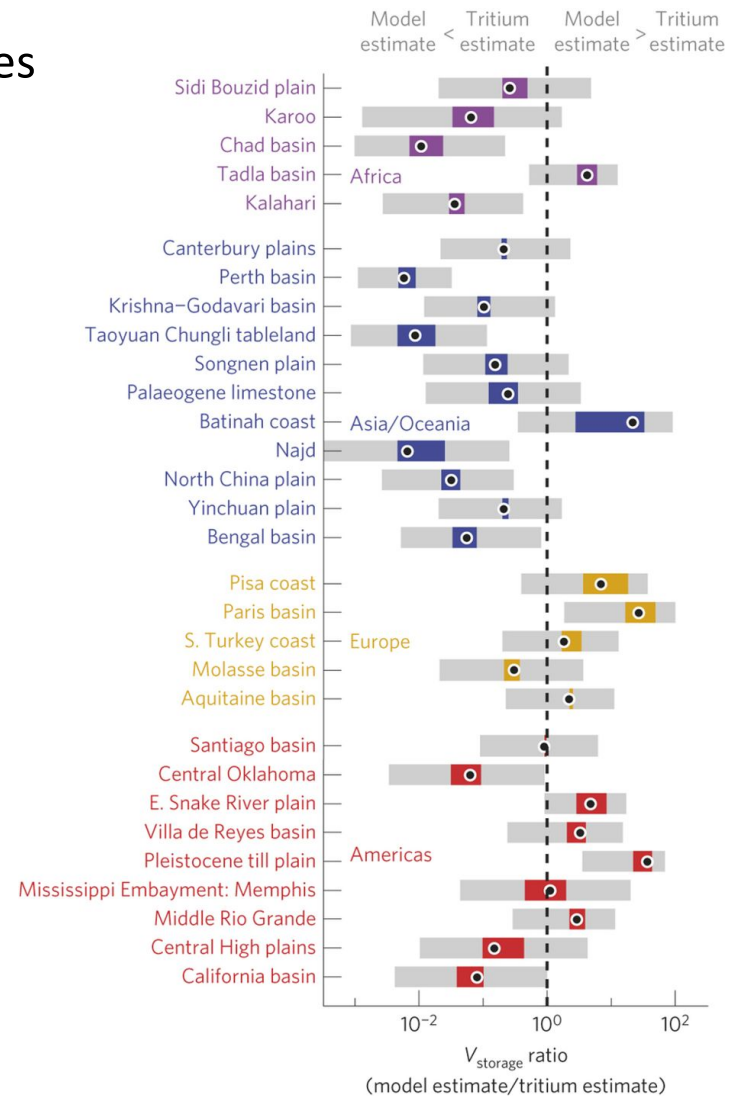


Isotopes to improve models

Comparing different aquifer depths and permeabilities with estimates based on isotopes



Groundwater models

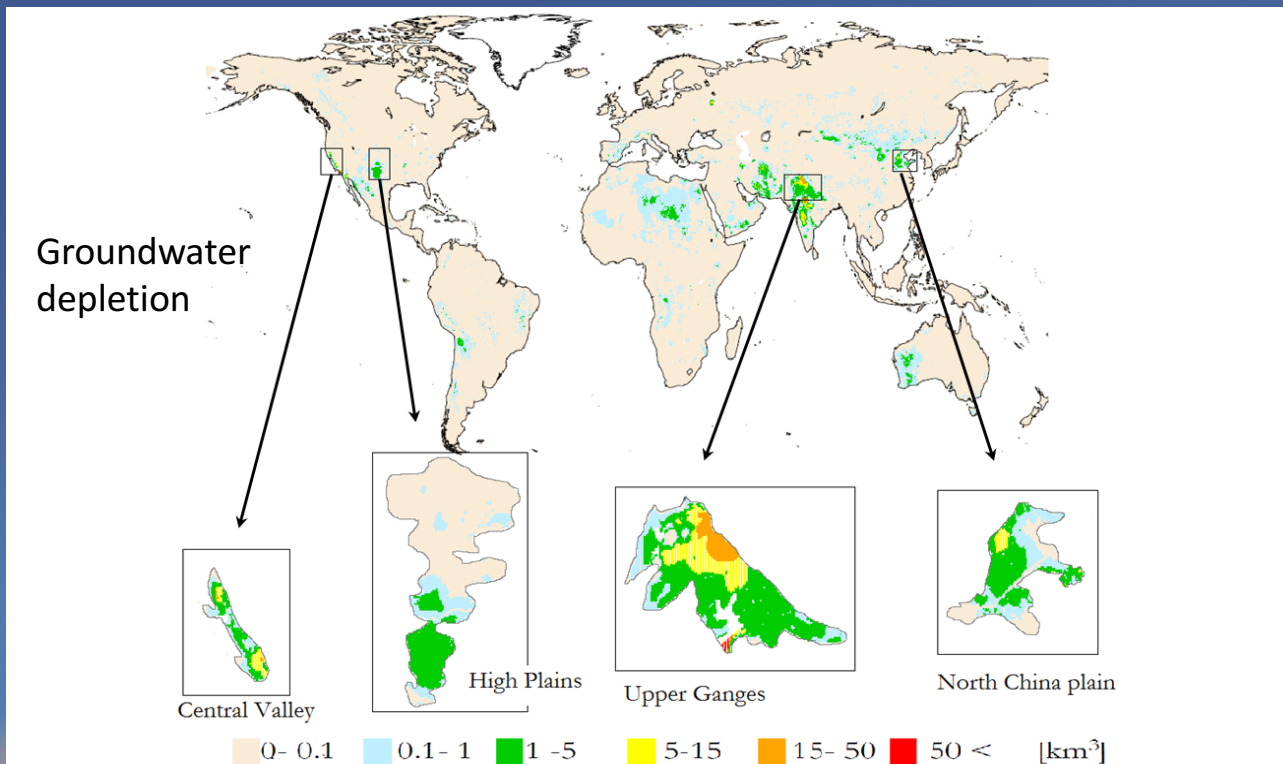


Thank you!

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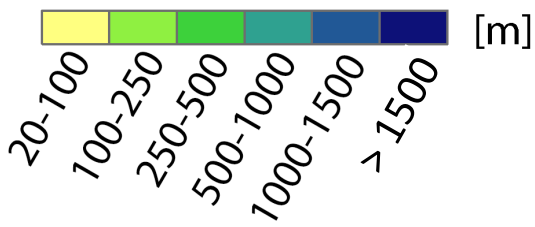
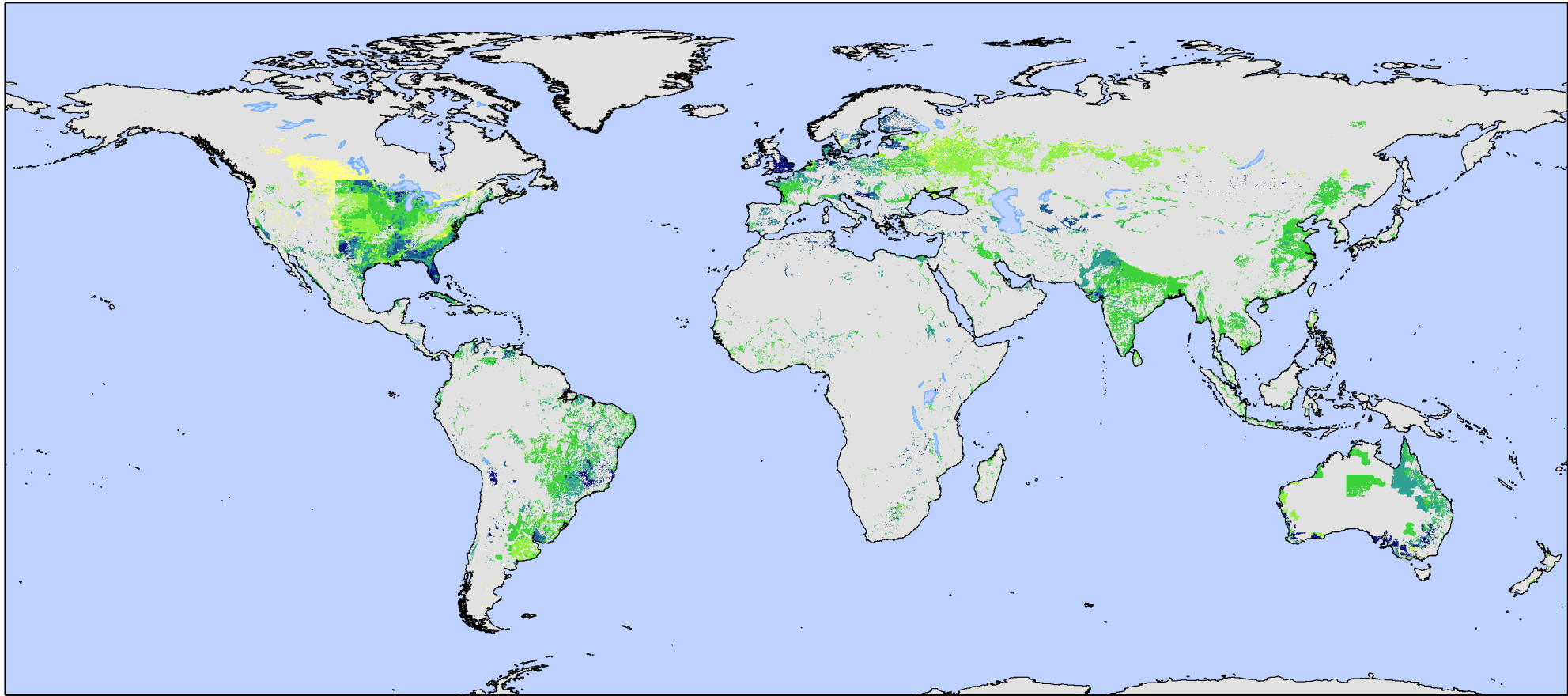
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Maximum economic groundwater depth



Extra slide