

Irrigation storage: a blind spot for analyzing and mitigating externalities of future water infrastructure

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The quest for irrigation and hydropower: Shasta Dam (ca. 1942)

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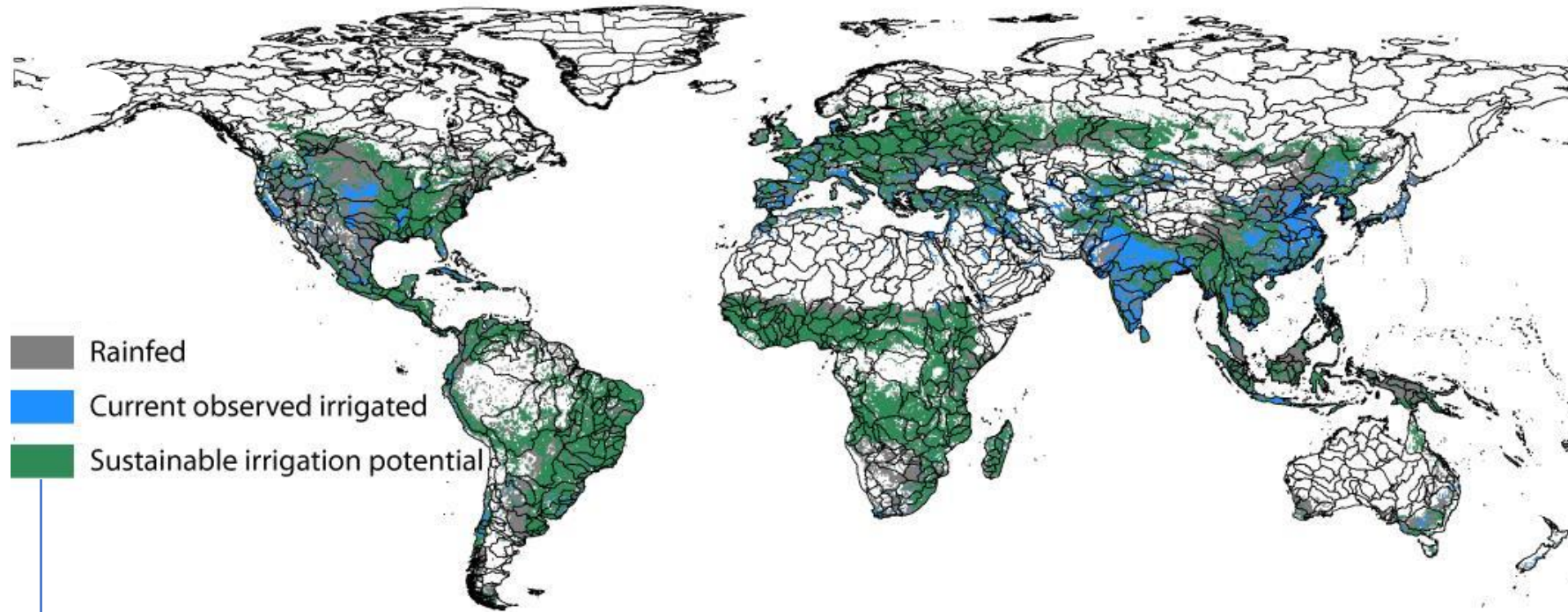
**How to meet projected 50
% increases in food
demand by 2050?**

Alternatives

Extensification:
Further pressures on
biodiversity and habitat

Intensification:
Increase productivity of
existing crop lands

Biophysical potentials for expanding irrigation

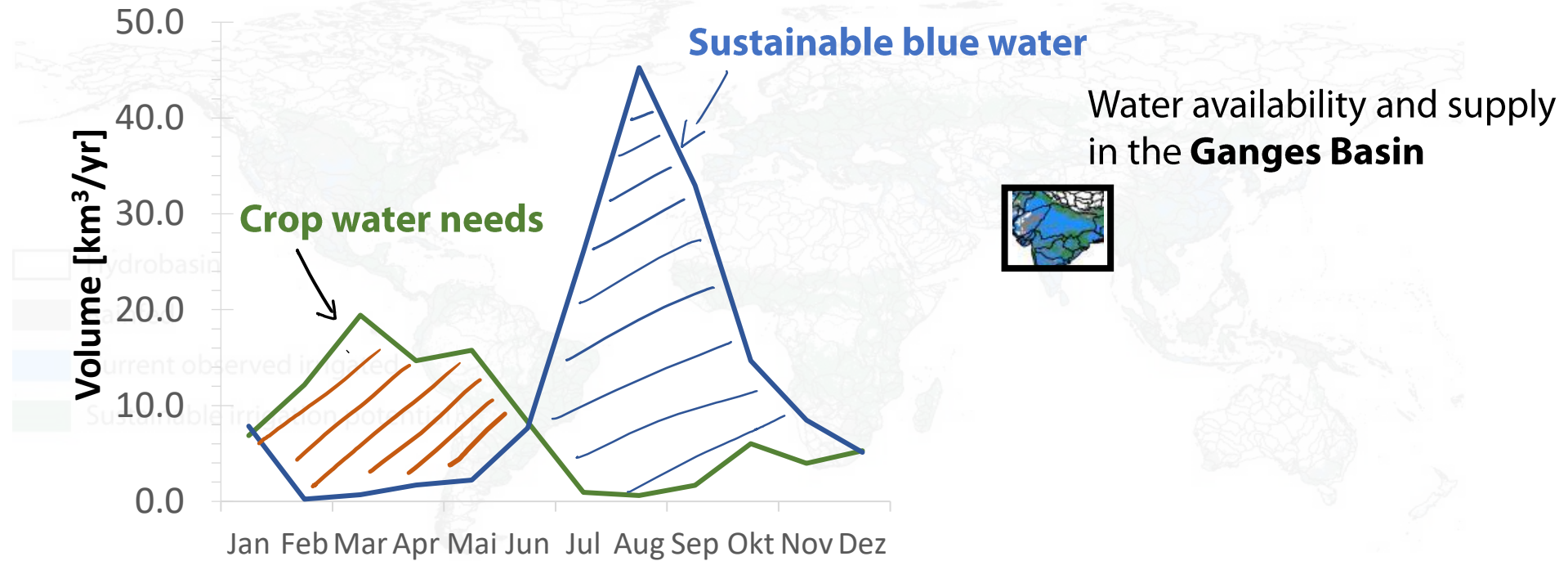


Areas where food production could be increased through irrigation

- On existing croplands
- Using sustainable blue water

Sustainable expansion of irrigation: 408 km³/yr of sustainable water resources remain to produce food for **2.8 billion people** ^[1]

Biophysical potential = real world potential?



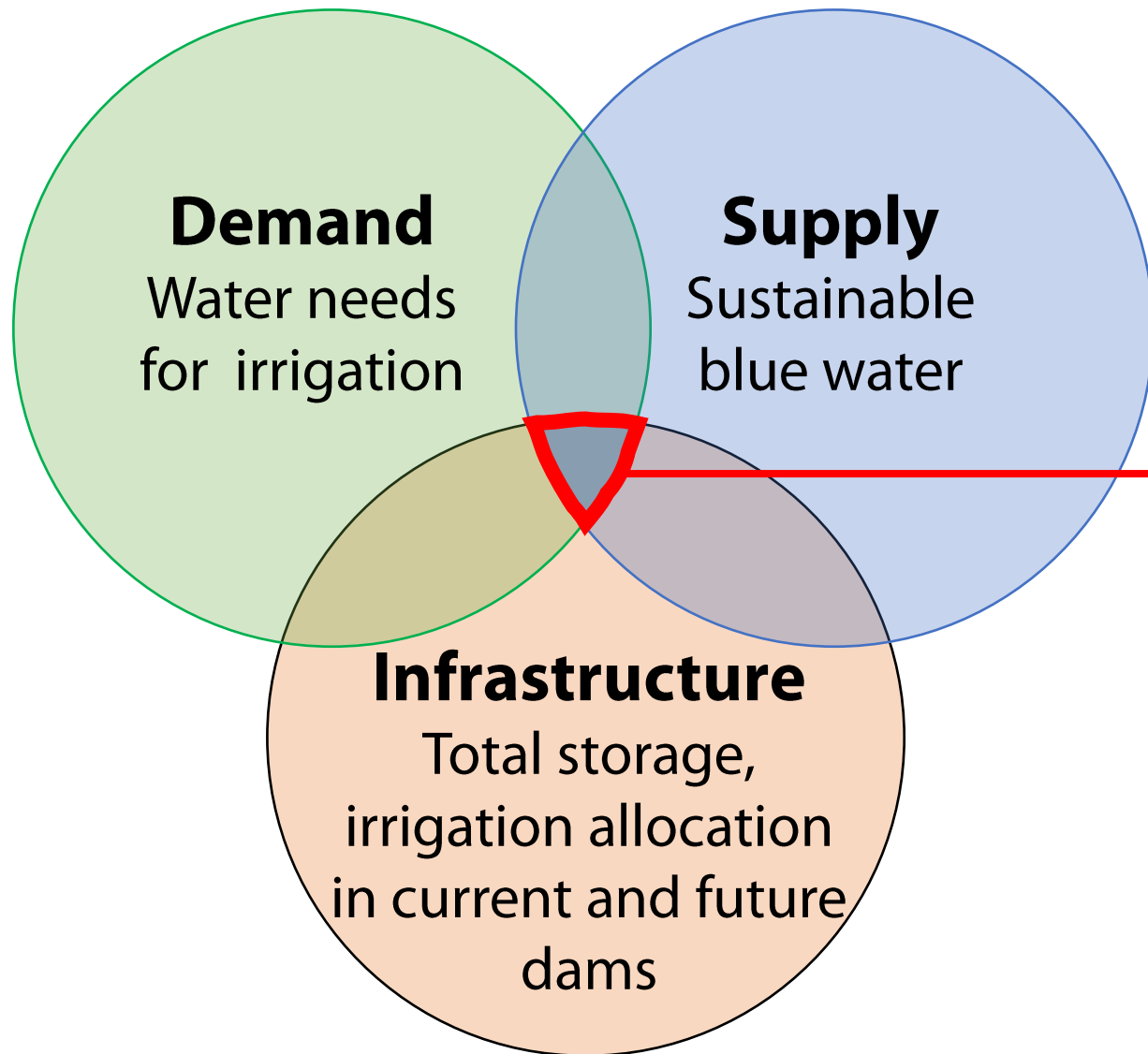
Blue water availability exceeds water demand

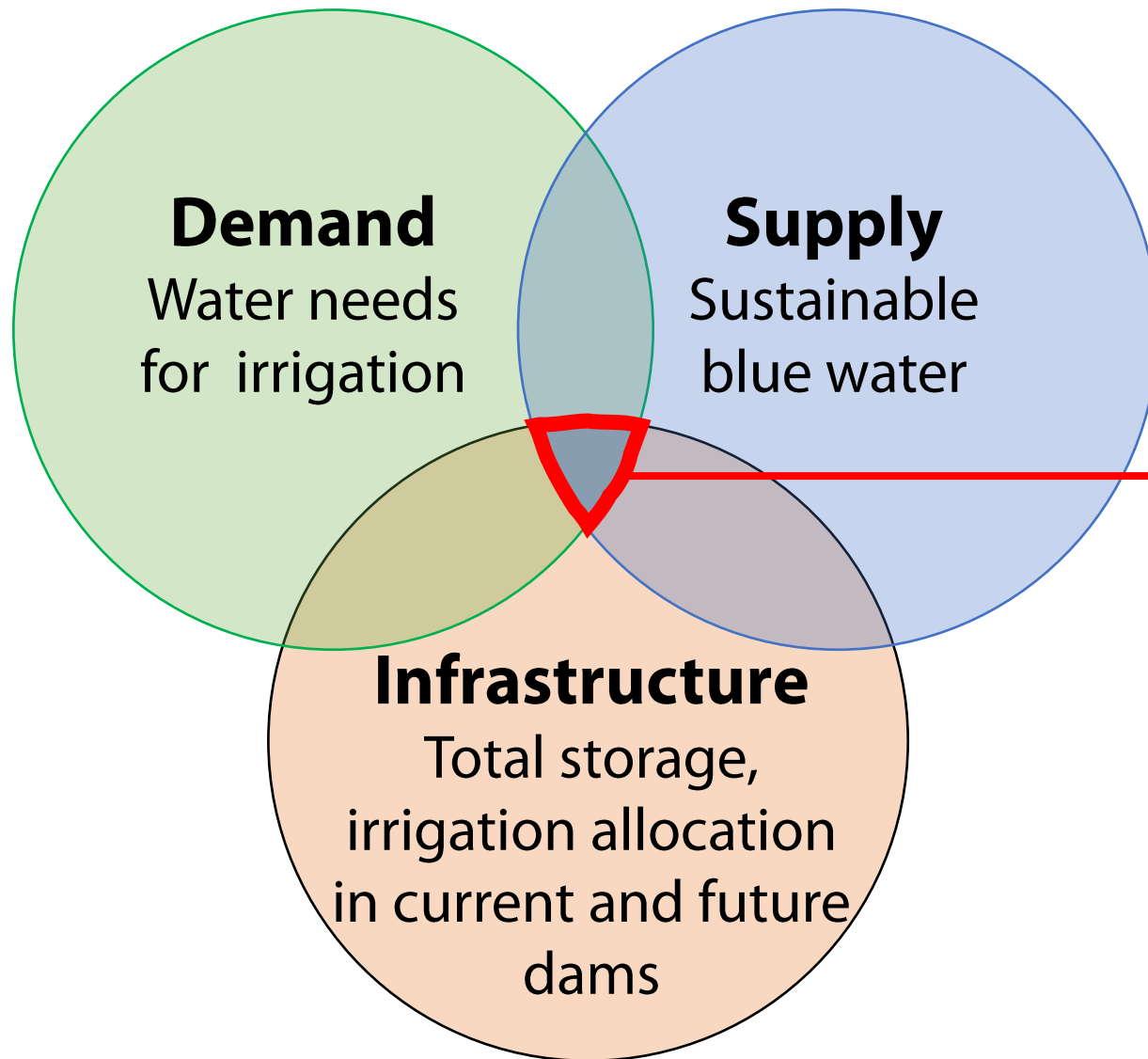
Biophysical potential only useable if water storage is available

Role of water storage for future food systems?

How much storage can be provided by dams?

Role of dams for irrigation?





Role of dams for irrigation?

Monthly basin water balance analysis
to determine the need for water storage

Scenario 1: Current
irrigation, current
irrigation dams

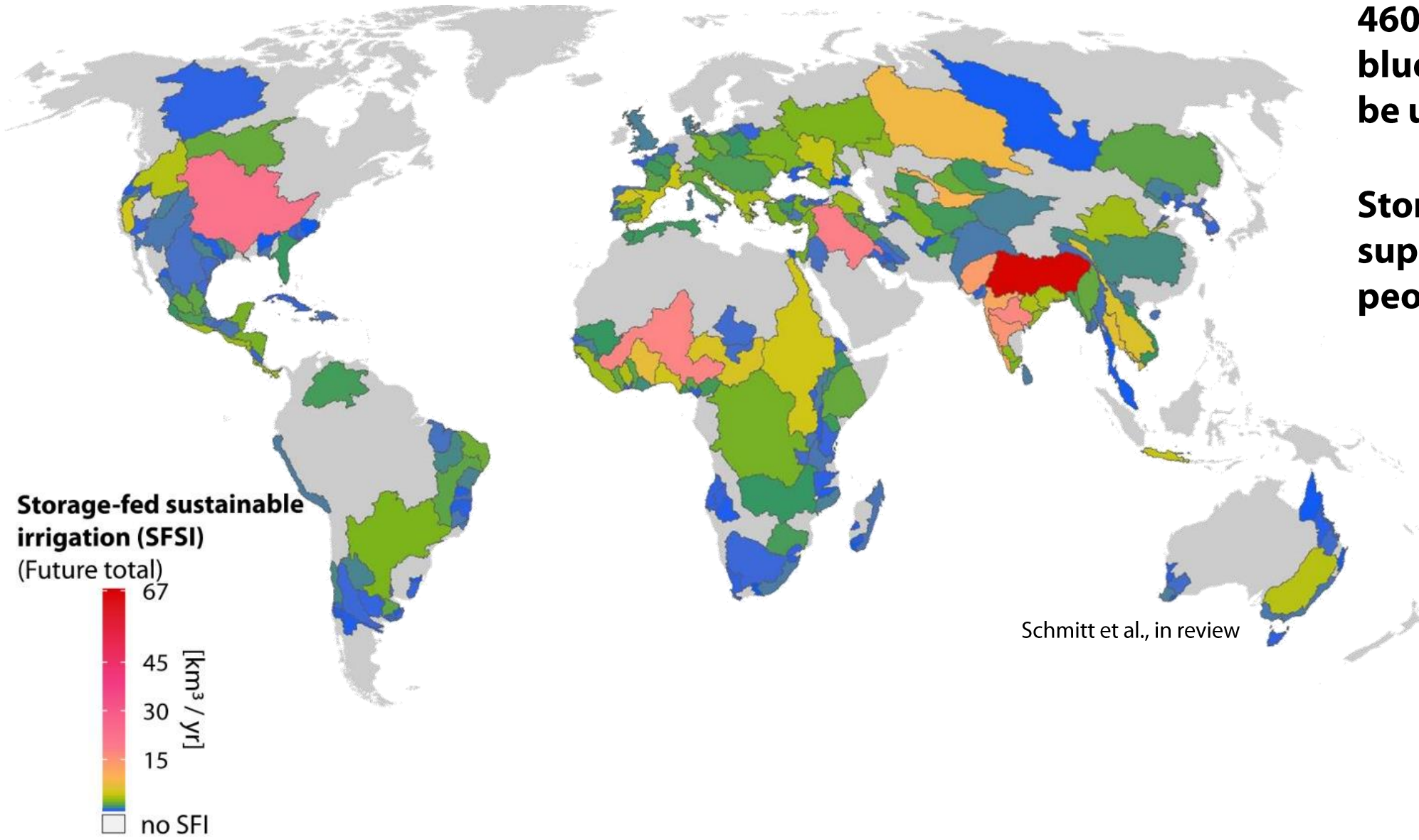
Scenario 2: Future
irrigation, + 3700
identified dams

Dam-level MCA for more than 5000 dams
considers uncertainty in storage allocation
to irrigation

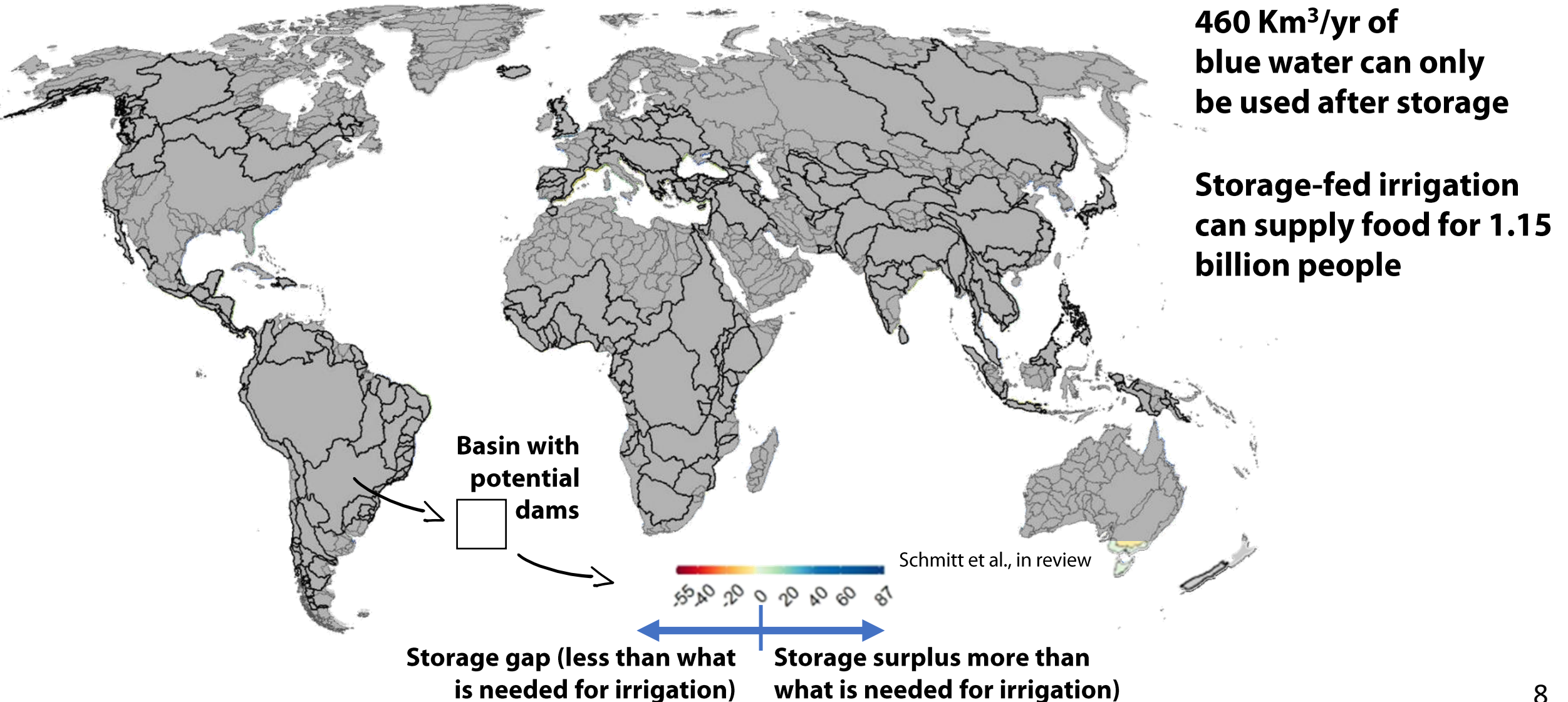
Results: importance of stored water

460 Km³/yr of sustainable blue water can only be used after storage

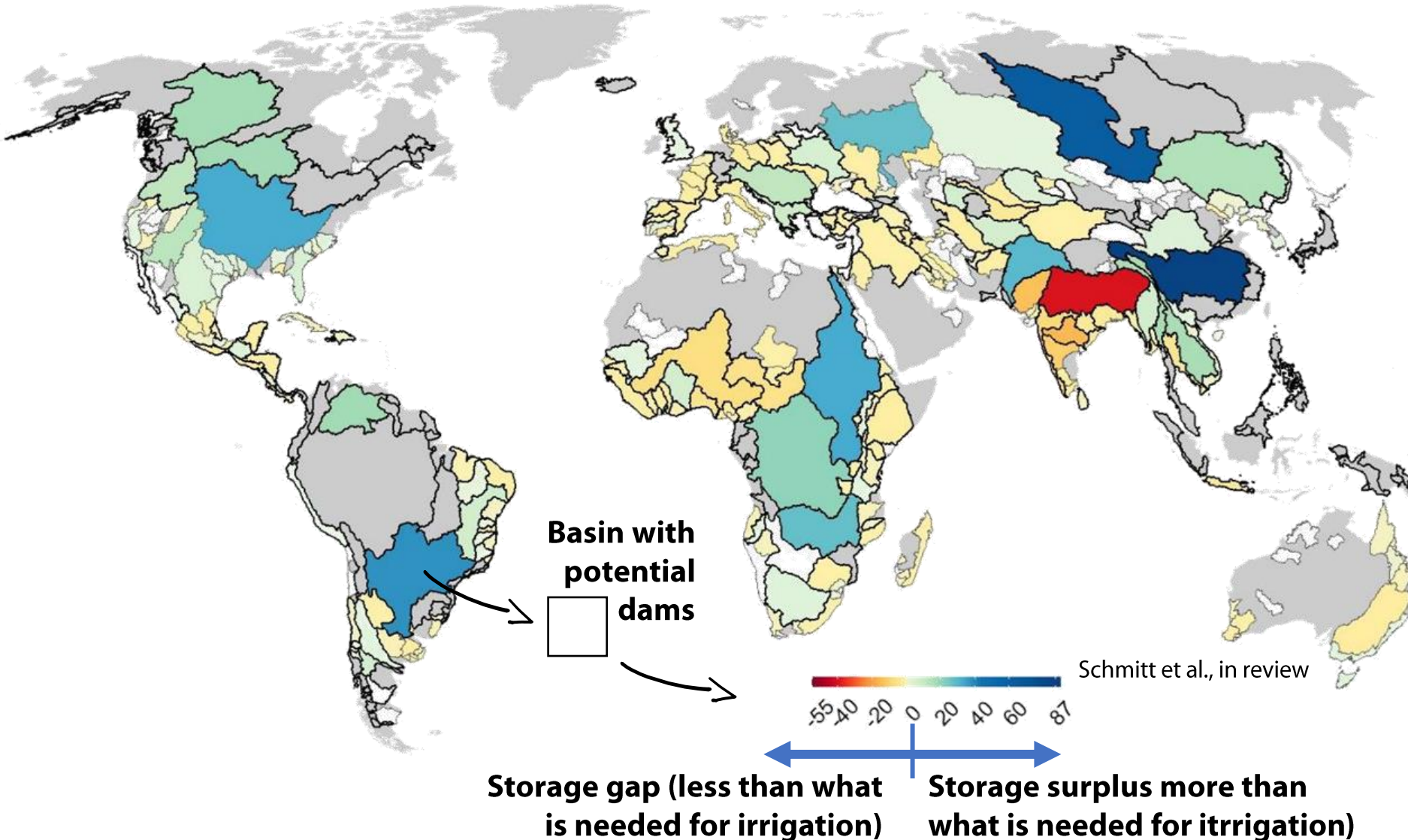
Storage-fed irrigation can supply food for 1.2 billion people



Results: role of current and future dams



Results: role of current and future dams



460 Km³/yr of blue water can only be used after storage

Storage-fed irrigation can supply food for 1.15 billion people

Current and future reservoirs can meet 50 % (227 km³/yr) of the biophysical potential

Even with all planned dams, major storage gaps persist in Africa and South Asia



Conclusion

Water storage required to leverage sustainable blue water use in food systems

Global assessments to highlight future roles of dams in the WEF sector (beyond hydropower)

Water storage will be a major ecologic-economic bottleneck for future food systems

Outlook: Climate change, alternative soft paths to water storage



Thank you!

Get in touch:

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