



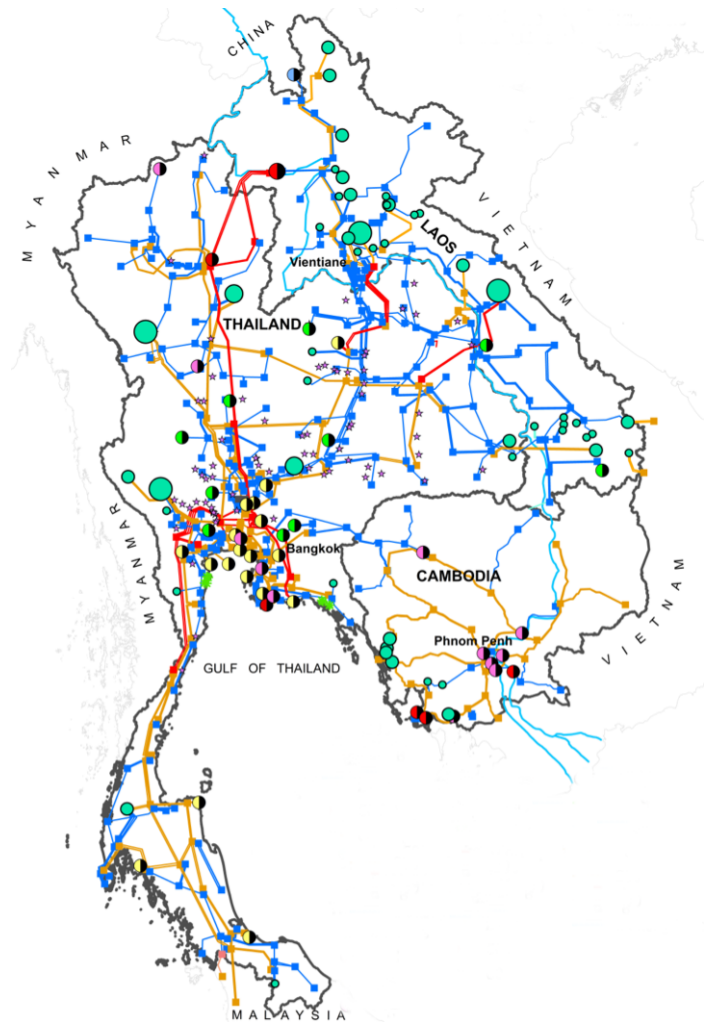
Assessing the impact of climate change on Southeast Asia's hydropower availability

Stefano Galelli^{1,2}, Thanh Duc Dang³

¹ Singapore University of Technology and Design

² Columbia University

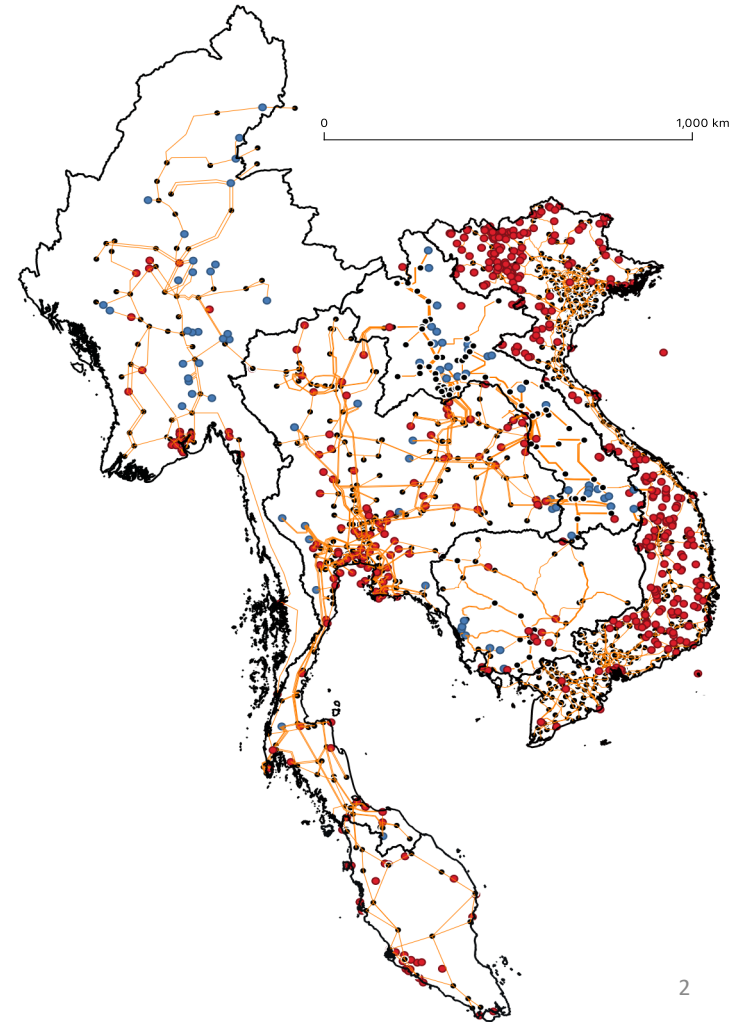
³ University of South Florida



Southeast Asia's power supply

Main challenges

- Sustaining economic growth
- Limit CO₂ emissions
- Buffer the expected impact of climate change
 - ↑ Higher electricity demand (e.g., cooling needs)
 - ↓ Diminished capacity of thermo-electric plants
 - ↑↓ Altered hydropower production



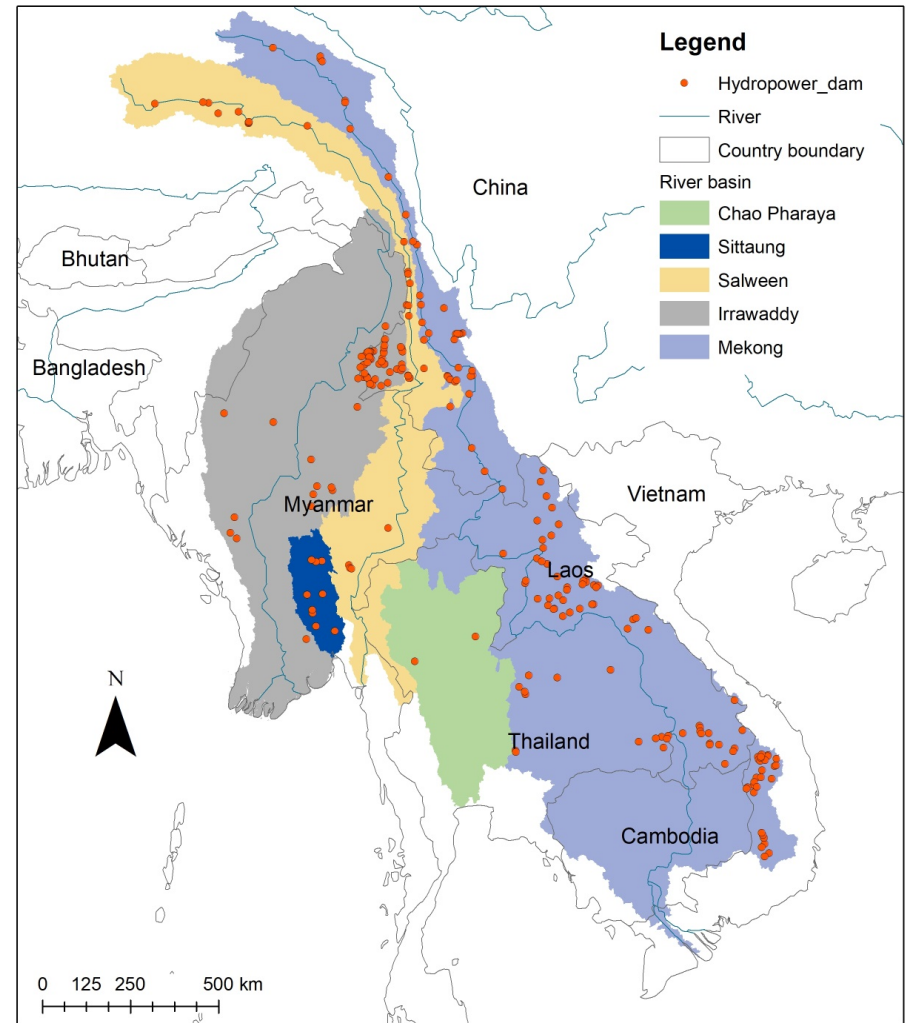
Regional hydropower system

Key features

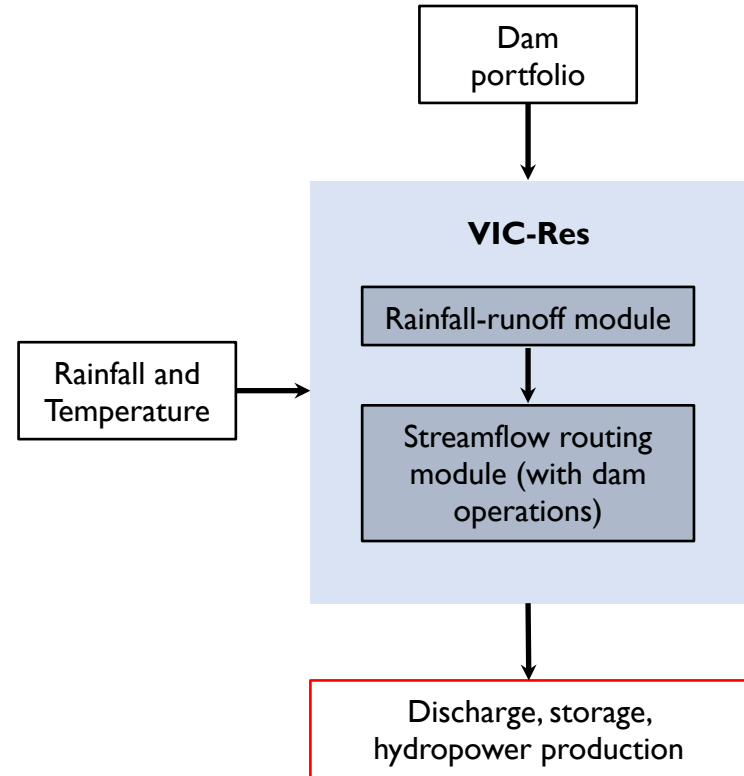
- 5 main basins
- 200+ dams
- ~40 GW of installed capacity

Impact of climate change (?)

- Decrease vs increase of production
- Spatial footprint
- Robustness w.r.t. to GCMs and SSPs

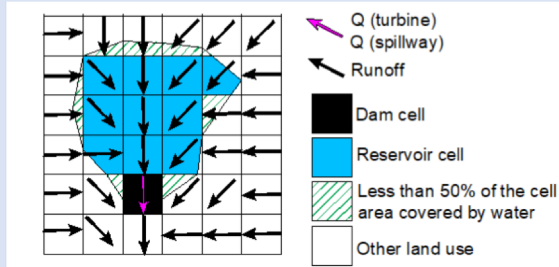


Modelling framework

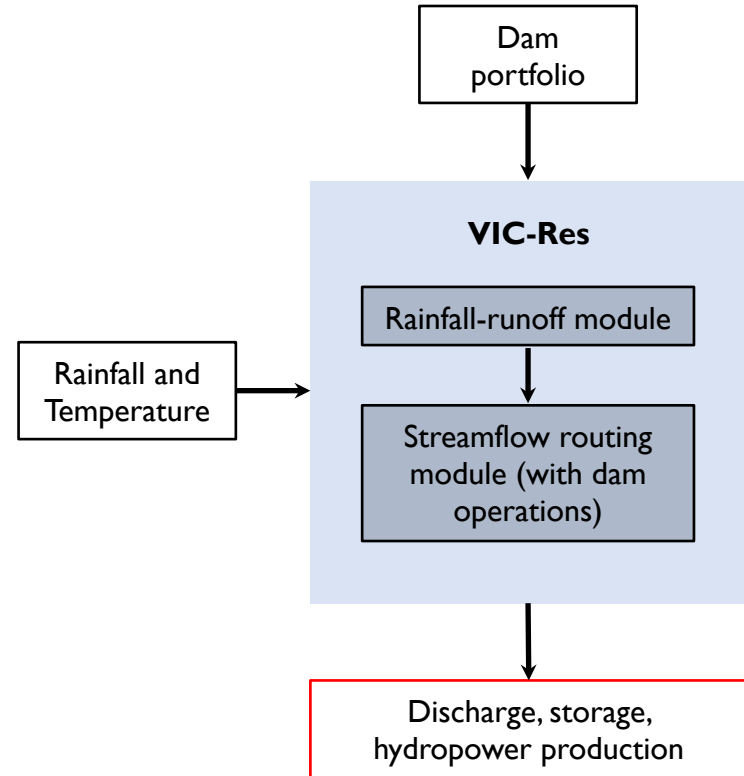
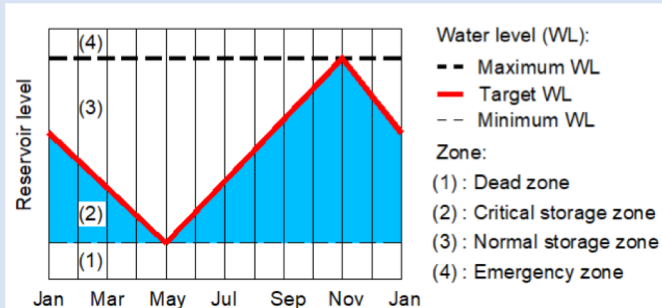


Modelling framework

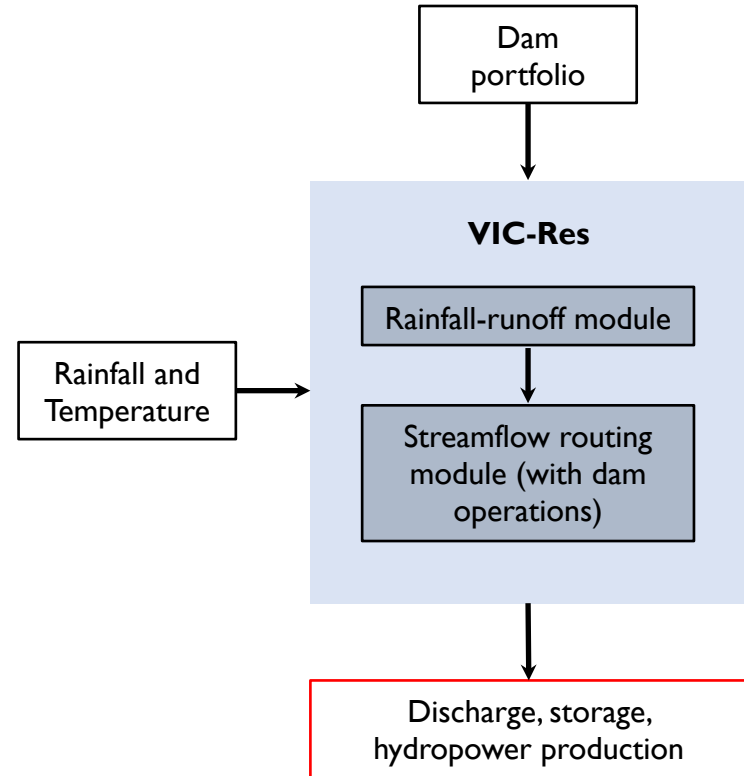
Spatial domain



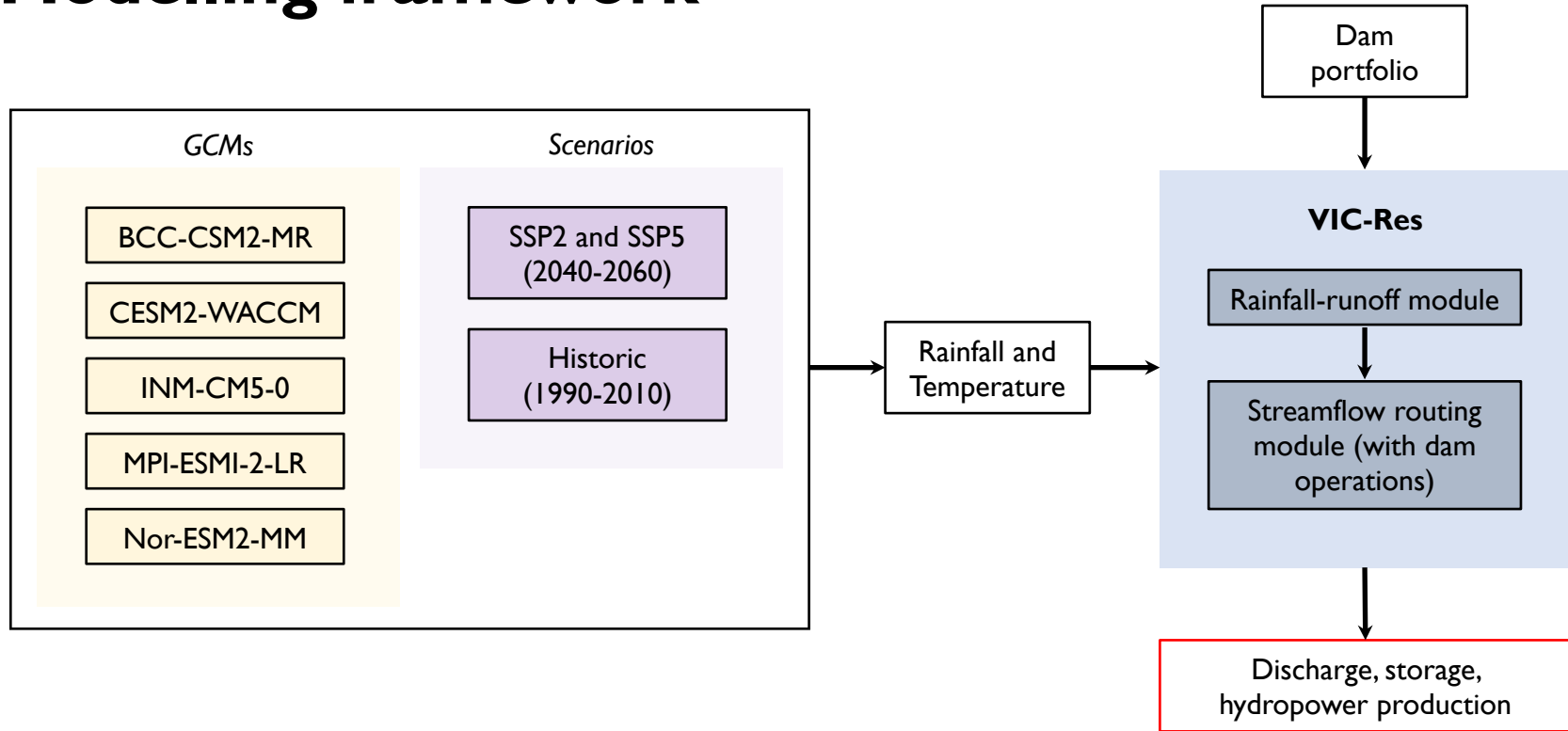
Rule curve



Modelling framework



Modelling framework

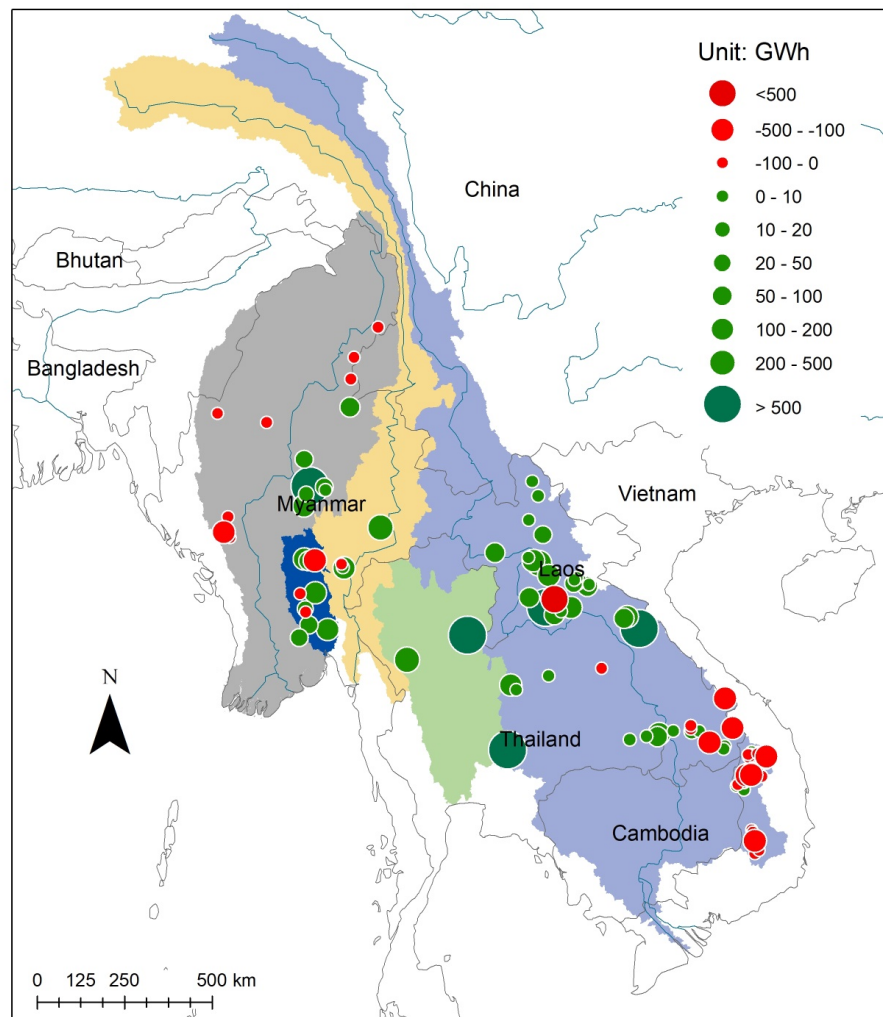


Results

Average across
GCMs and SSPs

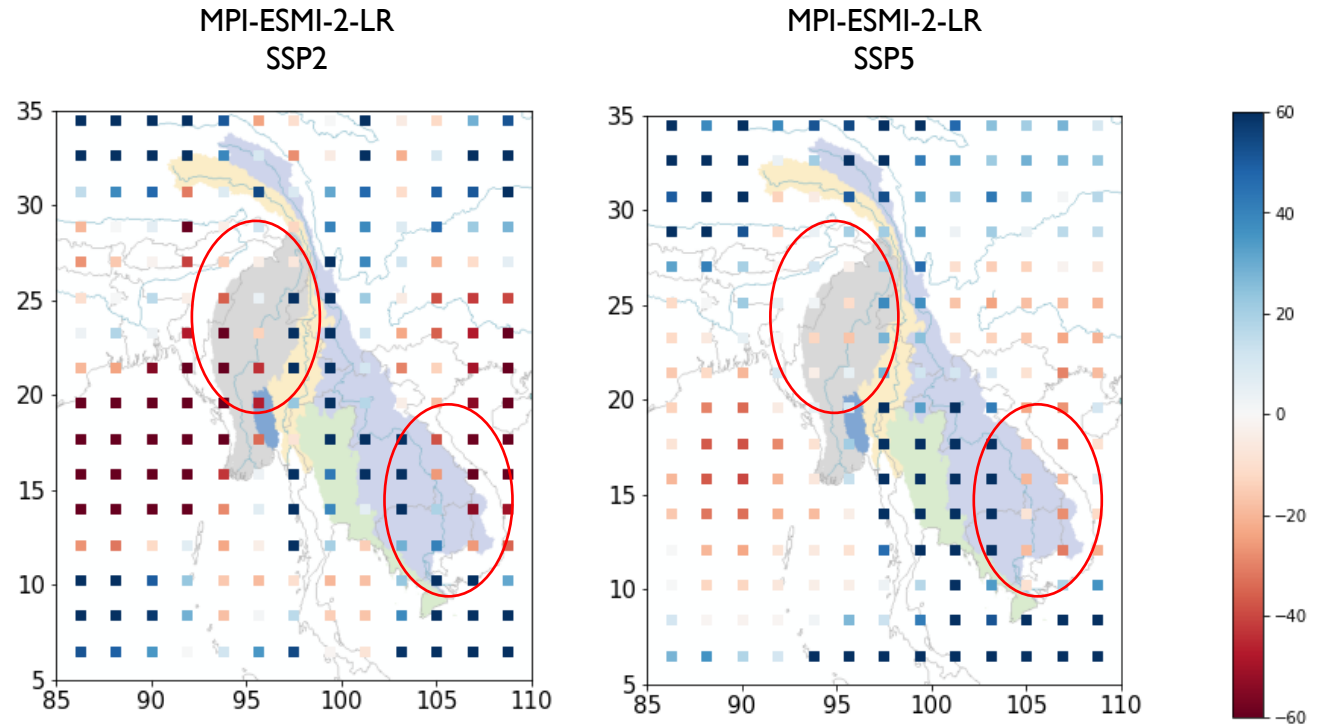
Change in annual hydropower production (GWh)

Basin	Change in production (TWh)
Mekong	+1.294
Chao Phraya	+2.496
Salween	+0.321
Irrawaddy	+ 0.705
Sittaung	+0.446



Results

Change in
precipitation (%)



Conclusions

- I. Slight increase in (average annual) hydropower production
 - Support the integration of other renewables (e.g., solar PV)
 - Restrain the construction of new dams?

Conclusions

1. Slight increase in (average annual) hydropower production
2. The response of hydropower dams to (projected) climate change exhibits spatial variability
→ Impact on the next steps of the ASEAN Power Grid

Conclusions

1. Slight increase in (average annual) hydropower production
2. The response of hydropower dams to (projected) climate change exhibits spatial variability
3. Need to further assess the robustness of these results w.r.t. other GCMs and SSPs

VIC-Res: <https://github.com/thanhiwer/VICRes>

Thanks!

Stefano Galelli
stefano_galelli@sutd.edu.sg

Resilient Water Systems Group
http://people.sutd.edu.sg/~stefano_galelli/