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science for global insight

Modelling integrated SDG pathways:

A case study analysis of goals 6, 7, 12 and 13

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TWI2050
The World in 2050
www.twi2050.org

- **The World in 2050 (TWI2050)** is a global research initiative in support of a successful implementation of the United Nations' 2030 Agenda.
- The goal is to provide the fact-based knowledge to support the policy process and implementation of the SDGs.

IIASA

Some previous work

- GEA (2012), van Vuuren et al. (2015)
  - Pathways to achieve multiple sustainability targets
- Kim et al. (2016)
  - Balancing water availability and use at the basin-scale in GCAM
- Gao and Bryan (2017)
  - Integrated SDG pathways from a land-use perspective for Australia

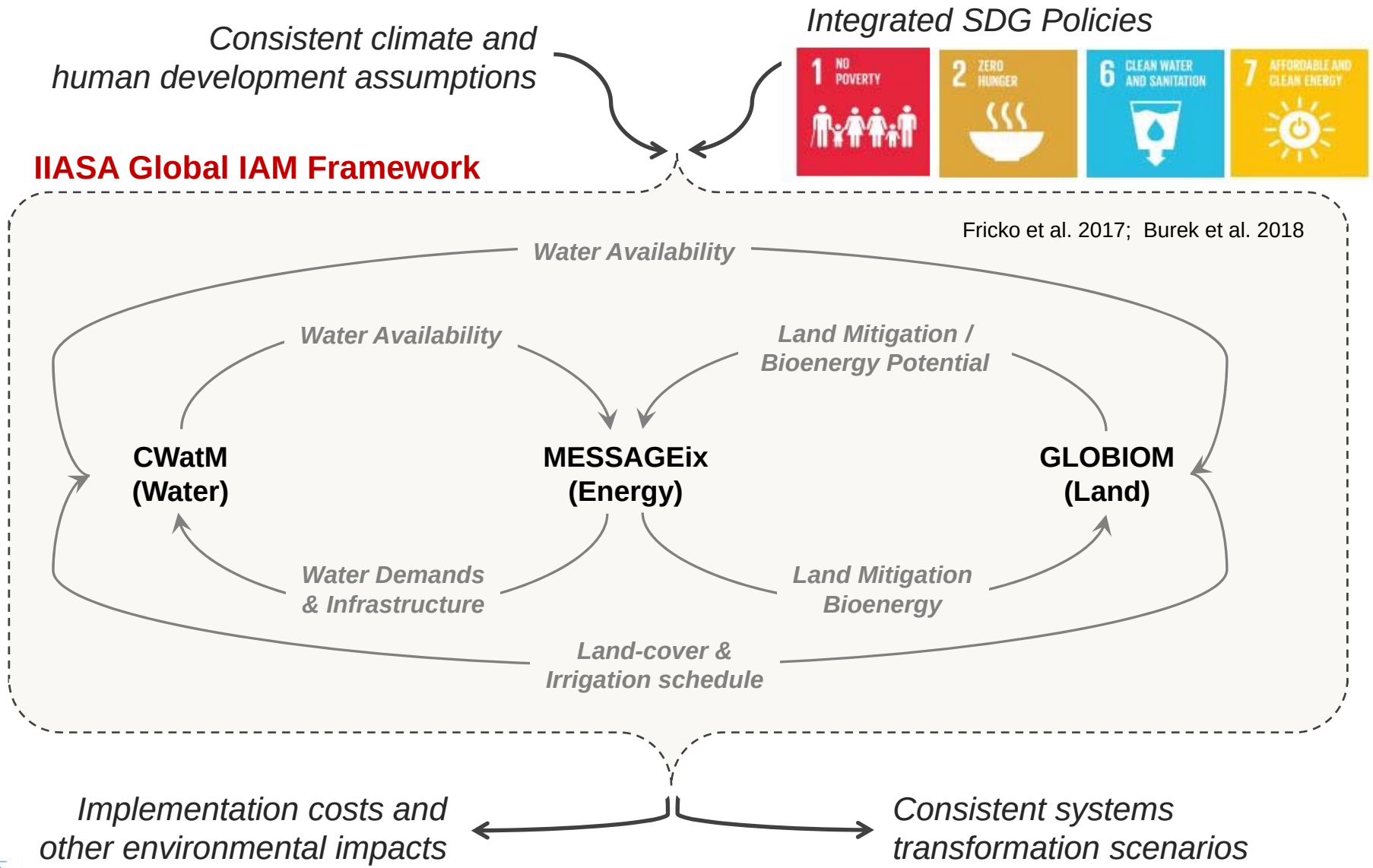
Research Questions

- How can we quantify interactions between water, energy and climate SDGs?

- How might sustainable consumption behavior impact SDG implementation costs?

Objective of Global IAM Development

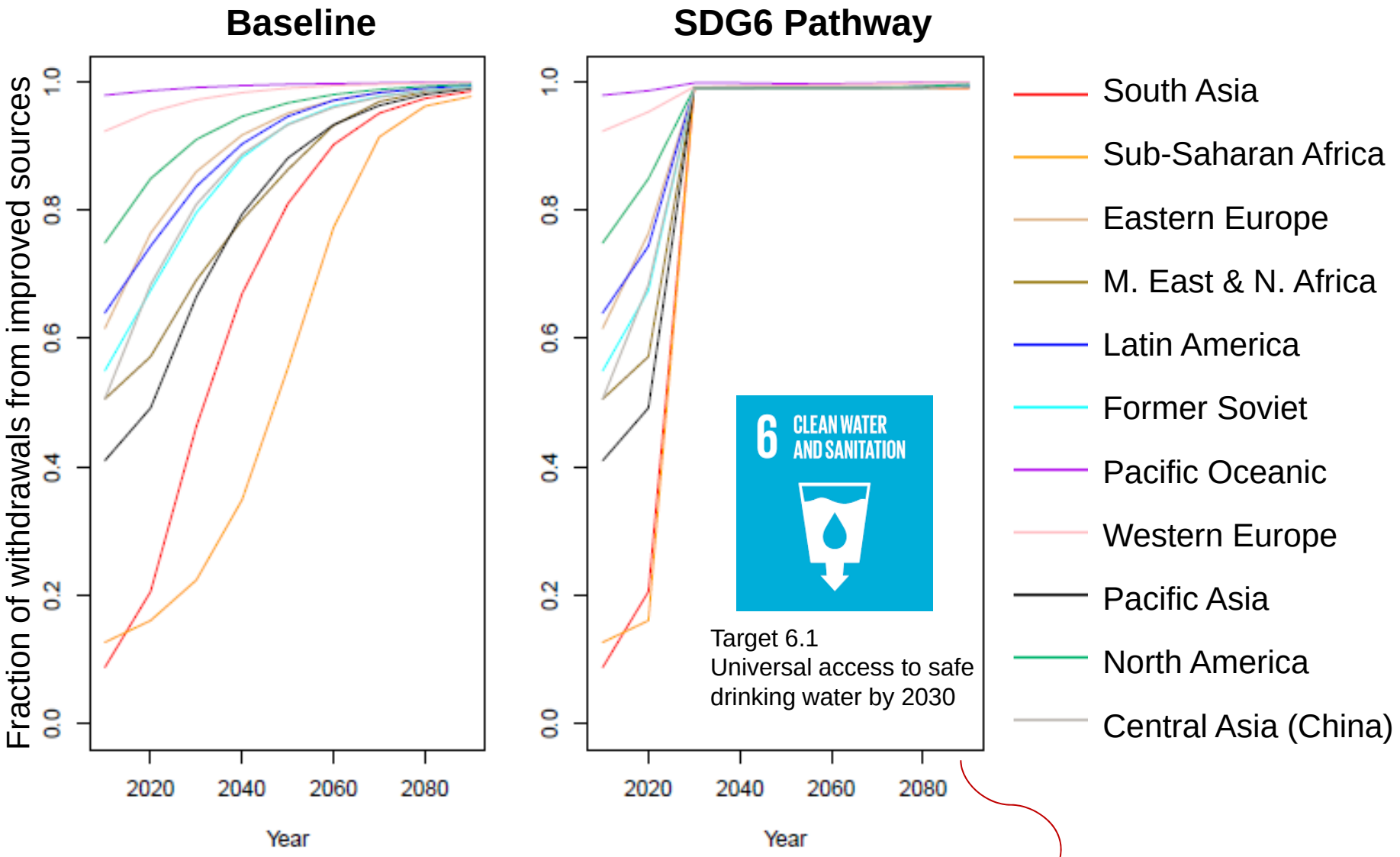
Integrated representation of water-energy-land transformation



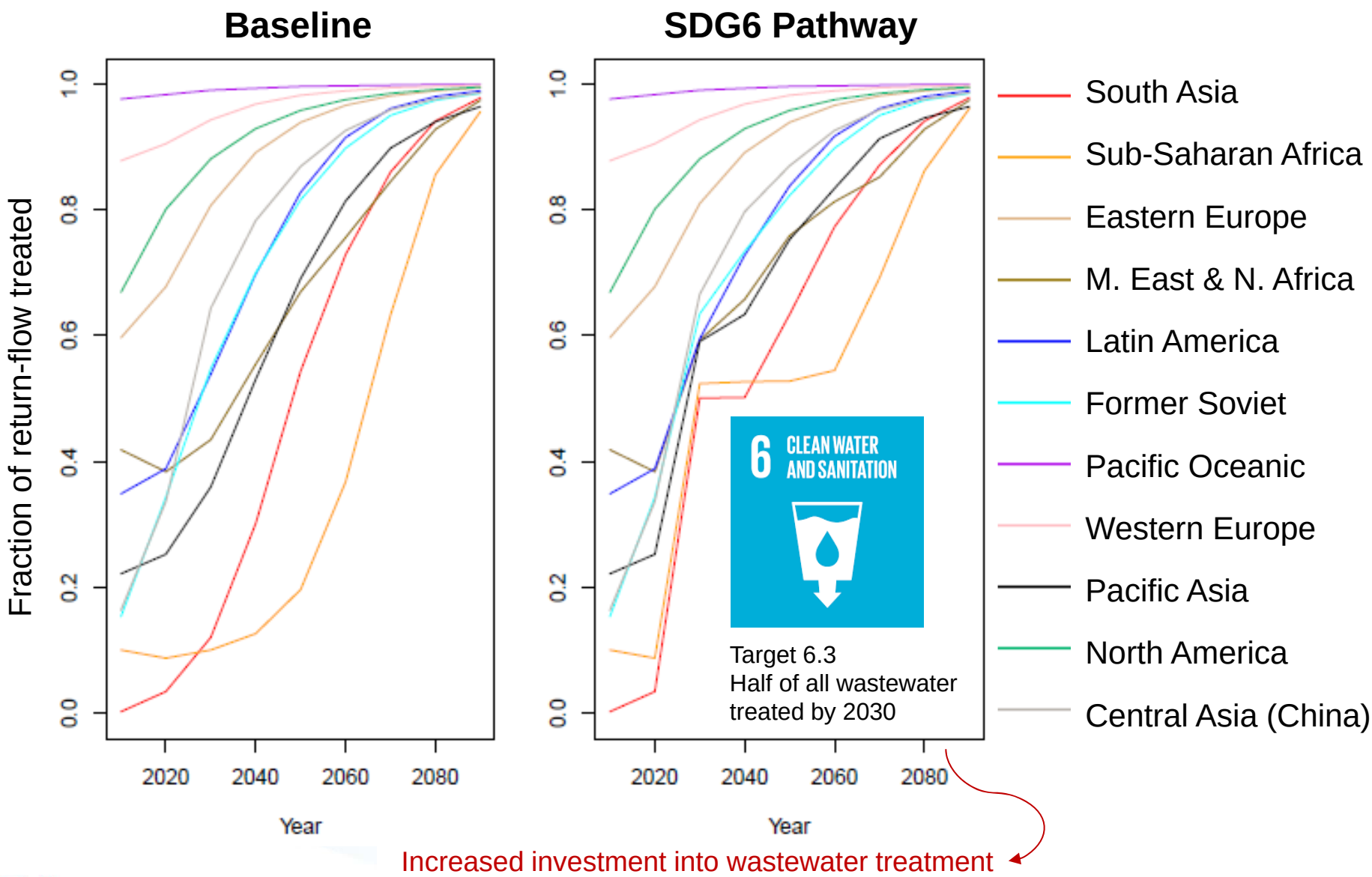
Scenario analysis

- SSP2 setup from Fricko et al. (2017)
- Energy SDG and Paris Agreement policies implemented as in McCollum et al. (2018)
- New water SDG indicators for water access, treatment, efficiency and stress.
- Comparison between scenarios with and without multiple SDG policies to understand incremental investment costs

Access to piped water infrastructure under different scenarios

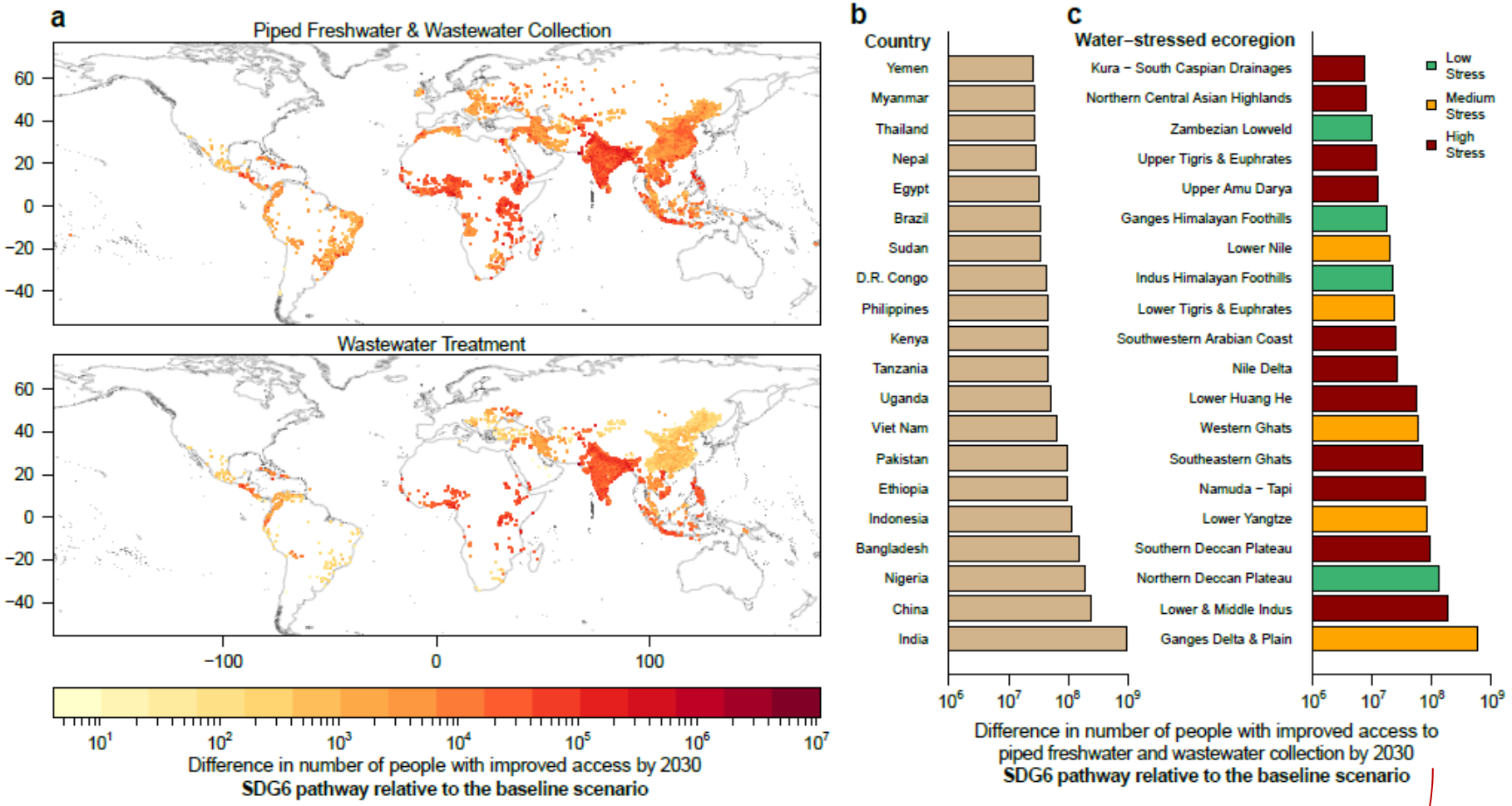


Access to wastewater treatment under different scenarios



Projecting infrastructure gaps under clean water goals

(difference between SDG6 and baseline scenario)

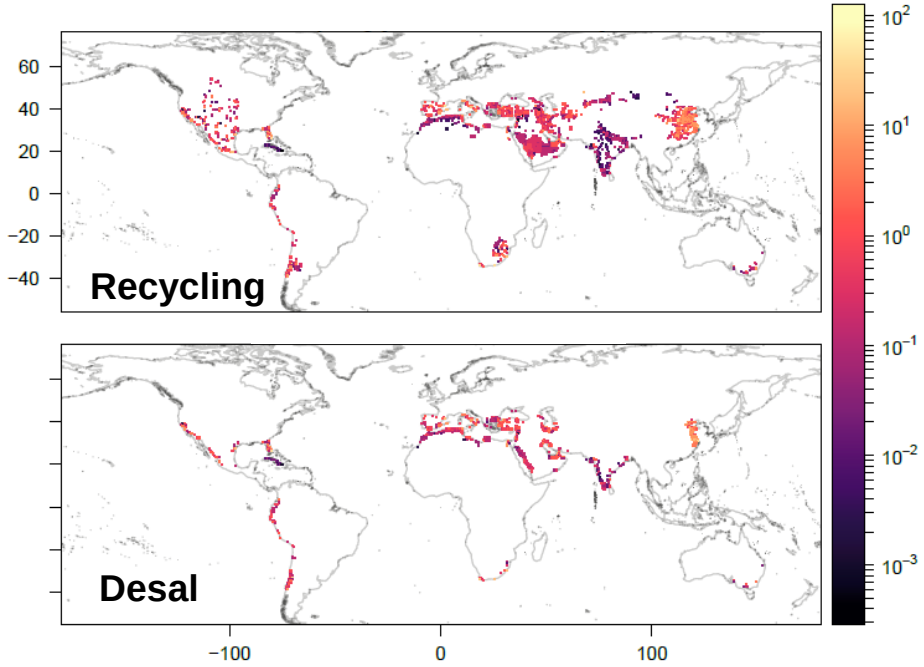


Parkinson et al. (2018)

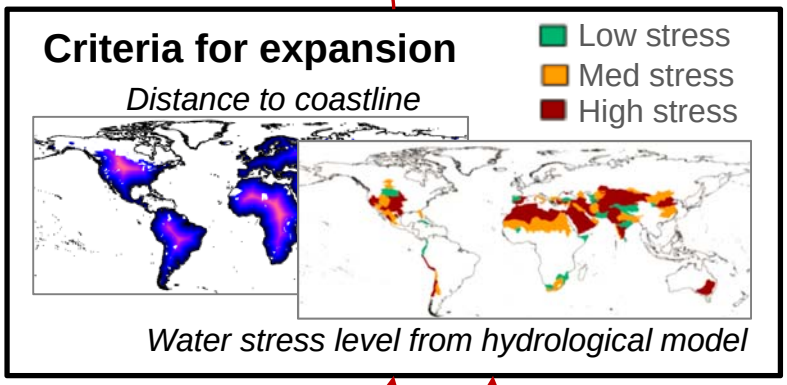
Water-stressed regions need to find unconventional sources of freshwater supply to meet increasing demands for water!

Projecting infrastructure demand under clean water goals

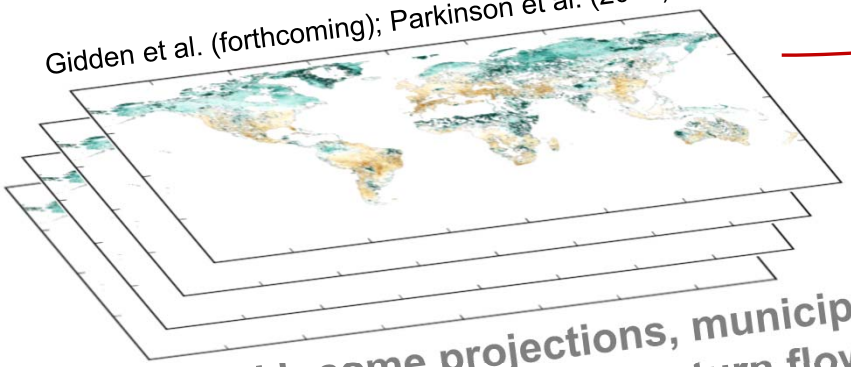
Expected capacity in 2030 [million cubic meters]



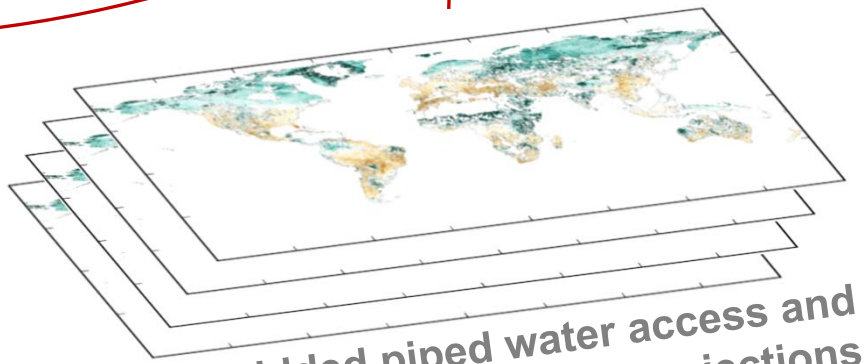
Where can we expect advanced water technologies to expand?



Gidden et al. (forthcoming); Parkinson et al. (2016)



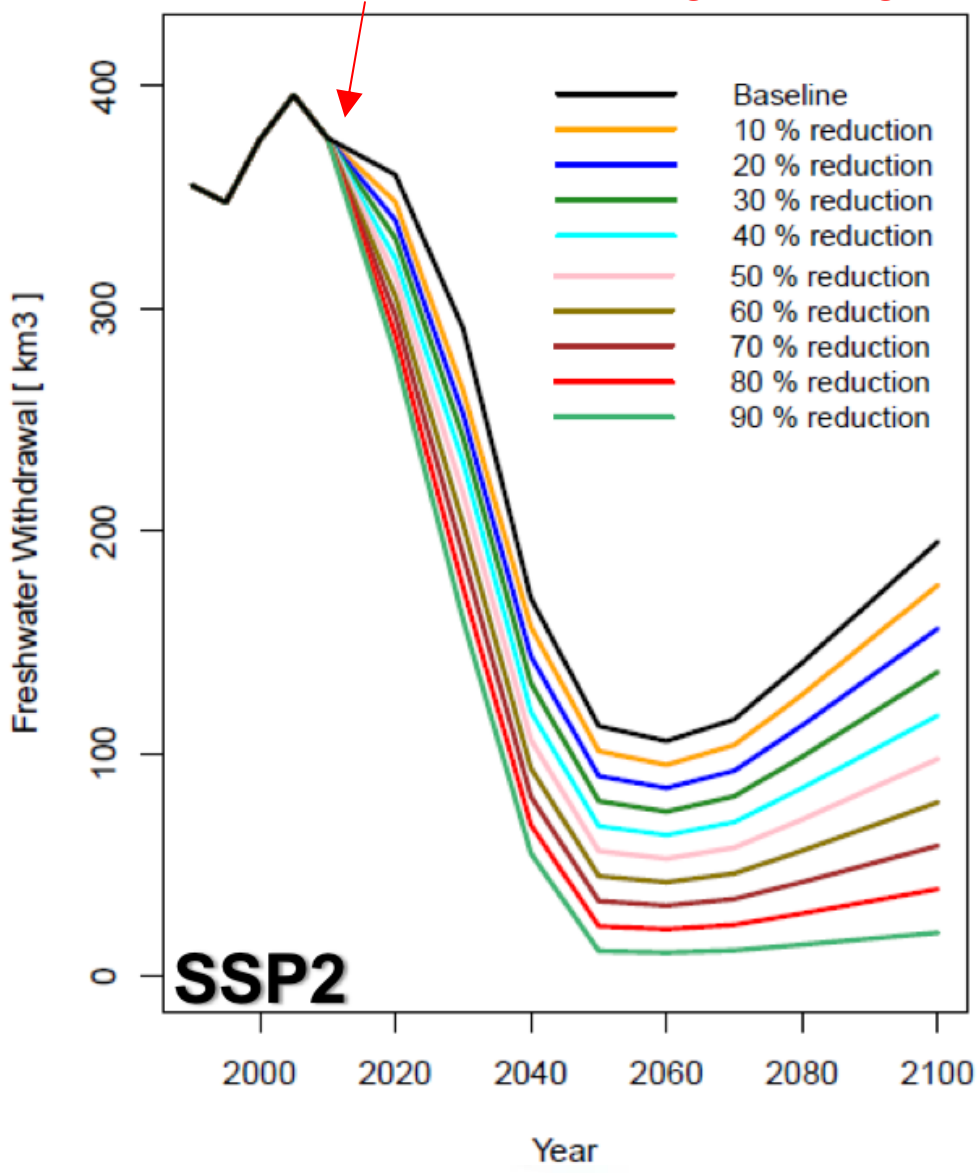
Gridded income projections, municipal withdrawals and return flows

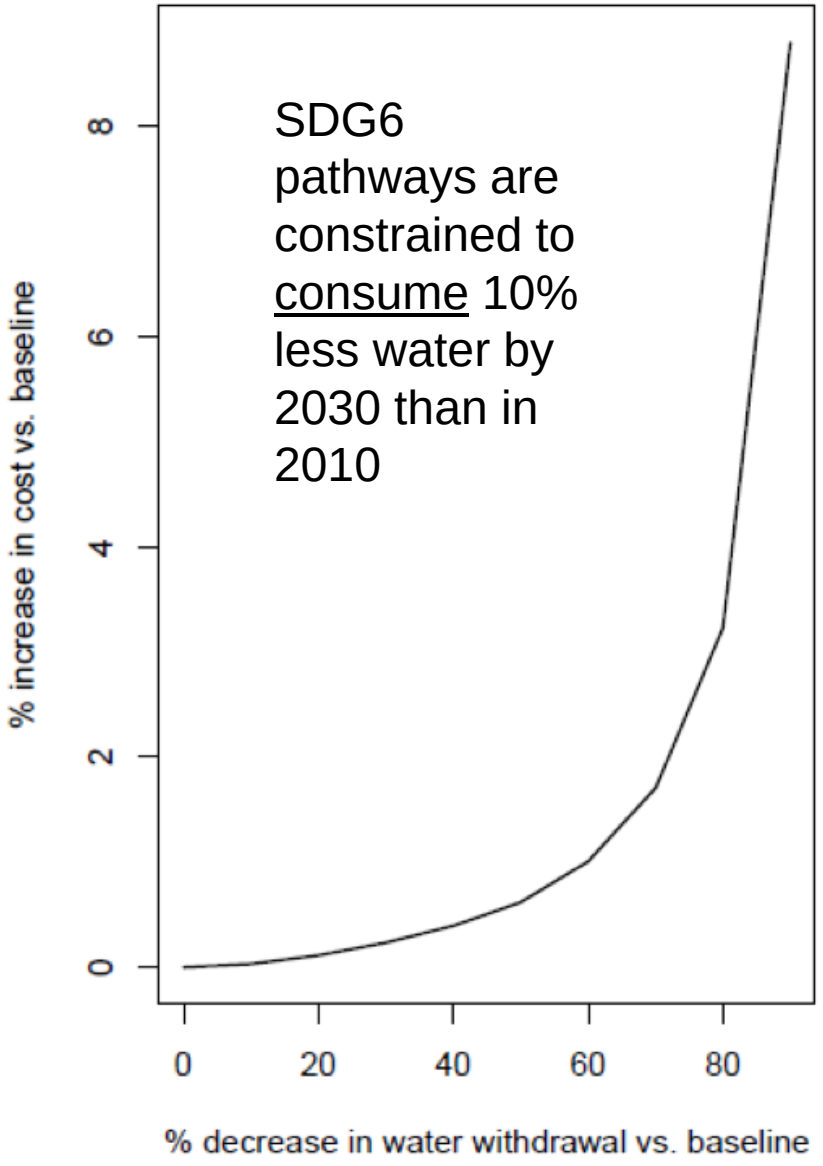


Gridded piped water access and wastewater collection projections

Long-term energy planning under water efficiency constraints

Phase out of once-through cooling

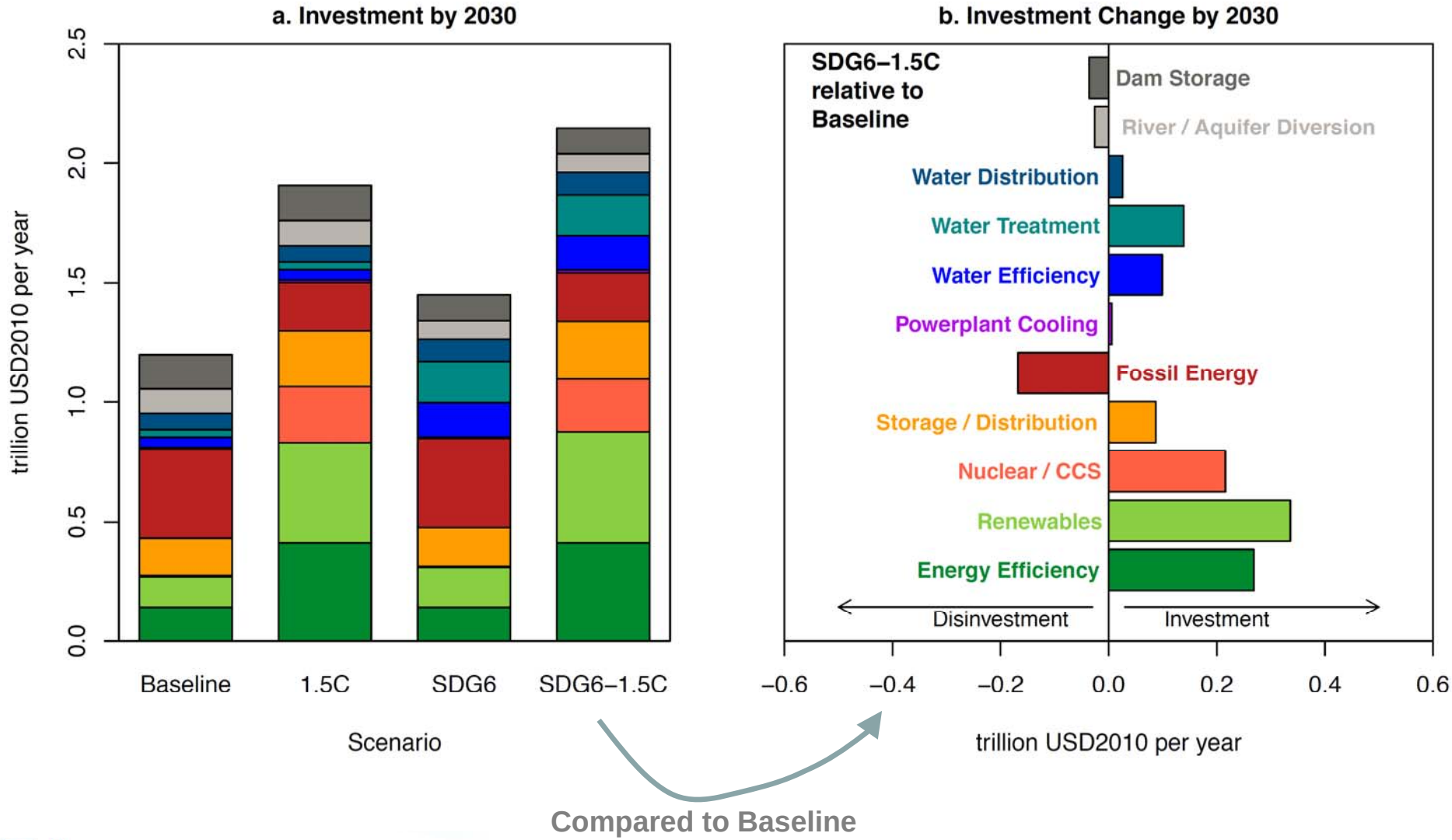




SDG6 pathways are constrained to consume 10% less water by 2030 than in 2010

Global Investment Portfolios

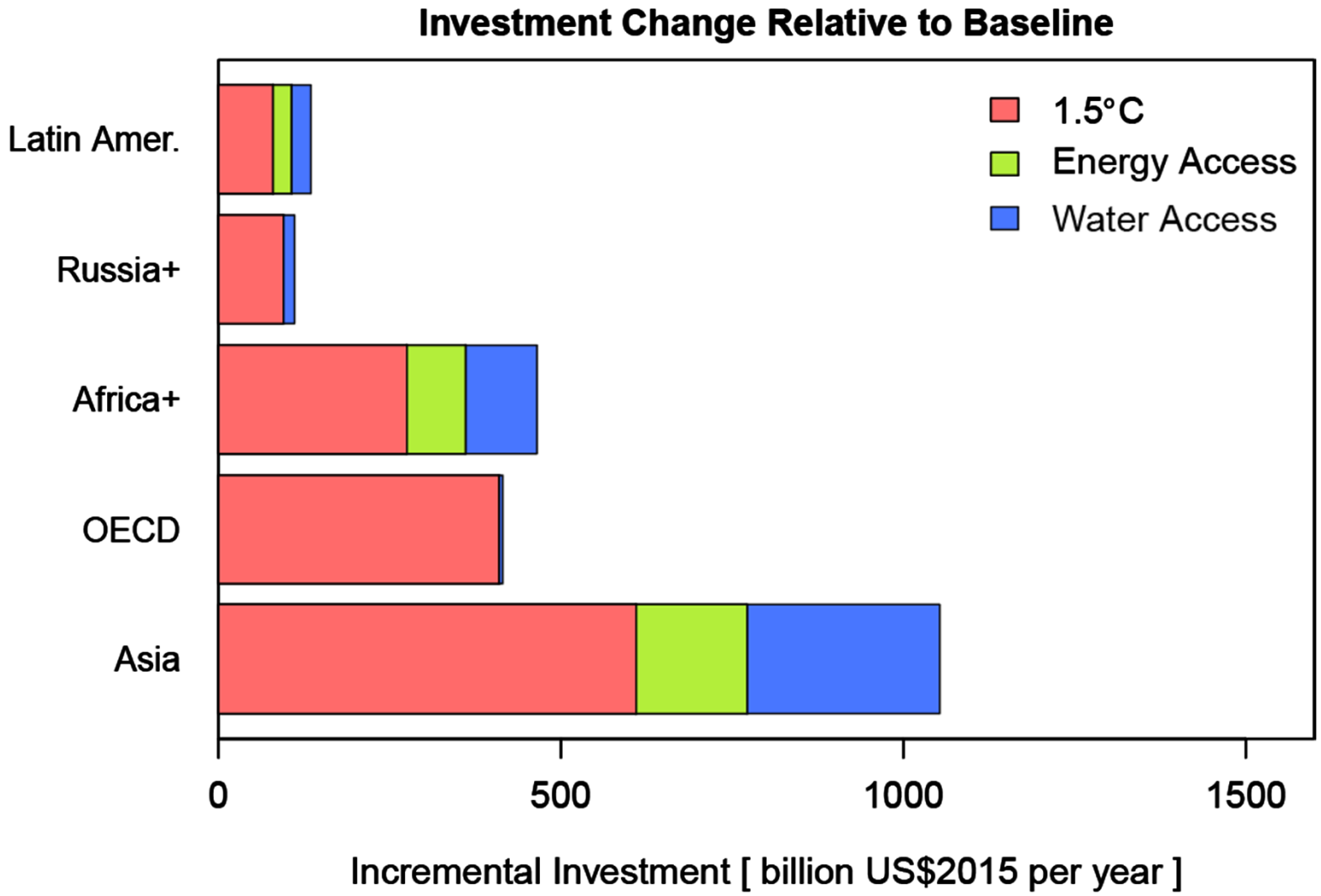
Average annual investments 2015 to 2030



Preliminary results: Do not cite or quote

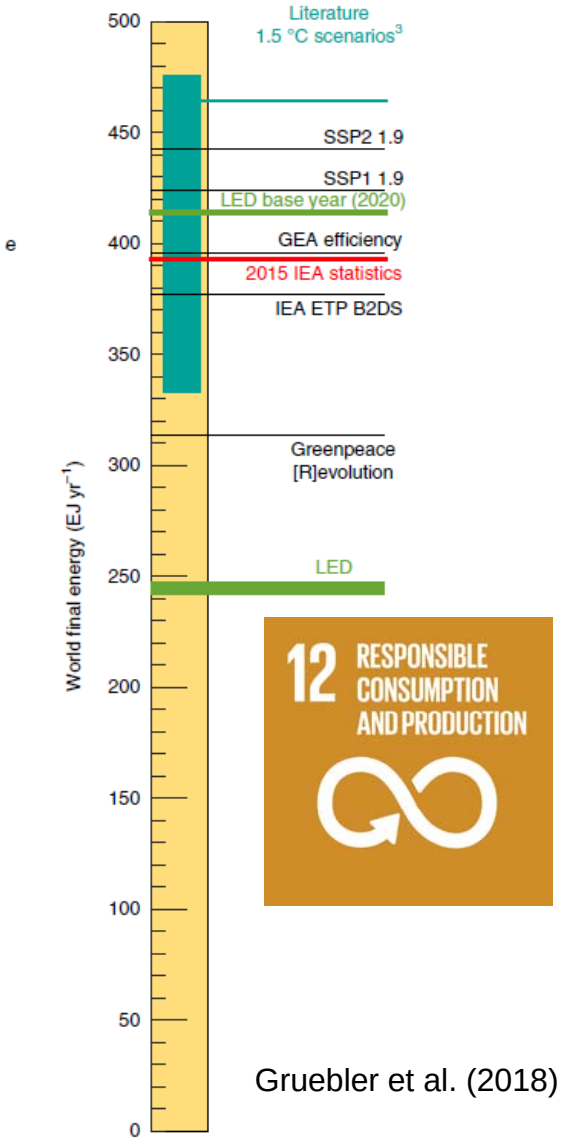
Regional Investments

2015-2030, compared to baseline



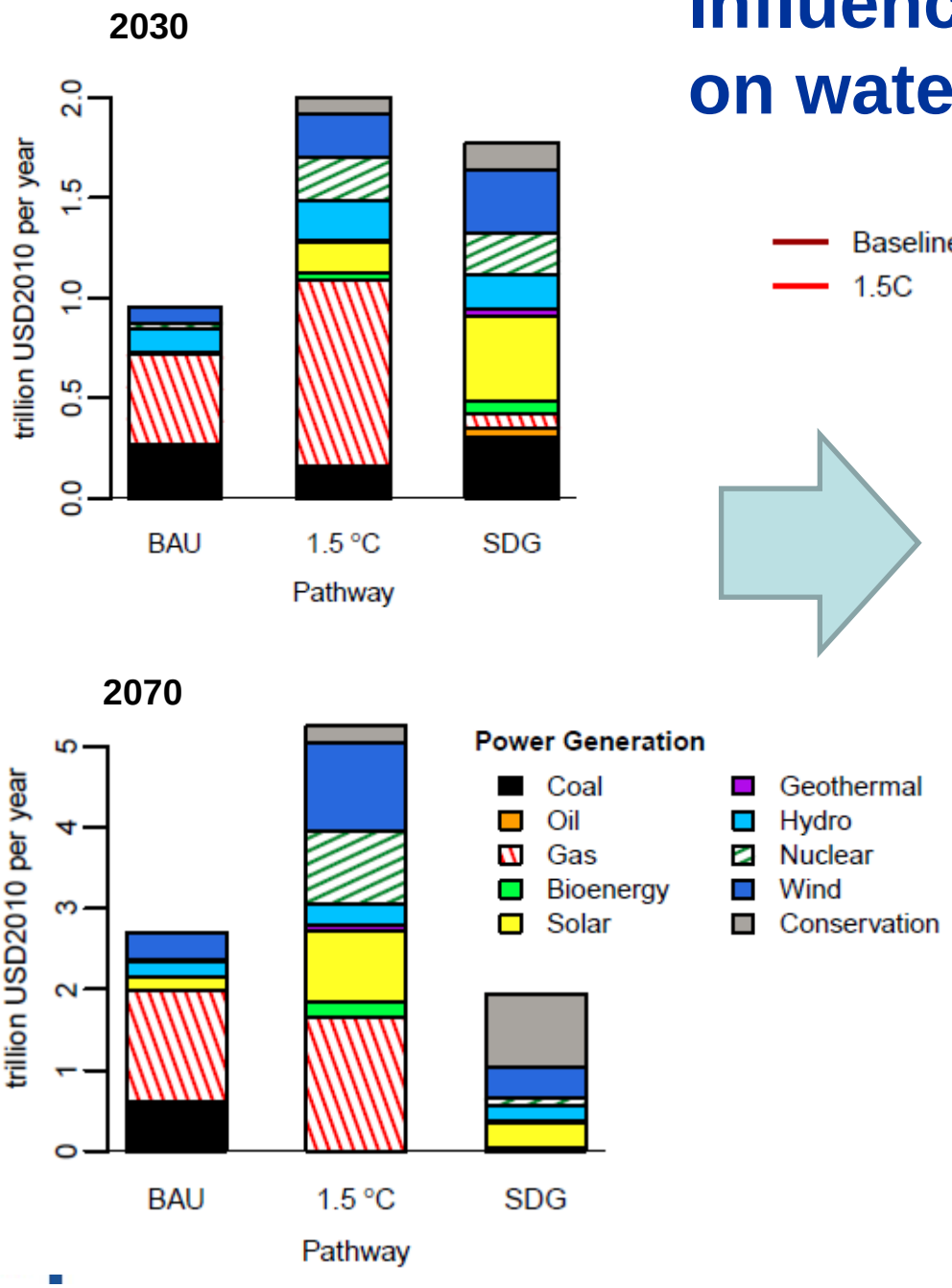
Preliminary results: Do not cite or quote

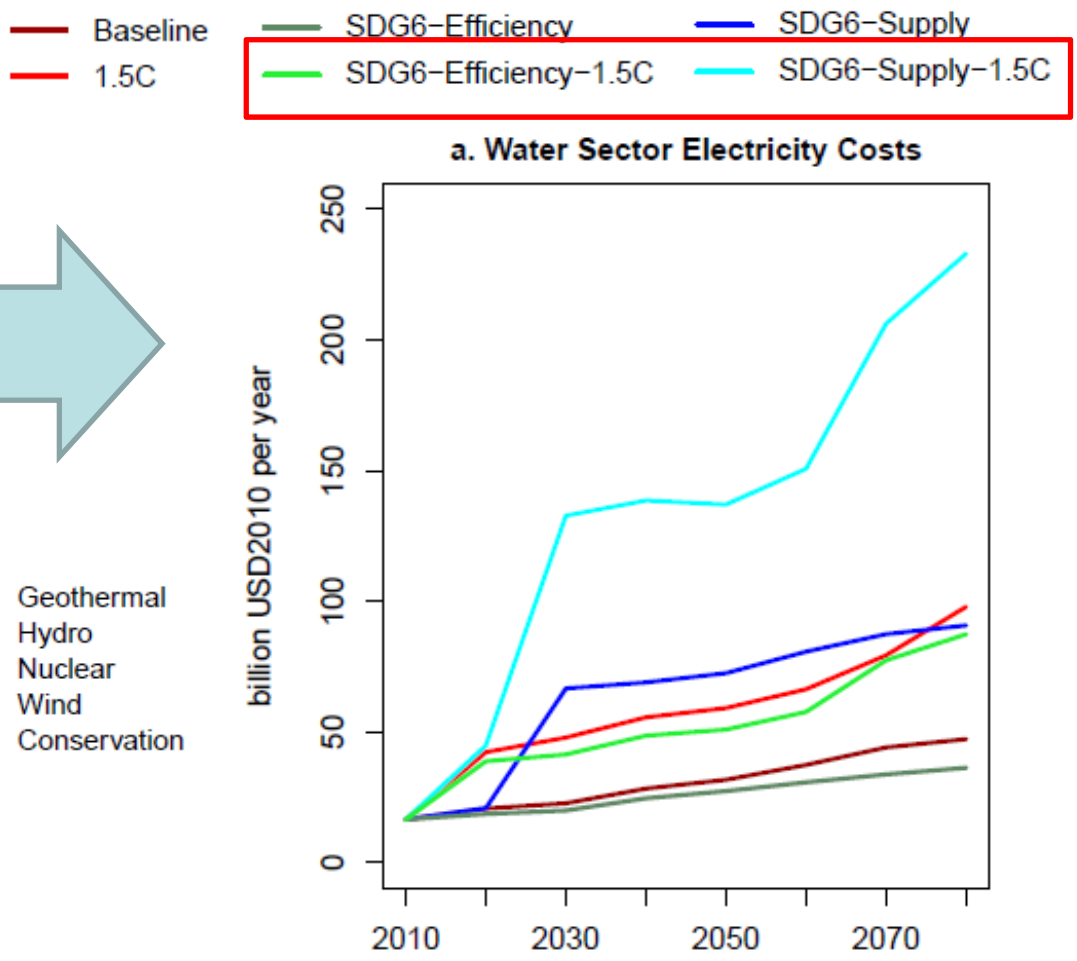
Incorporating representation of sustainable energy consumption



Gruebler et al. (2018)

Influence of energy efficiency on water costs





Preliminary results: Do not cite or quote

Conclusions

- **Adding the SDG6 target on top of Paris Agreement increases mitigation costs due:**
  - Increased energy demand for water treatment
  - Water efficiency investments and interplay with power plant cooling choices
  - Total investment costs increase by up to 8%
  - Note: this does not account for avoided adaptation costs
- **Water and energy conservation can significantly reduce implementation costs**
- **Future work: Add more SDG indicators to quantify additional interactions**

Thank you!