

Extreme weather events and population displacements in the world

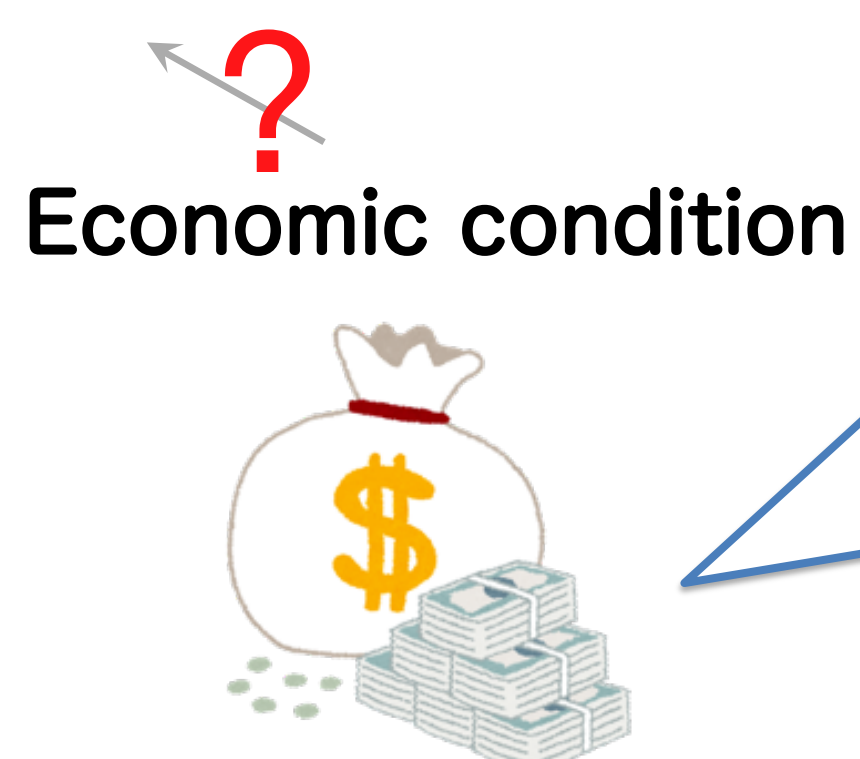
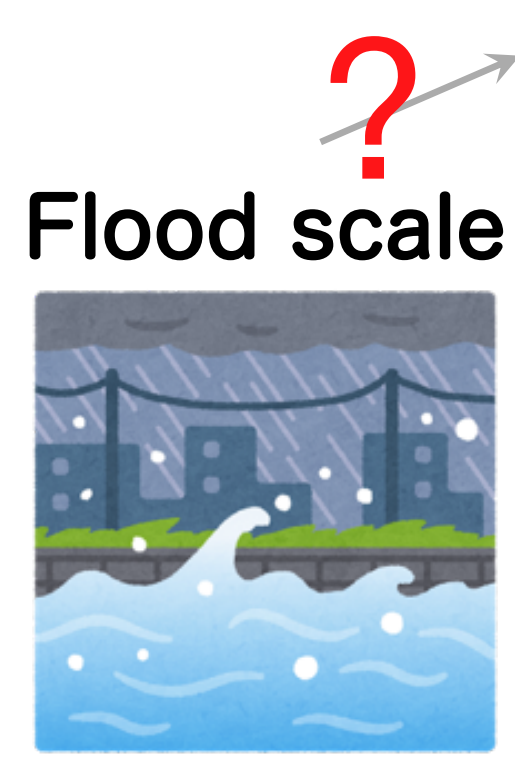
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1. Background

- **Population migration, displacement** that associate with climate hazard are a critical issue in the world (IPCC 2014; Black et al.2011)
- For developing a scenario, it is important to clarify the potential of population displacements

Occurrence of displacement

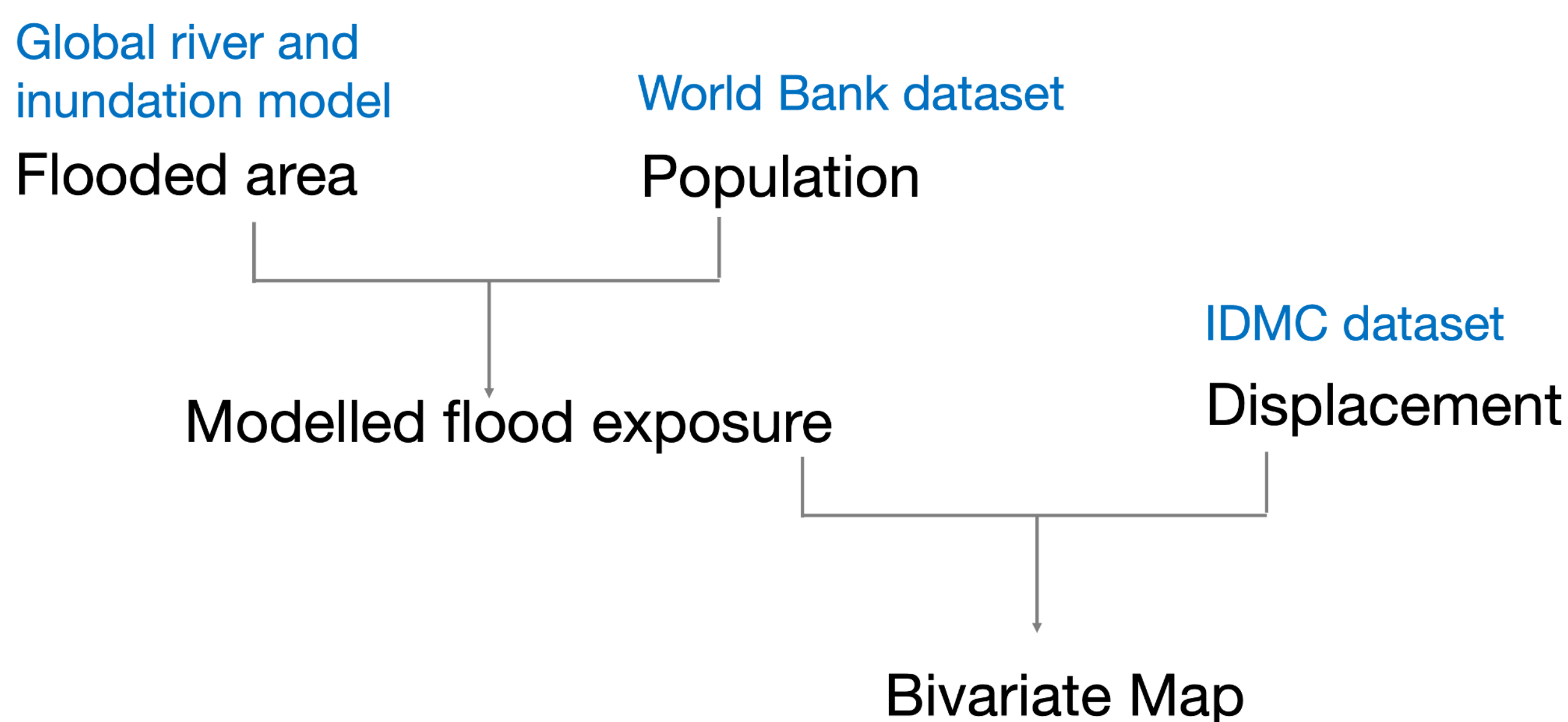


Research Question

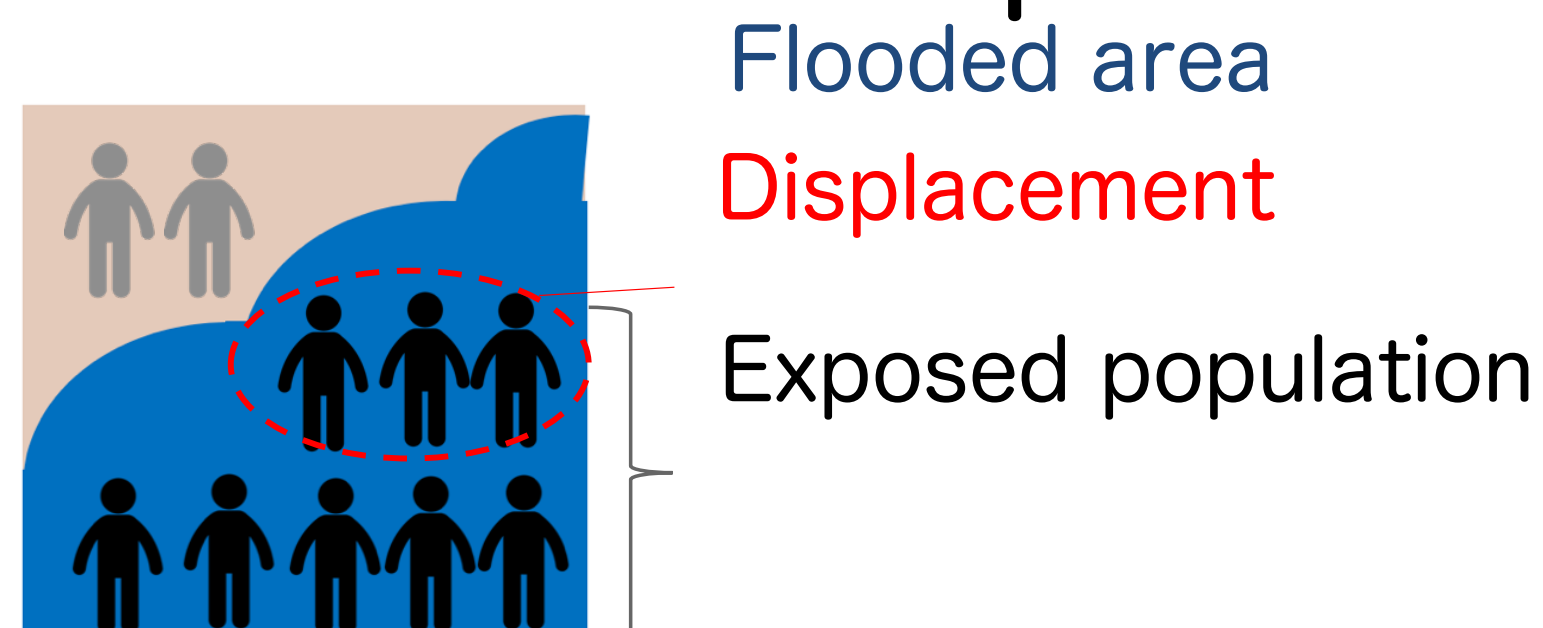
Where are **high potential areas** for flood-induced displacements?

2. Methods

Research Flow



Flood scale & exposure



Flooded areas were calculated by Global river and inundation model (CaMa-Flood; Yamazaki et al 2010)

- Resolution: 5' x 5' Term: 1960-2013 (Tanoue et al. 2016)
- Anomaly of flood areas at each country

Population displacement

- IDMC (Internal Displacement Monitoring Center)
- Event basis, Term: 2008-2013
- Displacements that caused by "Flood"

Economic level

- World Bank, Based on GNI (Gross National Income)
- Categorized into High, Upper Middle, Lower Middle, Low

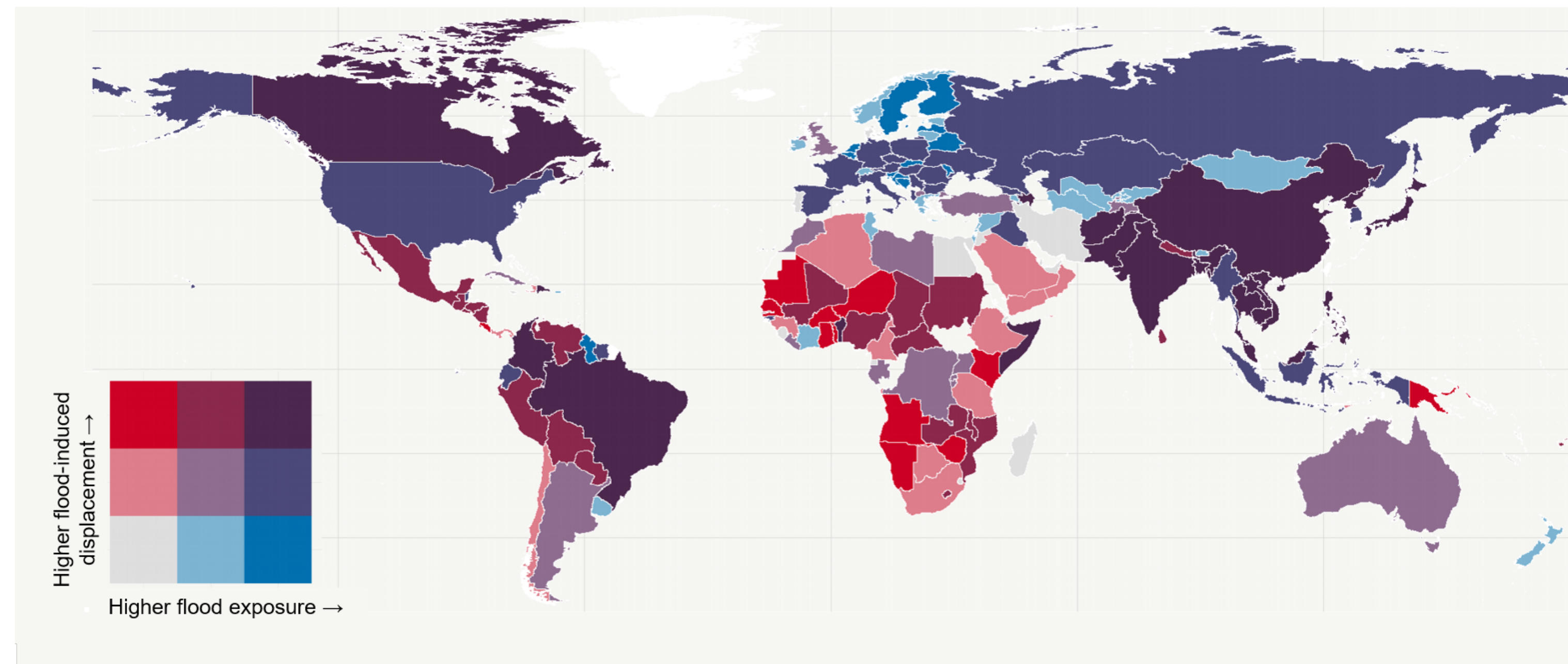
Generalized linear model (GLM)

Flood-induced displacement $\sim \beta_0 + \beta_1 * \text{Income Level} + \beta_2 * \text{Flood exposure}$

β_i is coefficient of explanatory variables, Logistic analysis, Target: 2008-2013

3. Results & Discussion

Flood exposure and displacement



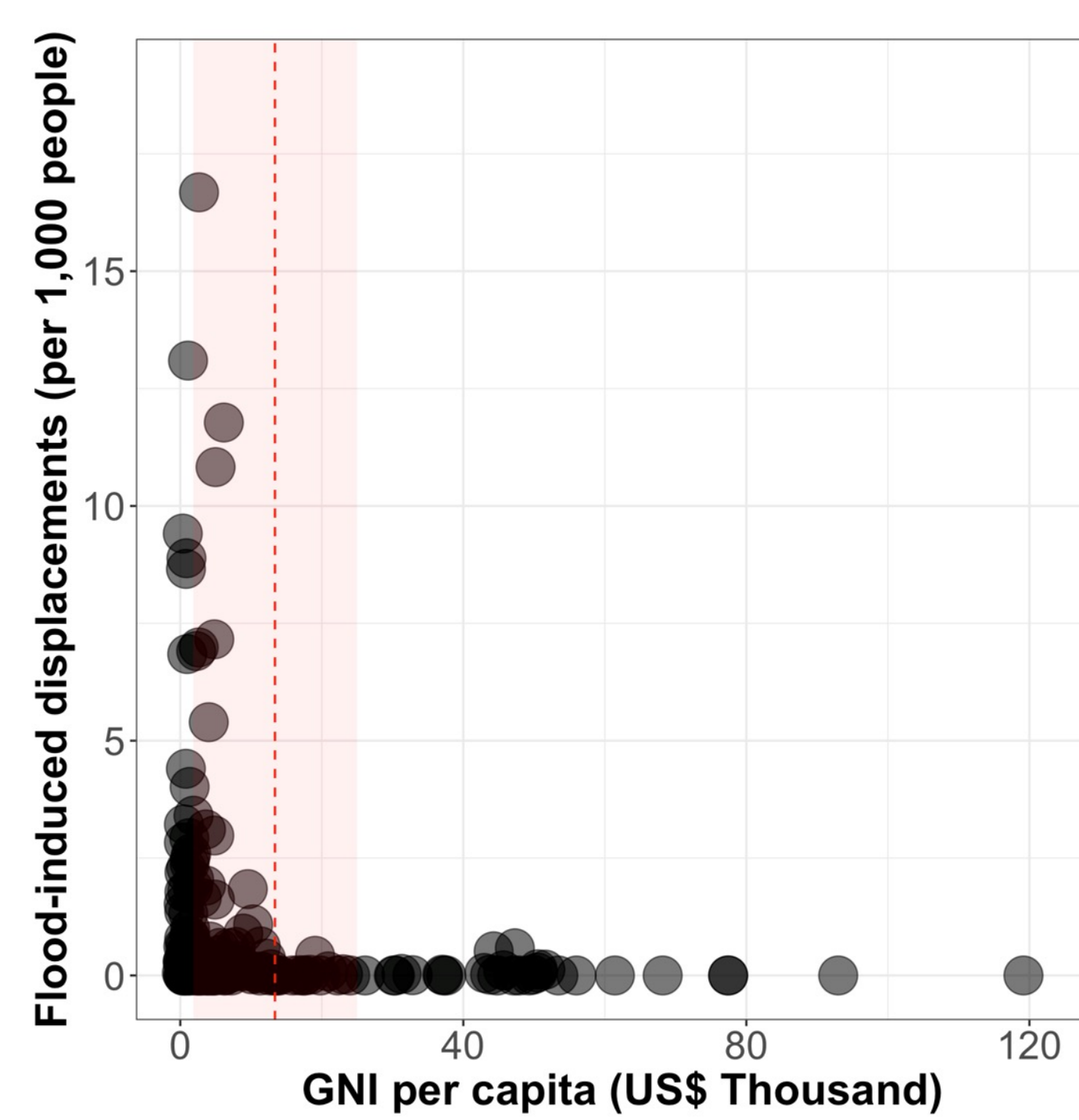
Kakinuma et al. 2020 ERL

Countries in **African regions** are vulnerable to floods

Results of GLM

	Estimate	95% Credible Interval	P
Income level (GNI per capita)	-0.25	[-0.39, -0.080]	< 0.01
Flood exposure	0.064	[-0.089, 0.22]	0.41

Economic condition & Displacement



Kakinuma et al. 2020 ERL

The relationship between income levels and displacement is nonlinear

4. Conclusion

Countries in **Africa** might be **highly vulnerable** to floods

- High flood-induced displacement even at low- to mid-level flood exposure

Large gaps in flood-induced displacement between high- and low-income countries

- **Income levels** substantial impact flood-induced displacement
- The relationship between income levels and displacement is **nonlinear**

Low-income countries, particularly in **Africa**, face a high likelihood of flood-induced displacement