

Development of lookup tables of climate change impact on national water resources

Naota Hanasaki

(NIES)

hanasaki@nies.go.jp

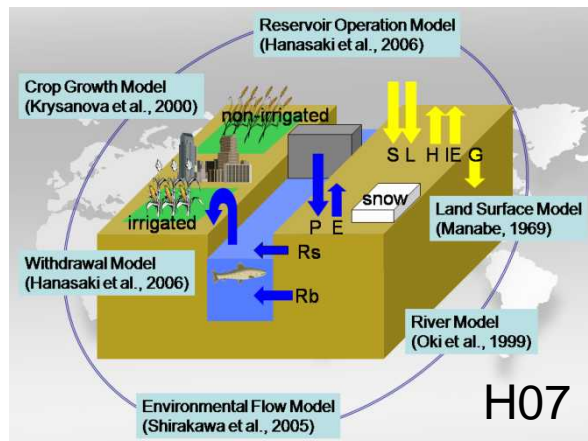
What is lookup table of climate change impact?

Typical impact studies

1. Develop a detailed model
2. Develop a detailed climate scenario
3. Run the model
4. Analyze several simulation runs

Lookup table approach

1. Using a detailed model, run hundreds of simulations by changing climate conditions.
2. Develop a database of response to climate change (lookup table).



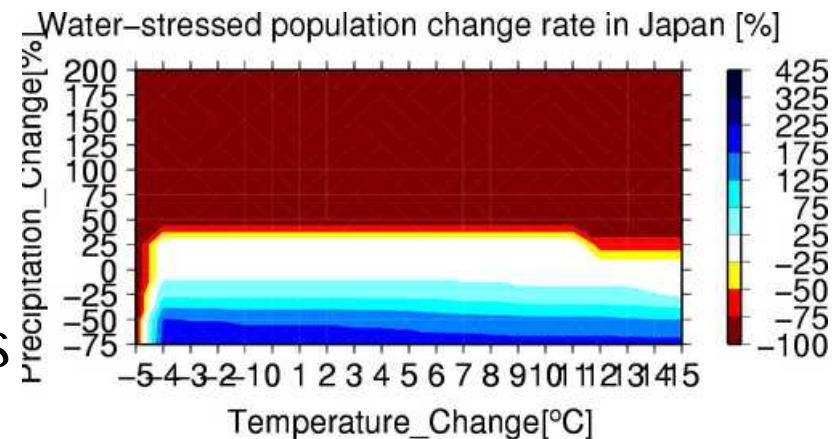
- Computationally expensive
- Difficult to incorporate into integrated models

Ex. Water Resources in Japan [km³/yr]
(2 explanatory variables: T and P)

	-1	0	+1	+2
-25%	168	170	173	176
0	308	311	314	318
+25%	462	465	469	473
+50%	622	625	629	633

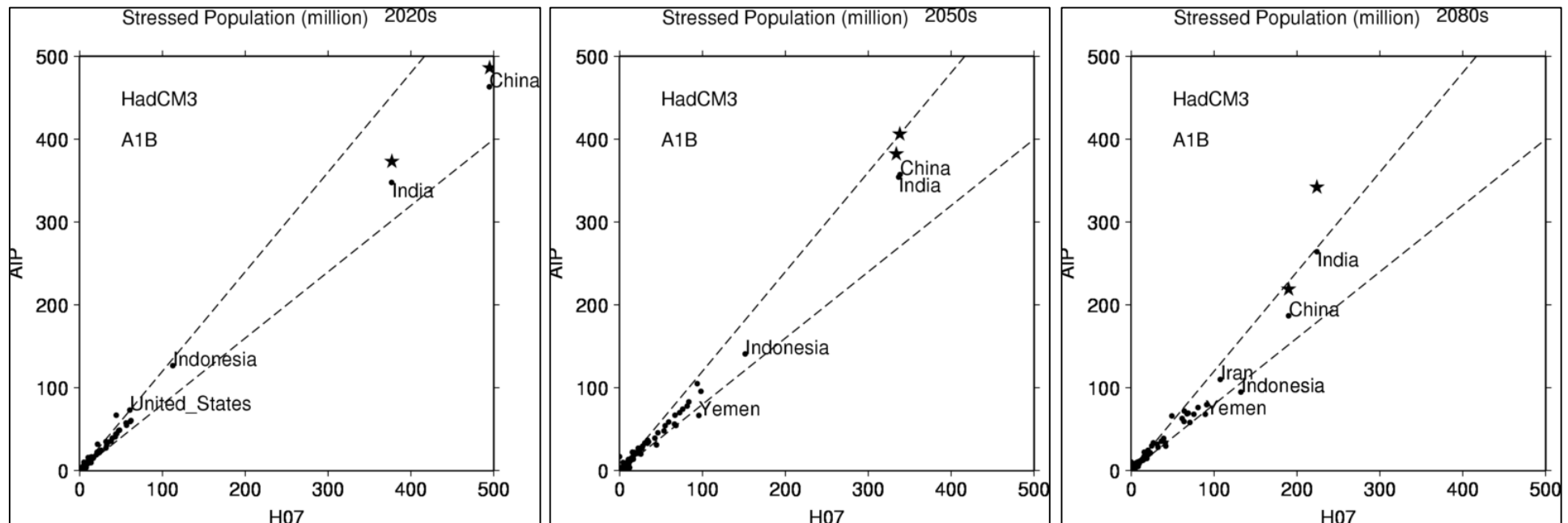
What we did?

- We developed lookup tables of
 - Annual renewable fresh water resources (=annual total river discharge)
 - Water stressed population (=number of people living in areas less than 1000m³/yr RFWR)
- For
 - 251 nations
 - + 35 states in India
 - + 34 provinces in China
- We intensively validated
 - Incorporate the lookup tables into AIM/Impact[Policy]



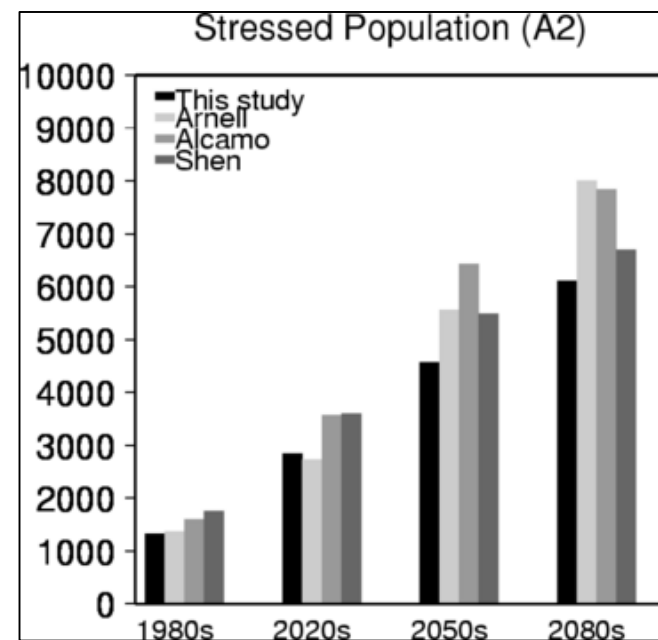
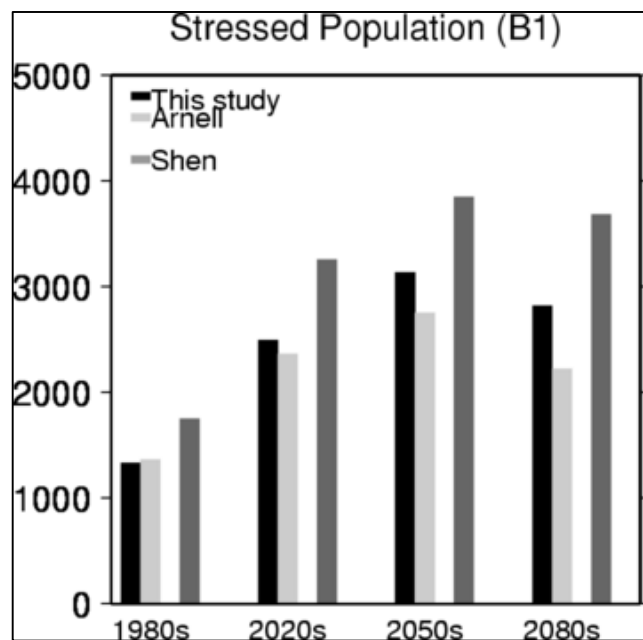
Is the simulation results using the lookup tables comparable to the results using the detailed model?

- We incorporated the lookup table into the AIM/Impact[Policy], and compared the results (AIP) with the results using the original model (H07).
- Water-Stressed population by country
- 2020s, 2050s, 2080s, SRES:A1B, (GCM: HadCM3)



Is the simulation results using the lookup table comparable to the results of IPCC/AR4?

- Water-Stressed population in the world
- 1980s, 2020s, 2050s, 2080s, SRES:B1, A2, (GCM: HadCM3)



- Our simulation results fairly compared with the estimations of three references cited in IPCC/AR4 (Arnell et al. 2004; Alcamo et al. 2007; Shen et al. 2008)

More information?

- English translation of two papers available
- We start to integrate these lookup tables into AIM models.
- Any comments, questions, requests
 - Naota Hanasaki
hanasaki@nies.go.jp