

# Modeling Migration with “Big” Population Data: Groundswell

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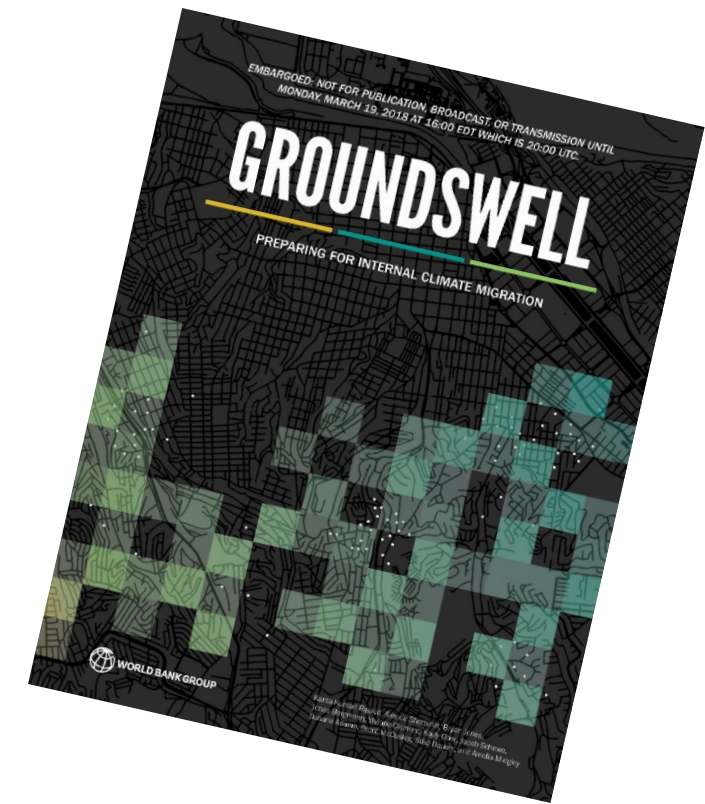
Population-Environment Research Network (PERN)

NASA Socioeconomic Data and Applications Center (SEDAC)

World Data Forum

Session TA 2.19: Harnessing the potential of data innovation for migration and development interventions: the state of the art, promises and challenges

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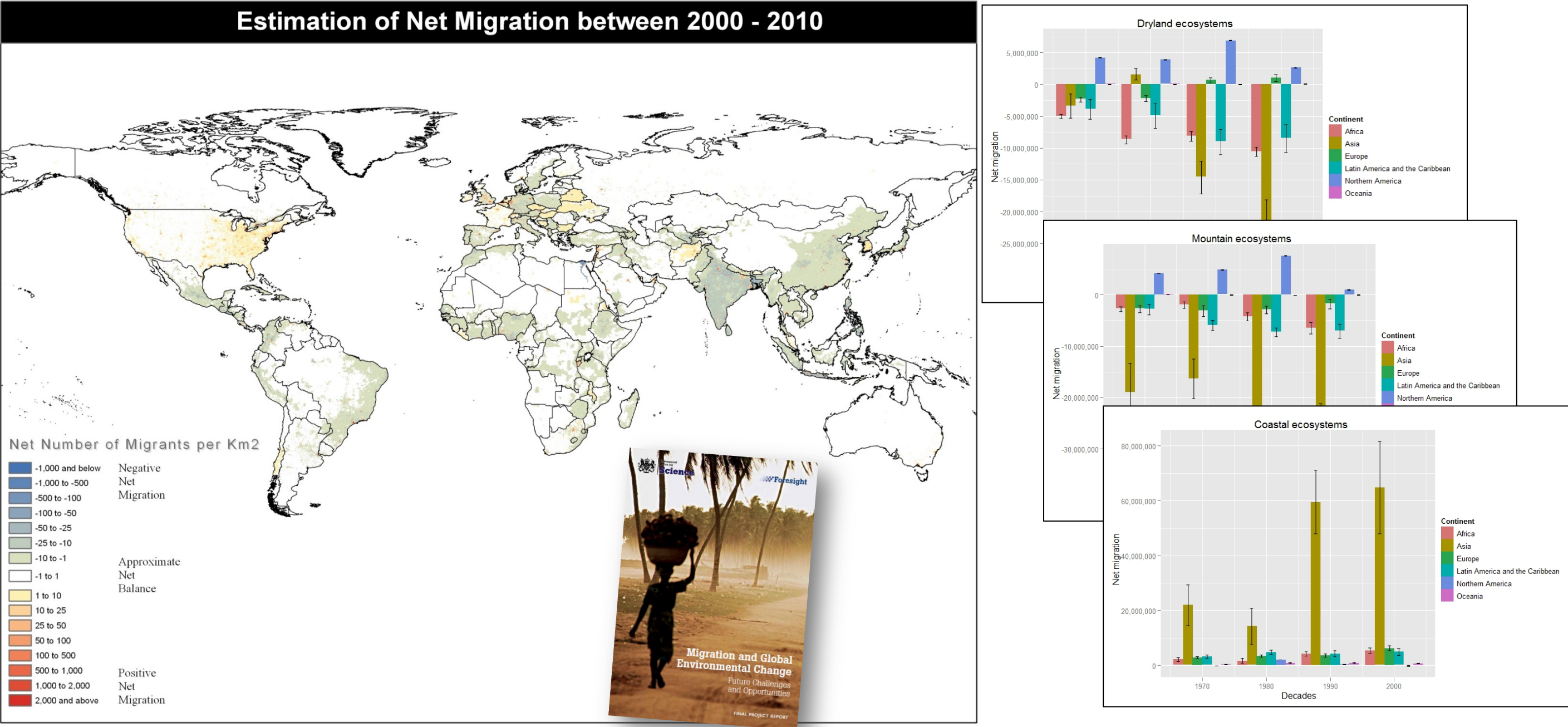
Modeling conducted by Bryan Jones, PhD  
CUNY Institute for Demographic Research  
CUNY Baruch College



With inputs from Jacob Schewe, PhD  
Potsdam Institute for Climate Impact Research (PIK)

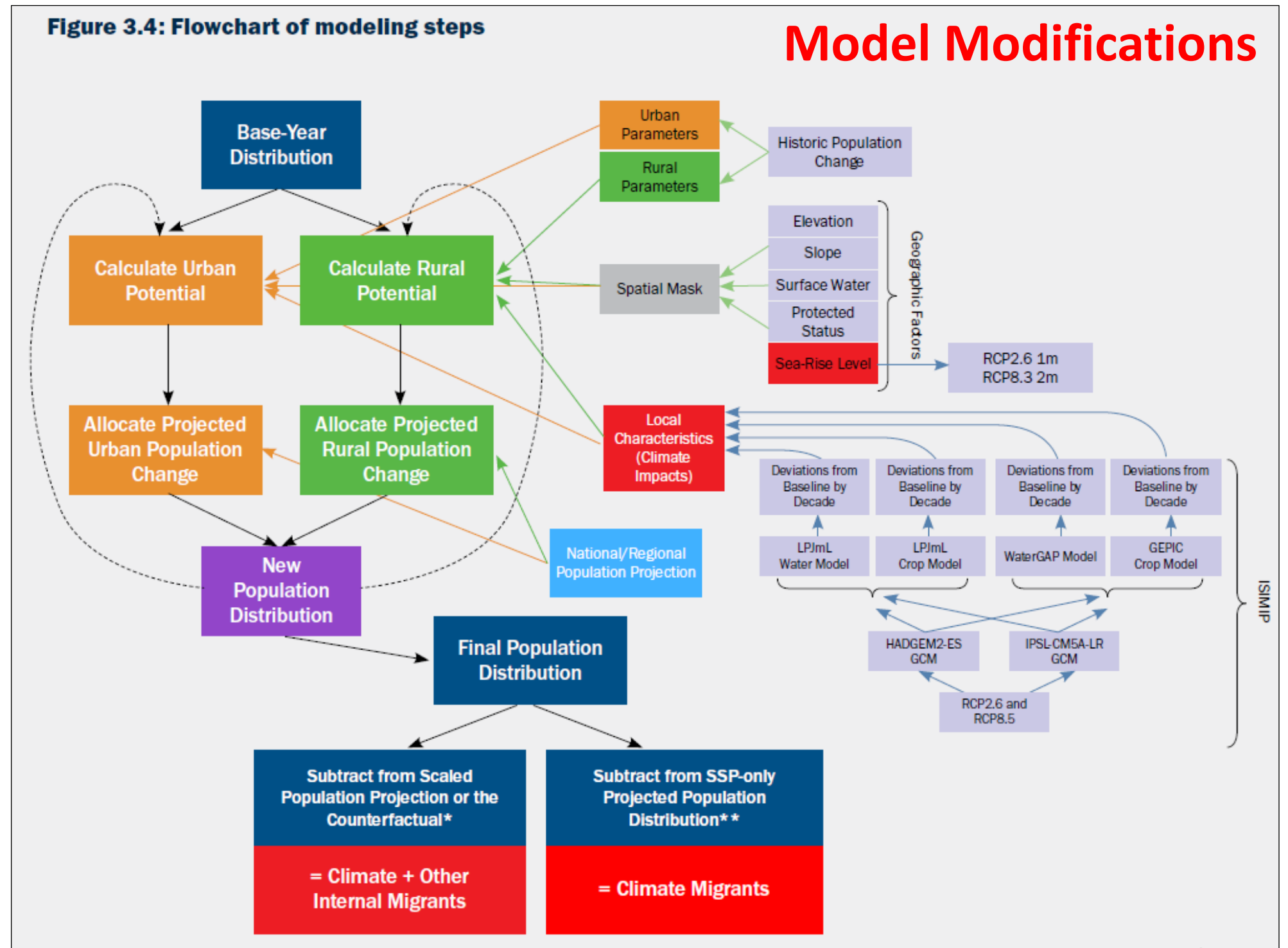


# Migration data are scarce – so indirect estimation using “big” population data is sometimes the best solution for global-scale analyses



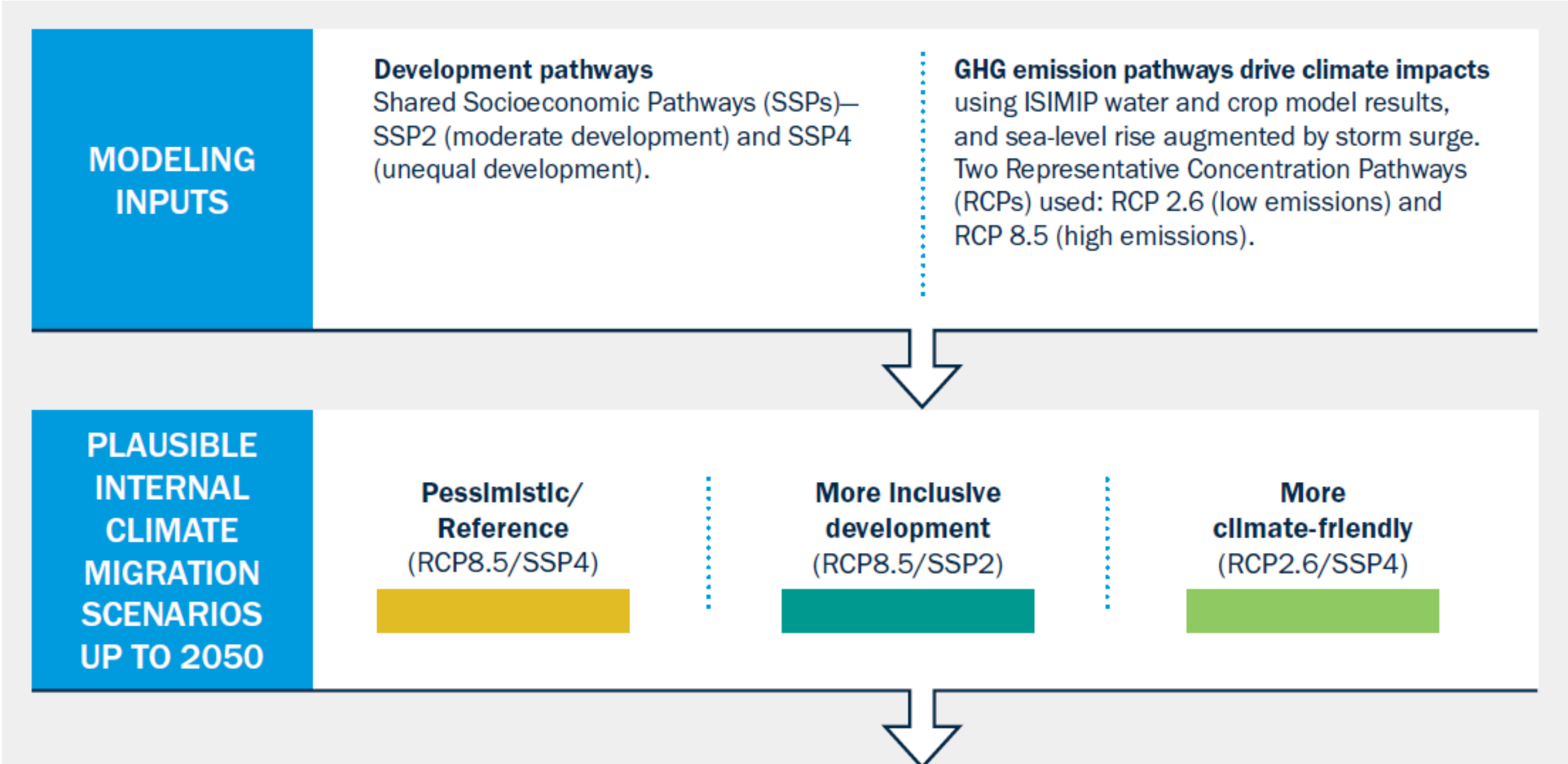
Download data at <http://sedac.ciesin.columbia.edu/data/set/popdynamics-global-est-net-migration-grids-1970-2000>

- Groundswell uses a population gravity modeling approach
- Gravity models start with a baseline population
- Future populations are projected based on the empirical observation that people tend to move to urban areas owing to economic opportunities and services (attractiveness)
- **Climate impacts could be a push or pull factor that will affect the relative attractiveness of locations**





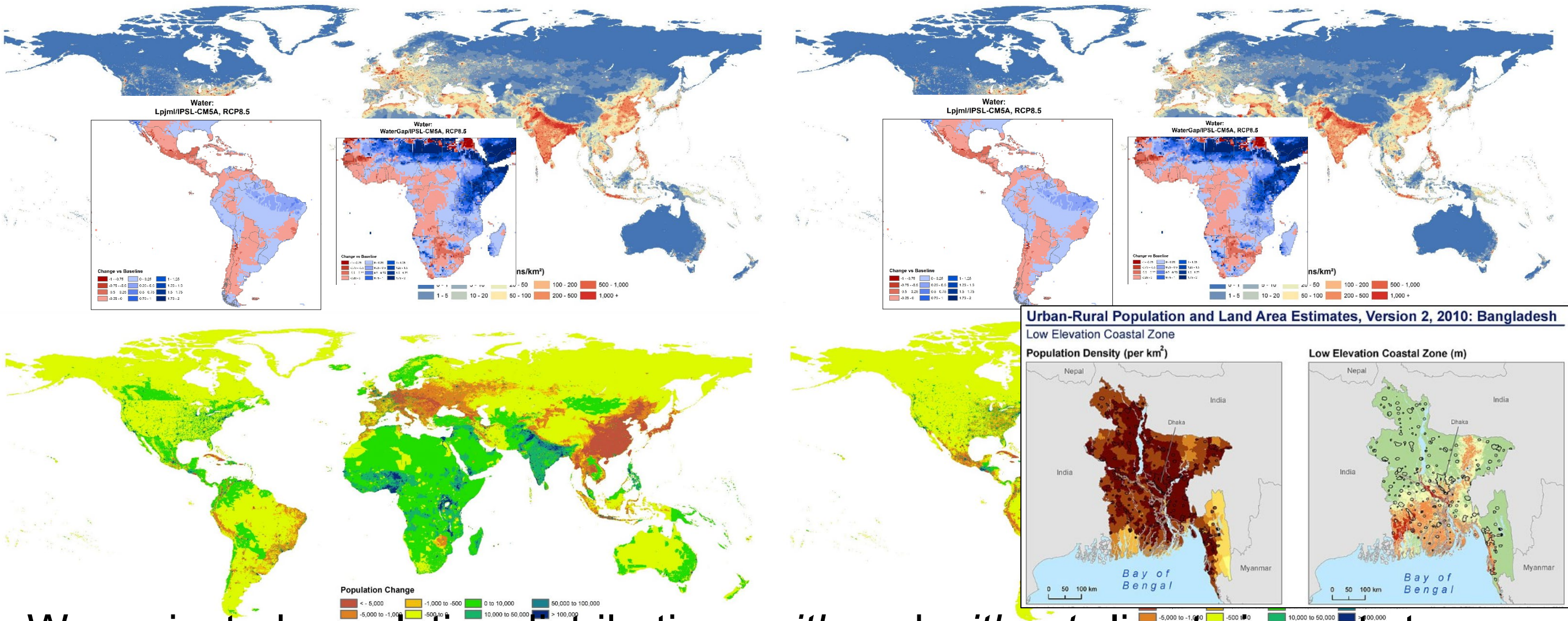
Groundswell took a scenario based approach based on combinations of development trajectories (Shared Socioeconomic Pathways) and climate impacts on crop production and water availability (from the ISIMIP project)



# Two SSPs + Climate Impacts

## SSP 2: Middle of the Road

## SSP 4: Inequality



We projected population distributions *with* and *without* climate impacts to generate two future population distributions – the difference between the two was assumed to result from the fast demographic variable.... migration

# Headline Numbers

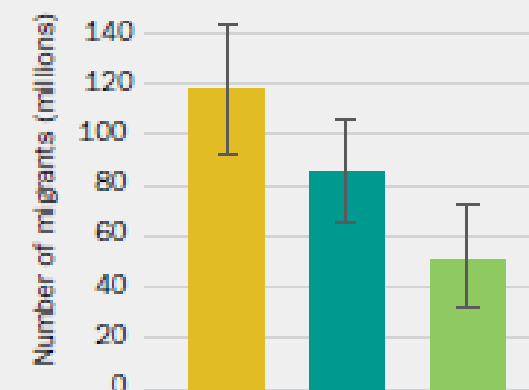
- Up to 140 million internal migrants by 2050 in the three regions
- The largest numbers are in Africa, suggesting high climate sensitivity in that region
- Numbers are lower for SSP2: more inclusive development, and lowest for the climate-friendly RCP2.6 scenario

## PLAUSIBLE SCENARIOS

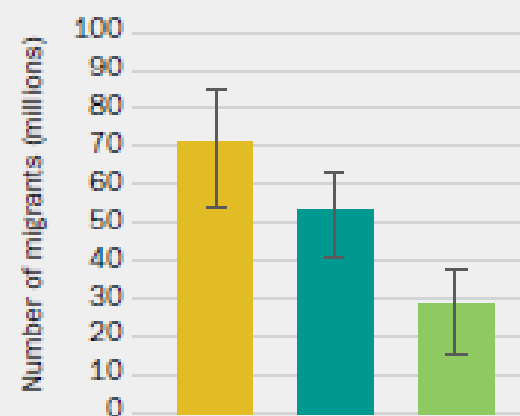
■ Pessimistic (Reference) ■ More Inclusive Development ■ More Climate-Friendly



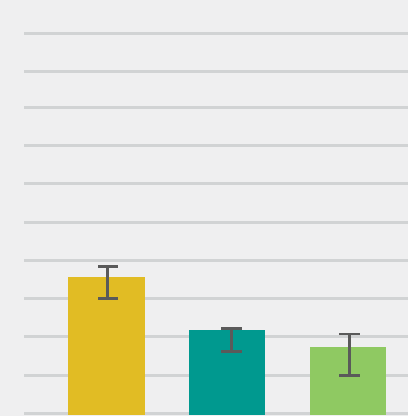
TOTAL FOR THE THREE REGIONS



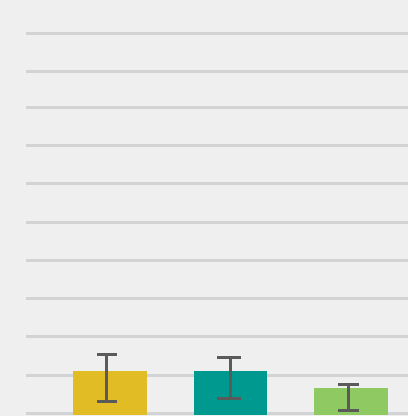
SUB-SAHARAN AFRICA



SOUTH ASIA

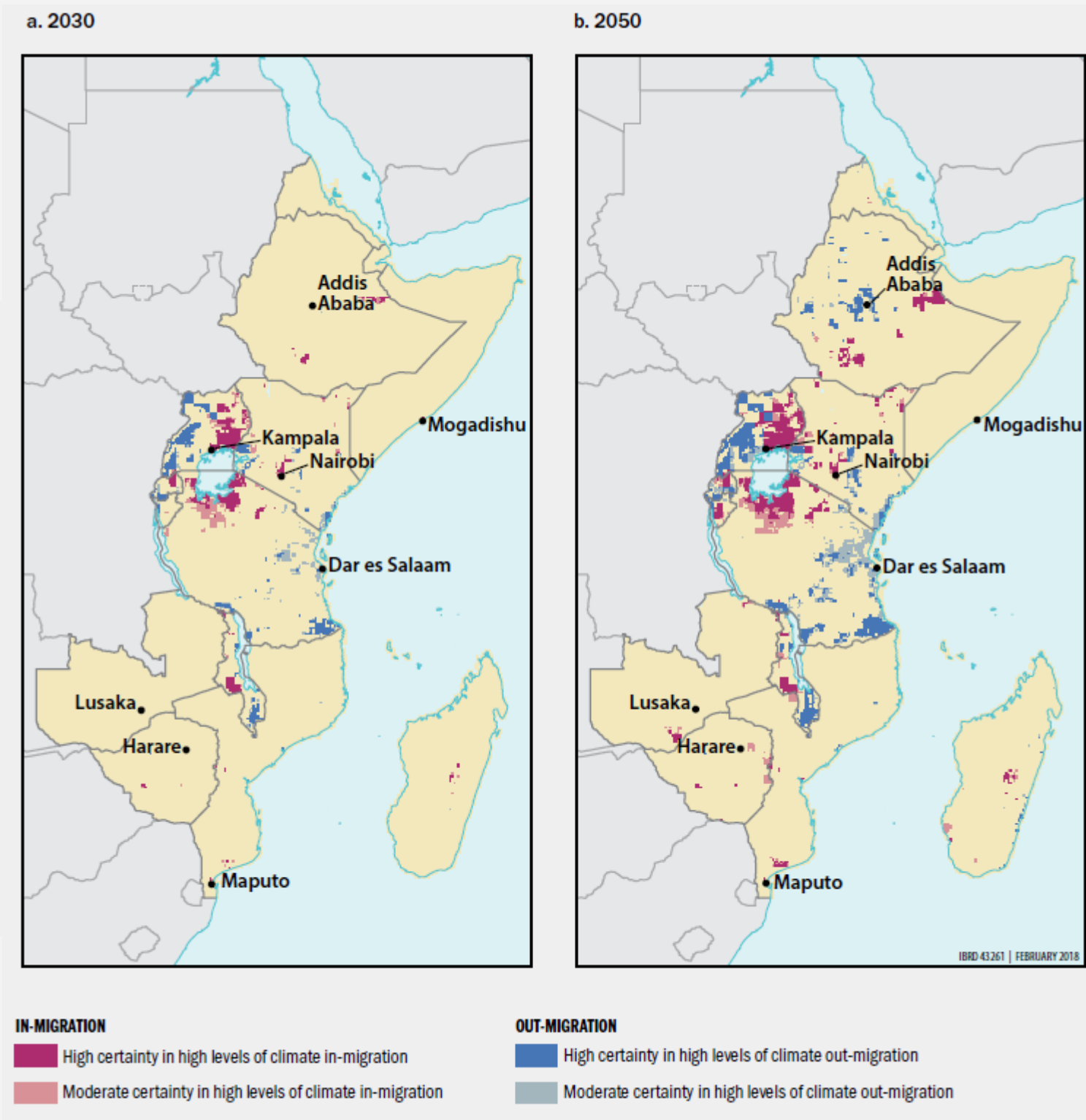
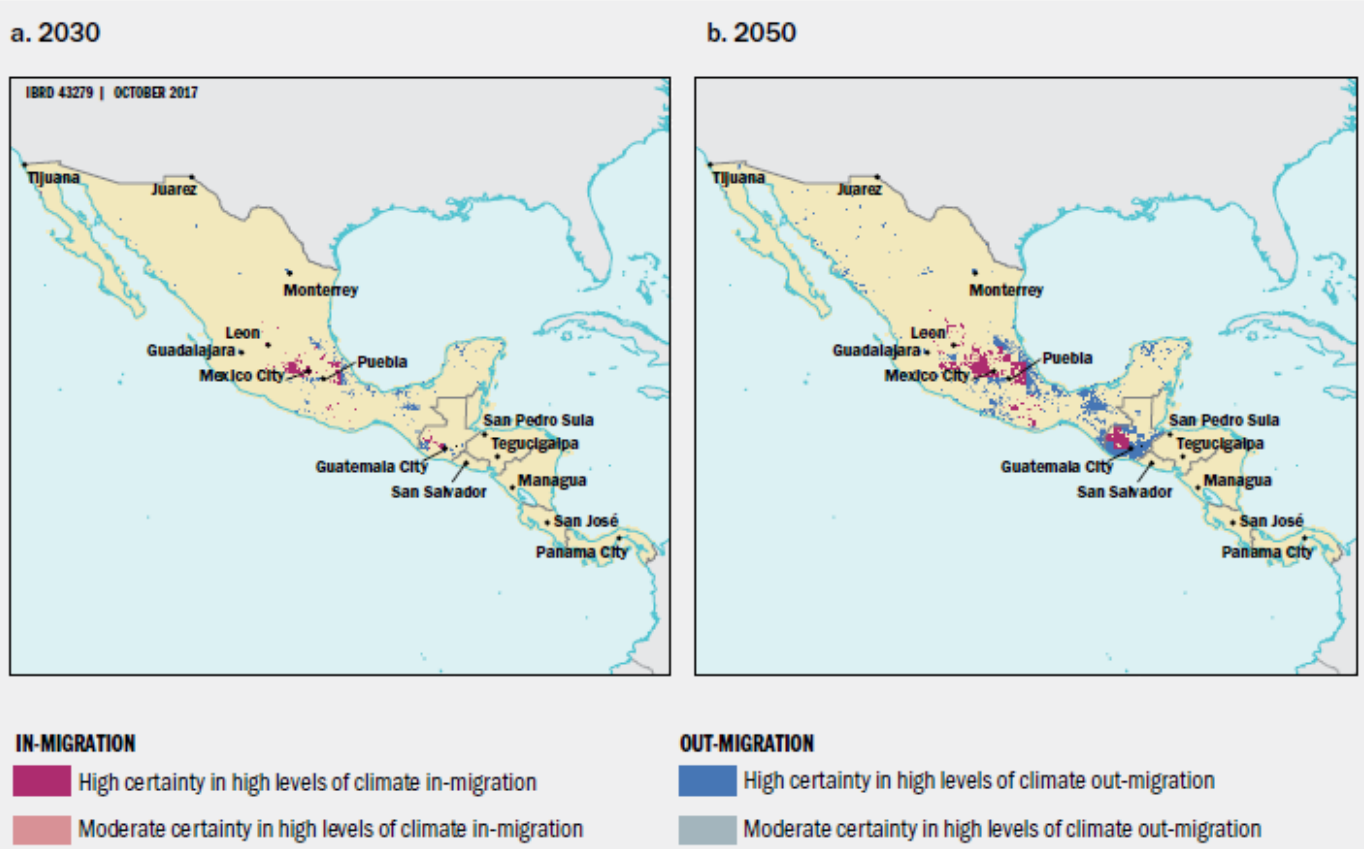


LATIN AMERICA





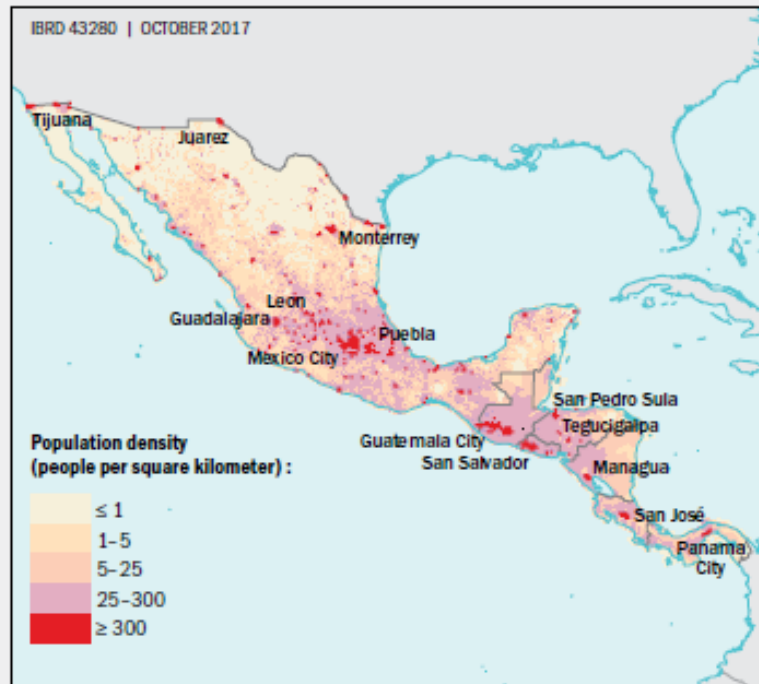
# Migration Hotspots for two out of three regions (South Asia not shown)



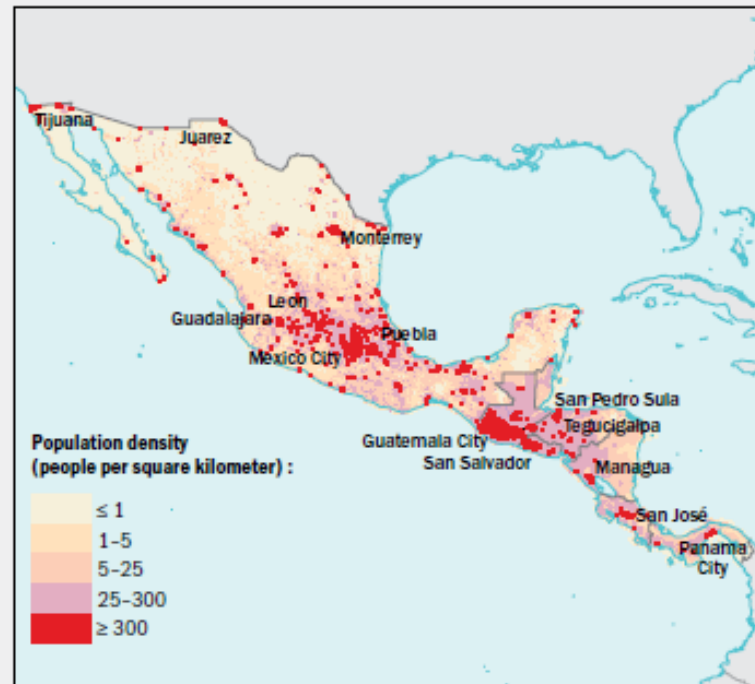
# Urbanization

Urban Threshold:  $\geq 300$  persons per sq. km.

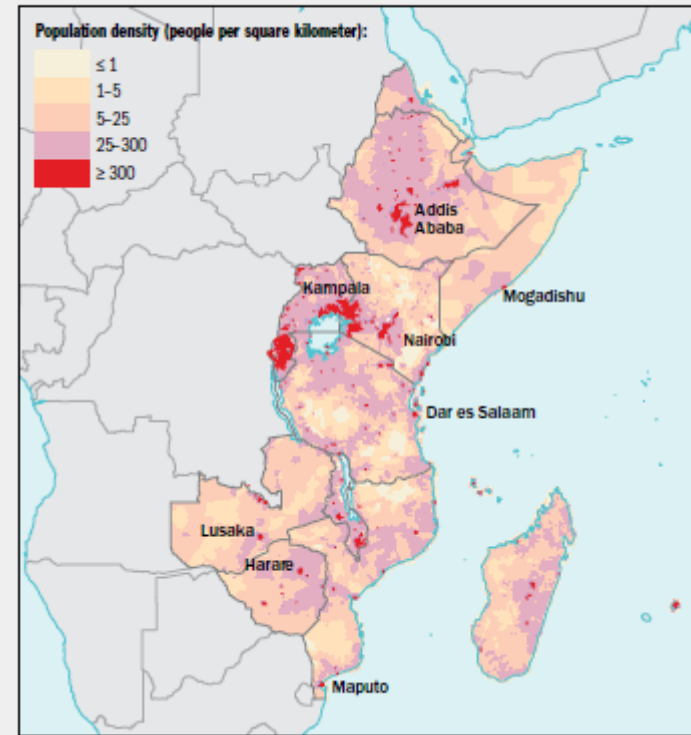
a. 2010



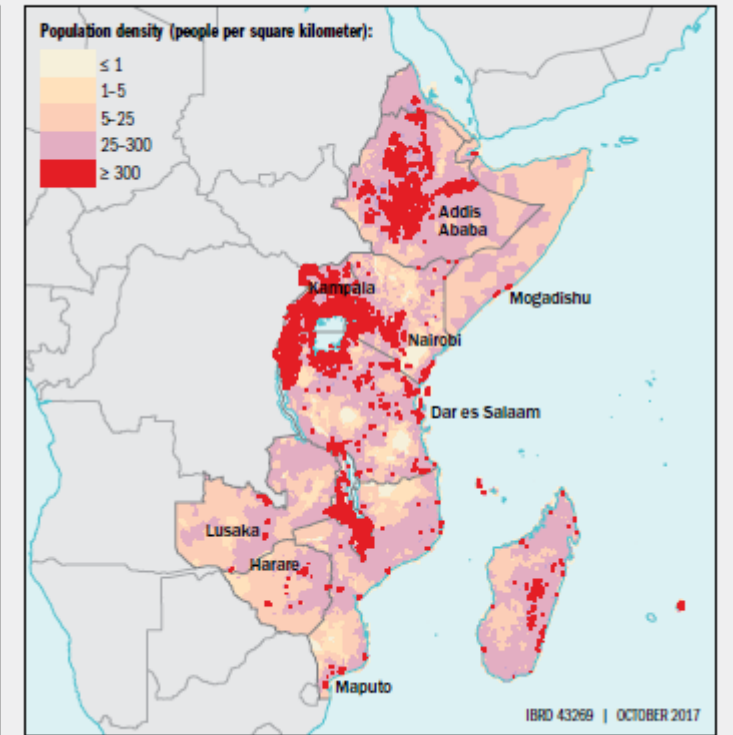
b. 2050



a. 2010

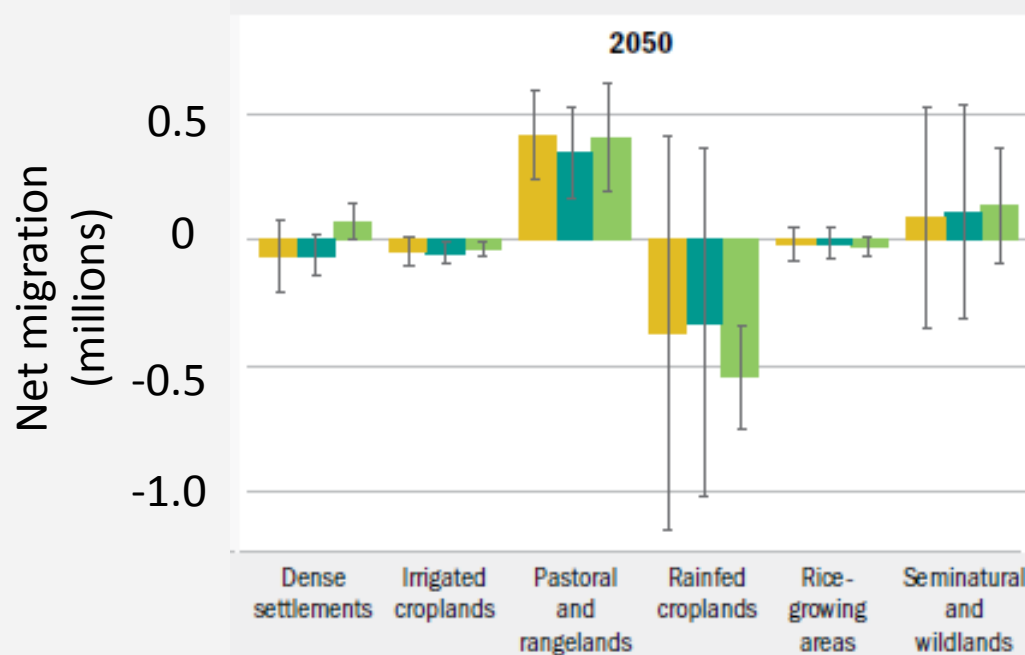
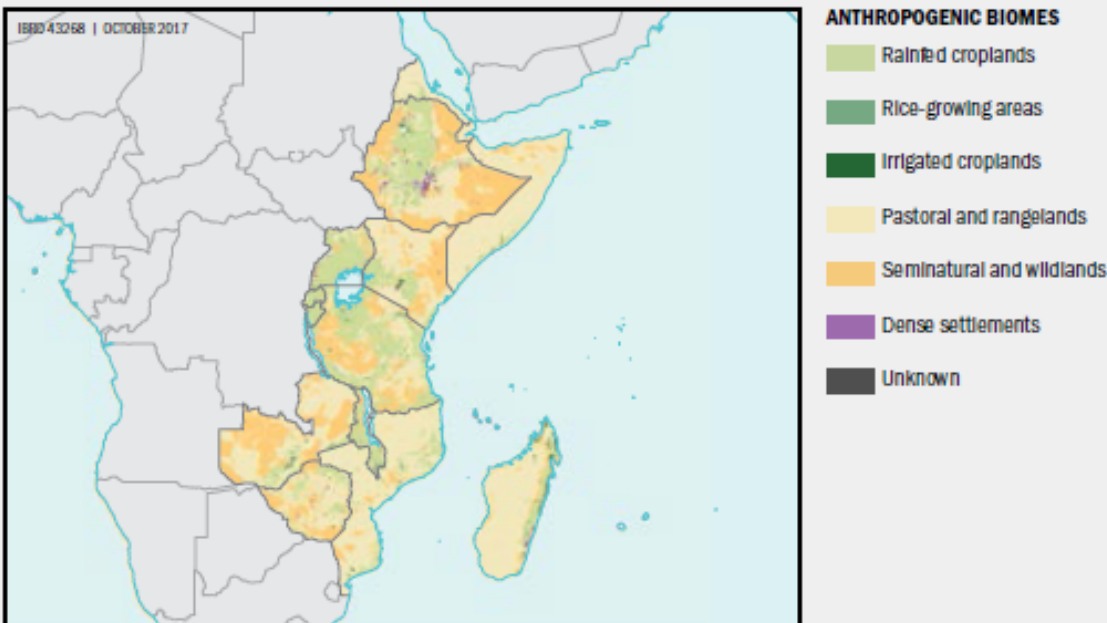
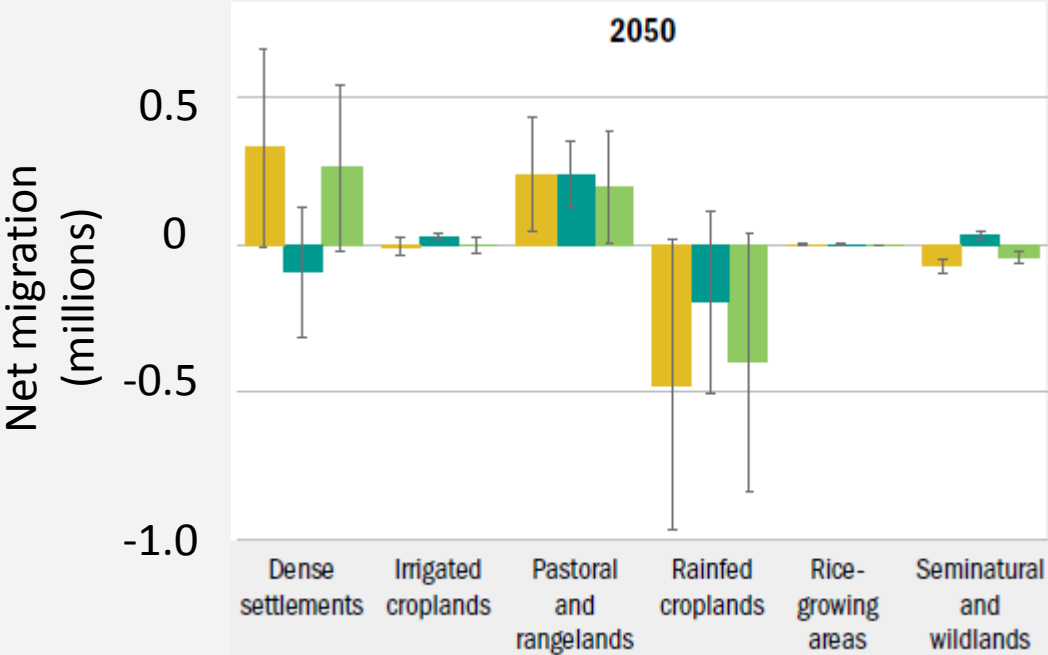
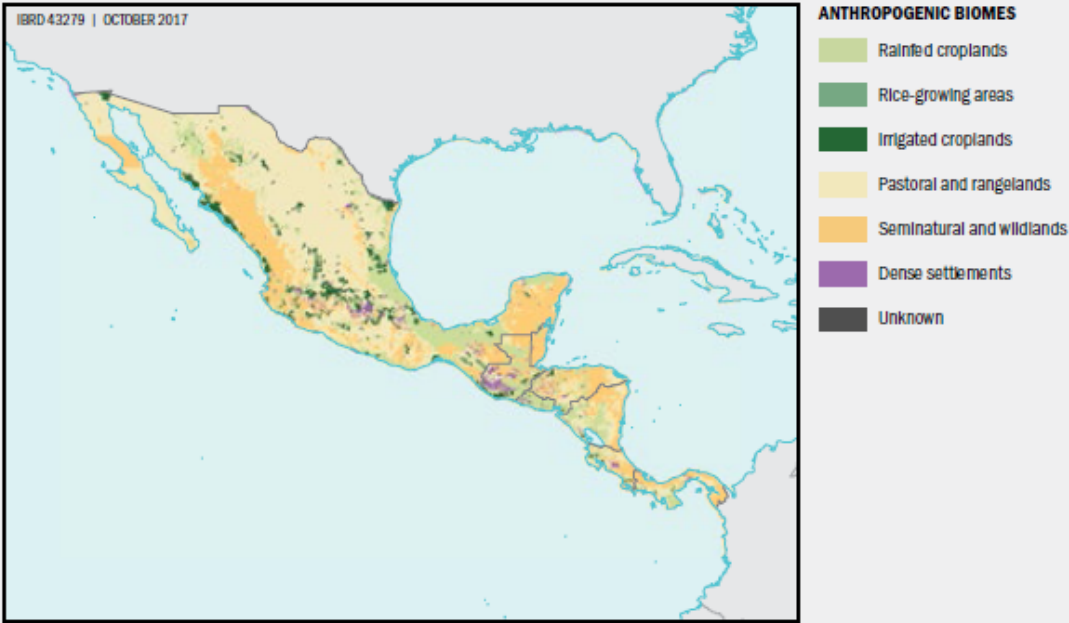


a. 2050





# Livelihood Systems



# Lessons from the “big data” approach to modeling migration

- Migration data are scant and often not comparable (e.g. stocks, flows, differing time periods)
- Using past and future population distributions offers potential solutions
- Results at local levels must be treated with caution
- However, results on aggregate are plausible
- Modeling future migration is fraught with uncertainty
  - Future patterns are likely to be affected by economic interdependencies, conflicts, and national policies in ways that can never be fully foreseen
  - Yet, if the models cause policy makers to consider the potential migration impacts of climate change for the first time, that is a useful result