COMMENTS FOR THE EGM ON THE SUSTAINABLE DEVELOPMENT IMPACTS OF CONFLICTS, CLIMATE CHANGE, DISASTERS, AND POPULATION DISPLACEMENT

Bryan Jones
Baruch College School of Public & International Affairs
CUNY Institute for Demographic Research
21 February 2019

CUNY INSTITUTE FOR DEMOGRAPHIC RESEARCH

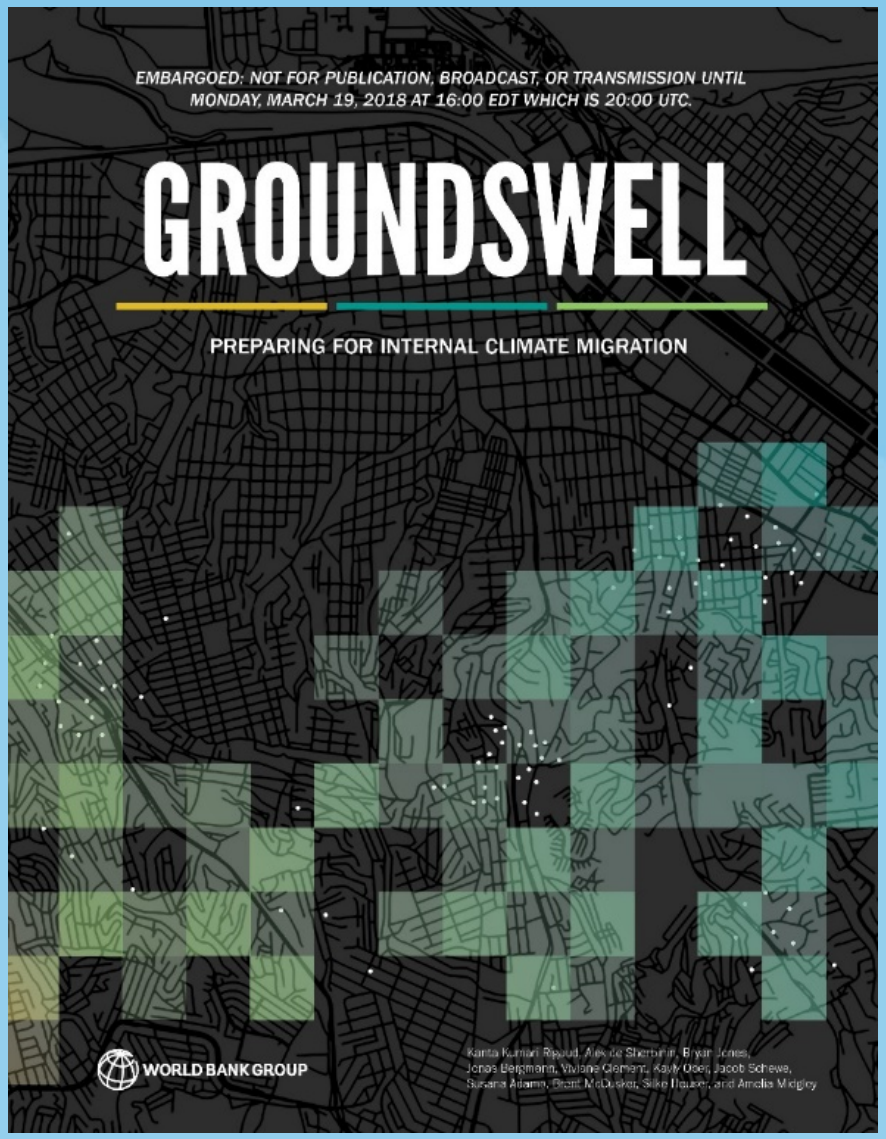
Center for International Earth Science Information Network
EARTH INSTITUTE | COLUMBIA UNIVERSITY

THE WORLD BANK
IBRD • IDA

PIK

What do we know?

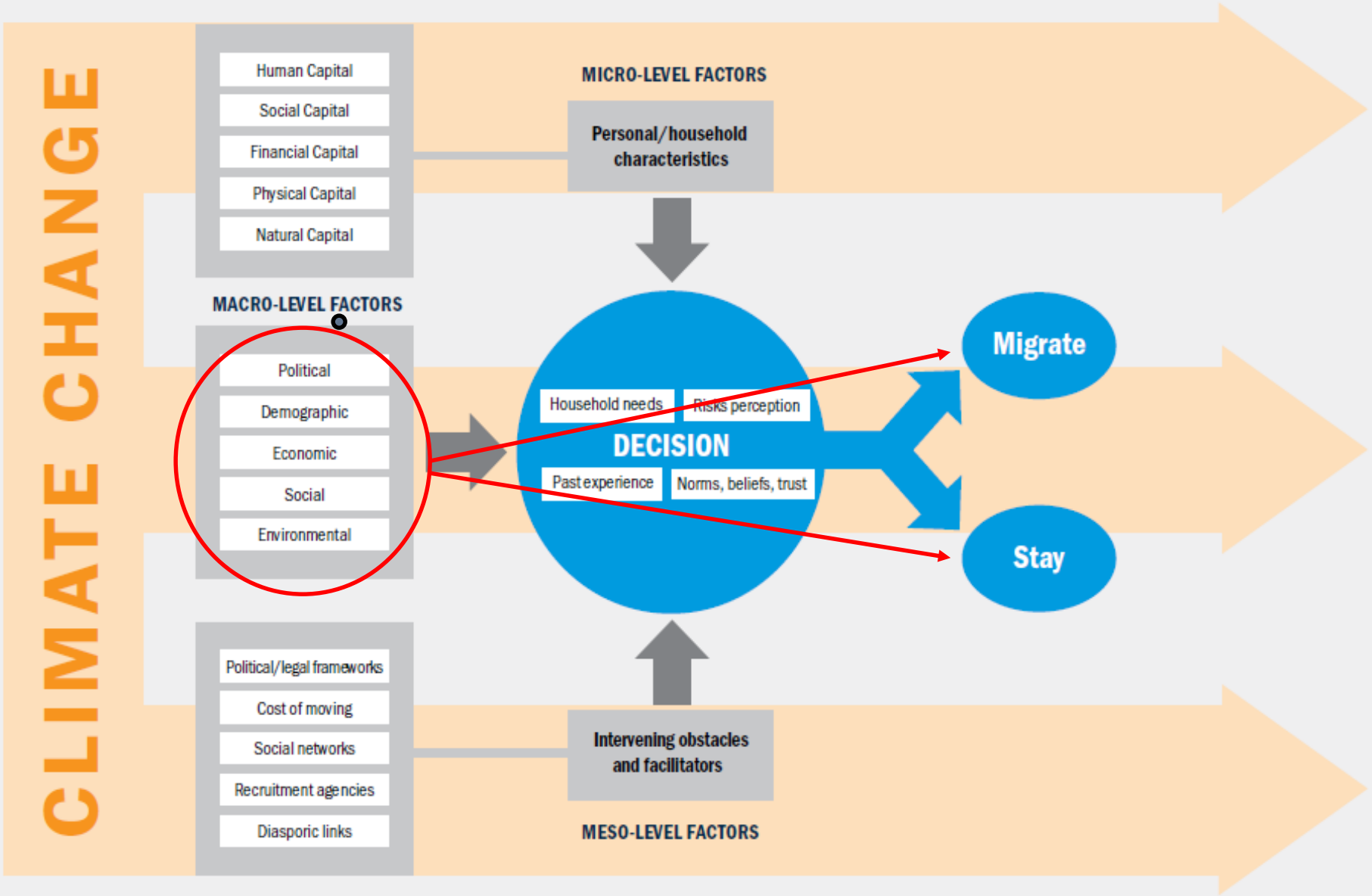
- Internal migration in response to climate change is already happening at scale and is expected to increase.
- Migration decisions are the product of complex decision processes.
- Climate change will affect multiple aspects of human livelihoods that feed into migration decisions.
- The impact of internal migration can be substantial in both sending and receiving areas.
- Migration is an adaptation strategy and must be managed for both its opportunities and challenges.



The *Groundswell* Model

CUNY INSTITUTE FOR DEMOGRAPHIC RESEARCH

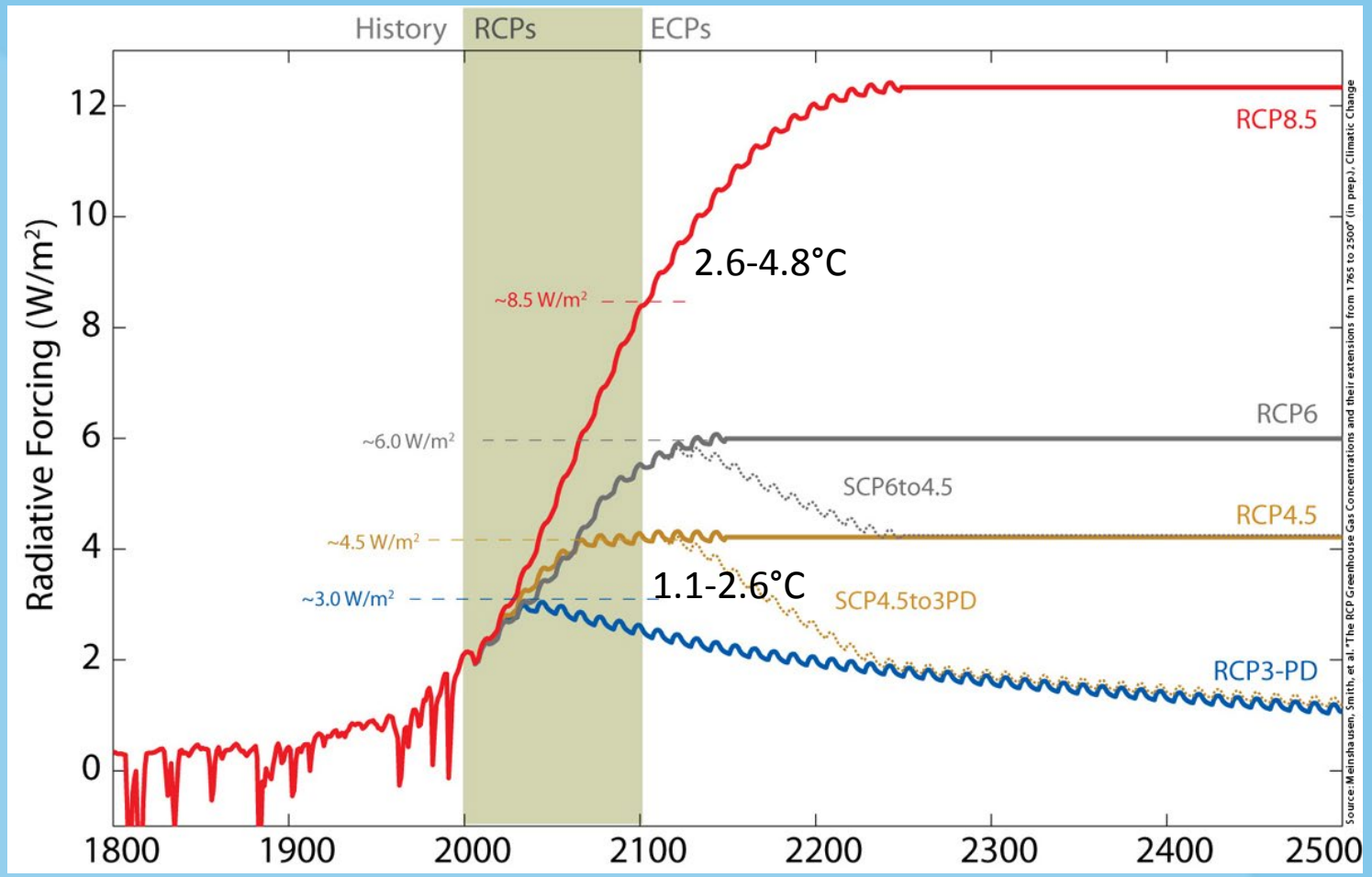
Figure 2.1: Foresight model adapted to illustrate climate change, livelihoods, and household migration behaviour



Source: Extended and adapted from Foresight (2011) and McLeman (2016)

IPCC Scenario Process

Representative Concentration Pathways (RCPs)

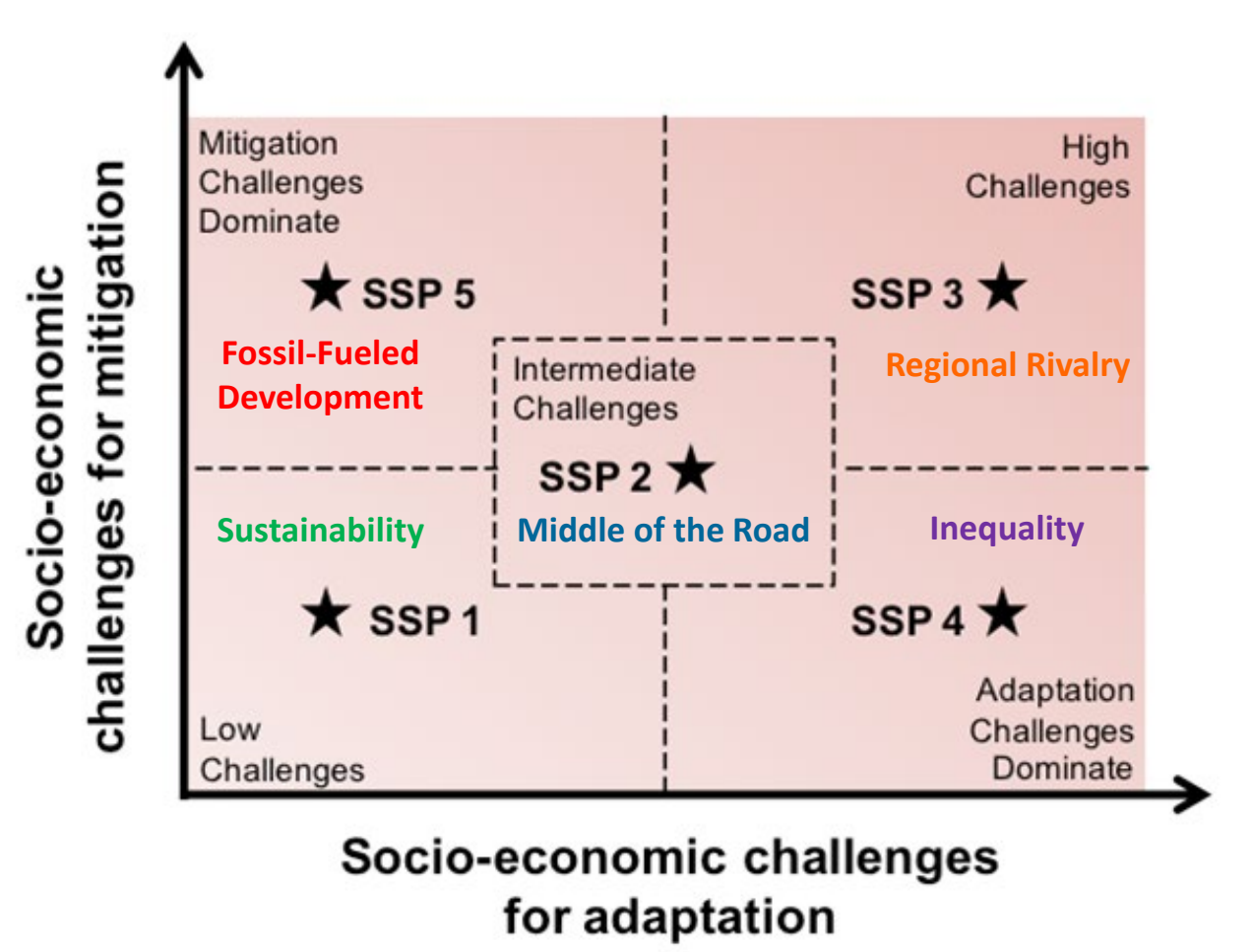


Source: Meinshausen et al., 2011

CUNY INSTITUTE FOR DEMOGRAPHIC RESEARCH

IPCC Scenario Process

Shared Socioeconomic Pathways (SSPs)

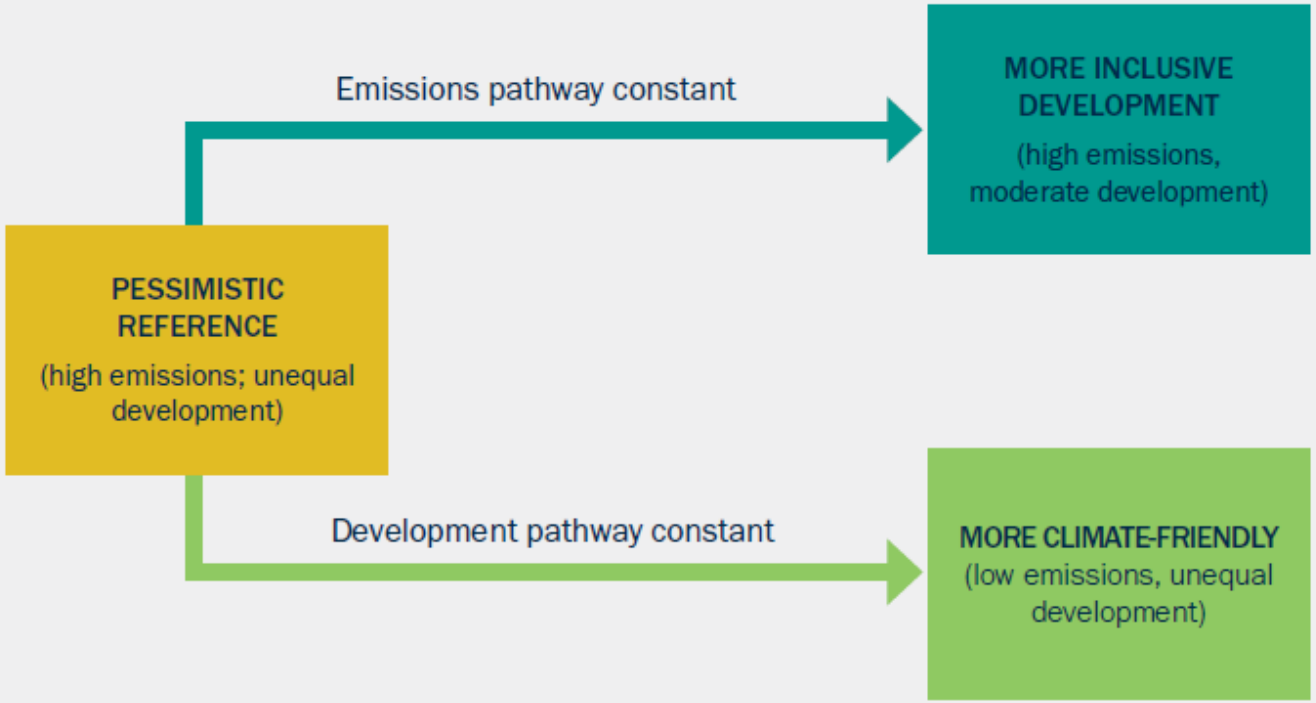


Source: O'Neill et al., 2012

CUNY INSTITUTE FOR DEMOGRAPHIC RESEARCH

Groundswell Approach

Figure 1.2: Projecting internal climate migration under three plausible scenarios

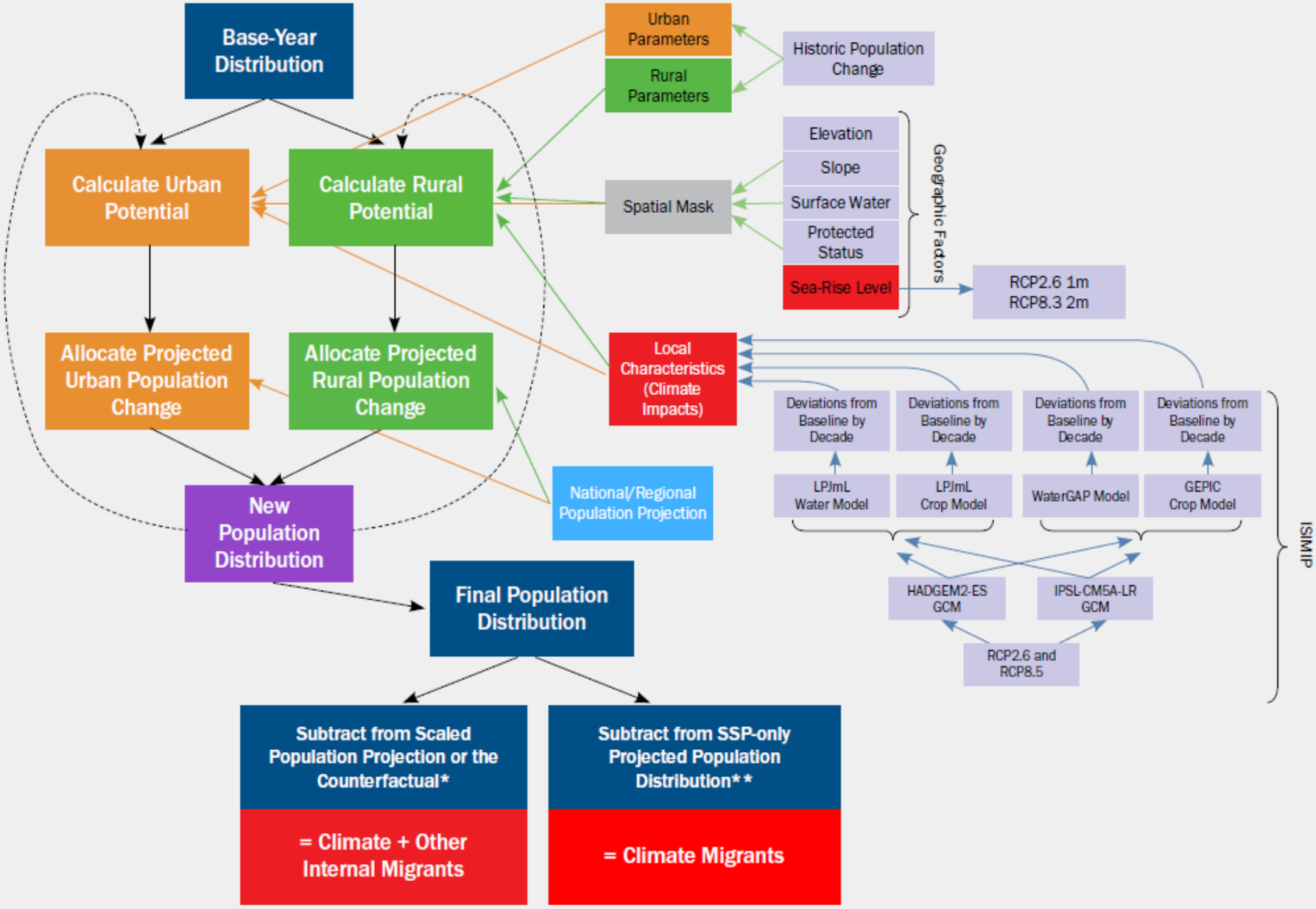


Note:
1. The scenarios are based on combinations of two Shared Socioeconomic Pathways—SSP2 (moderate development) and SSP4 (unequal development)—and two Representative Concentration Pathways—RCP 2.6 (low emissions) and RCP 8.5 (high emissions).
2. Estimates of climate migrants are derived by comparing these plausible climate migration (RCP-SSP) scenarios with development only (SSP) or the "no-climate impact" scenarios.

CUNY INSTITUTE FOR DEMOGRAPHIC RESEARCH

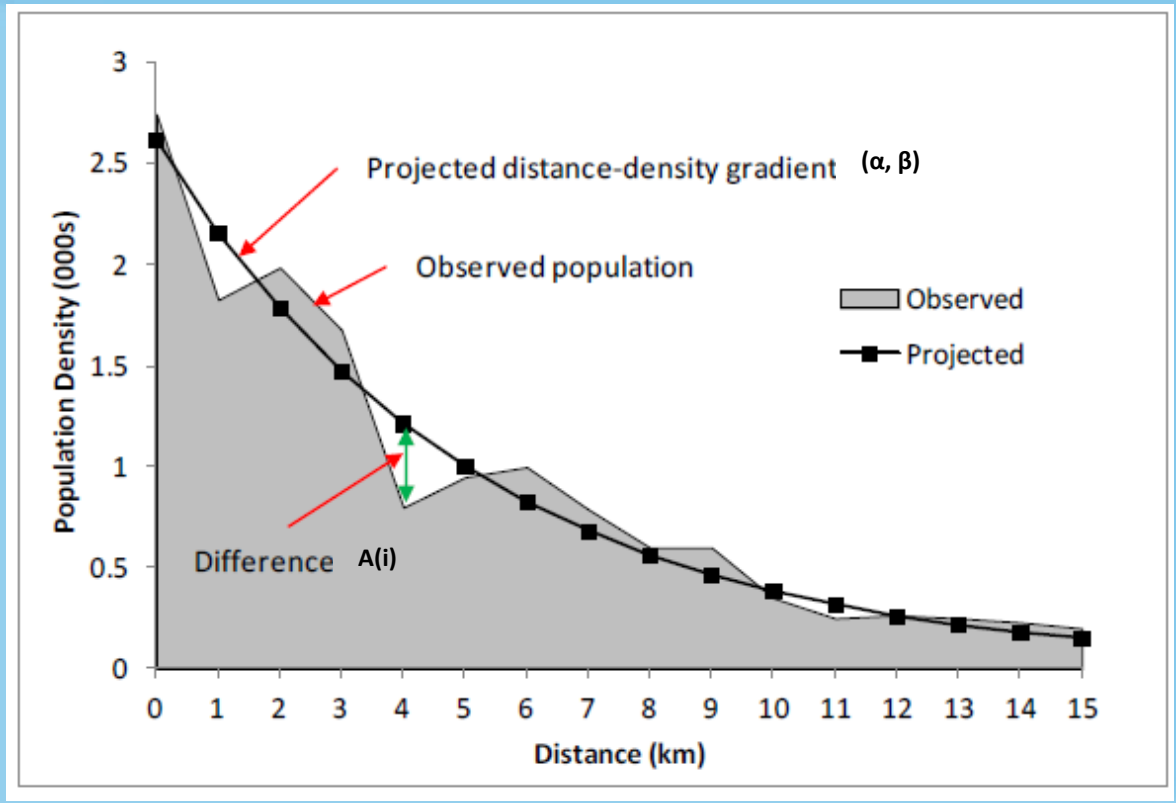
Model Modifications

Figure 3.4: Flowchart of modeling steps



Identifying a Climate Signal

We hypothesize that these residuals can be explained, in some small part by local environmental characteristics, which are used to estimate the *local* (A_i) parameter.



CUNY INSTITUTE FOR DEMOGRAPHIC RESEARCH

Identifying a Climate Signal

We then estimate the relationship between observed A and cell-specific climate and sectoral impact indicators, as well as other know drivers, by fitting a spatially autoregressive model:

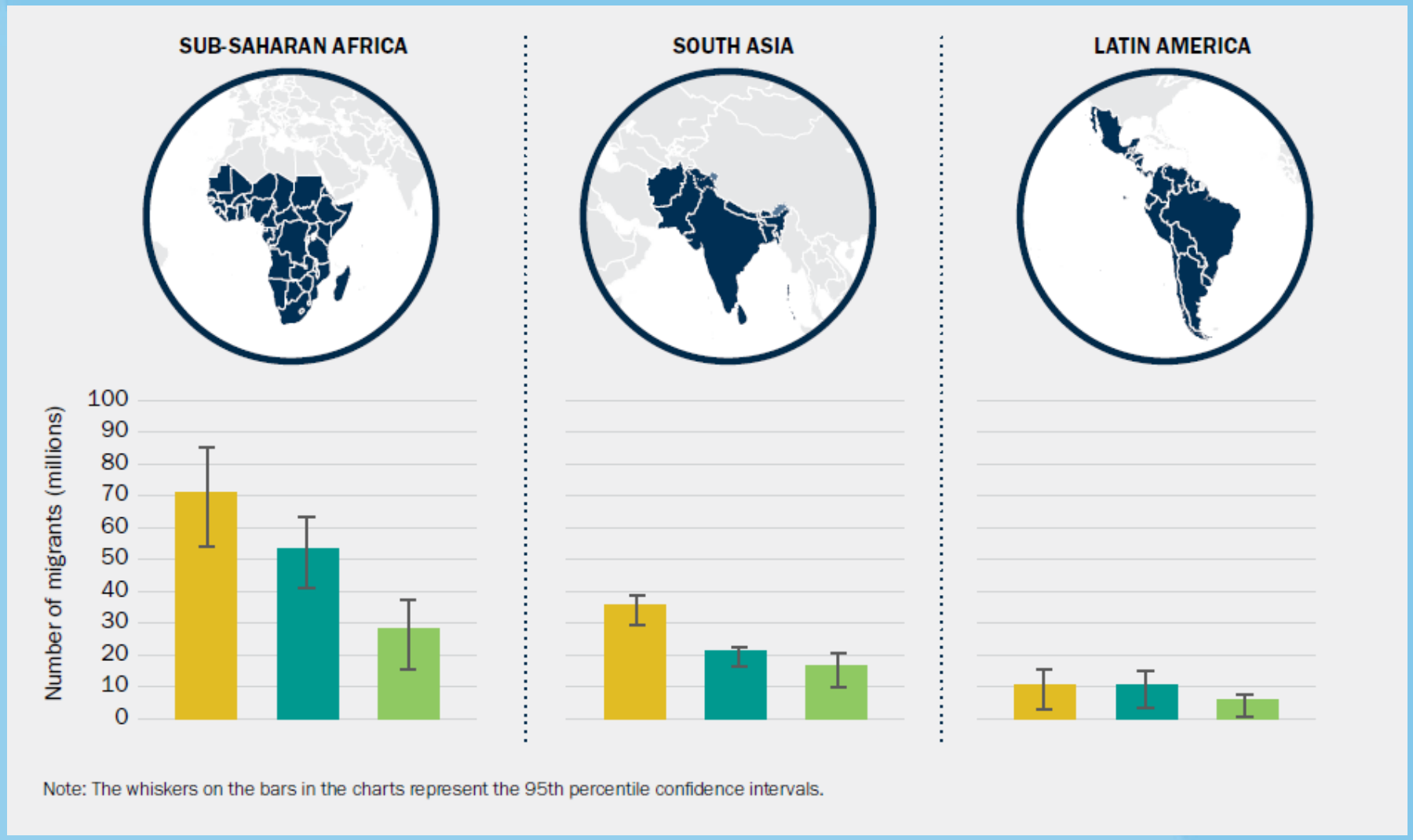
$$A_{i,t} = \rho W A_{i,t} + \beta_1 C_{i,t} + \beta_2 H_{i,t} + \varepsilon_{i,t}$$

where C and H are the set of explanatory variables that go into producing index $A(i)$ (crop production and water availability, respectively), ρ is the spatial autocorrelation coefficient and W is a spatial weight matrix. From this procedure, a set of cell specific $A(i)$ values is estimated for both urban and rural population.

Coefficients on C and H are used to estimate future values of $A(i)$ for use in the projections.

CUNY INSTITUTE FOR DEMOGRAPHIC RESEARCH

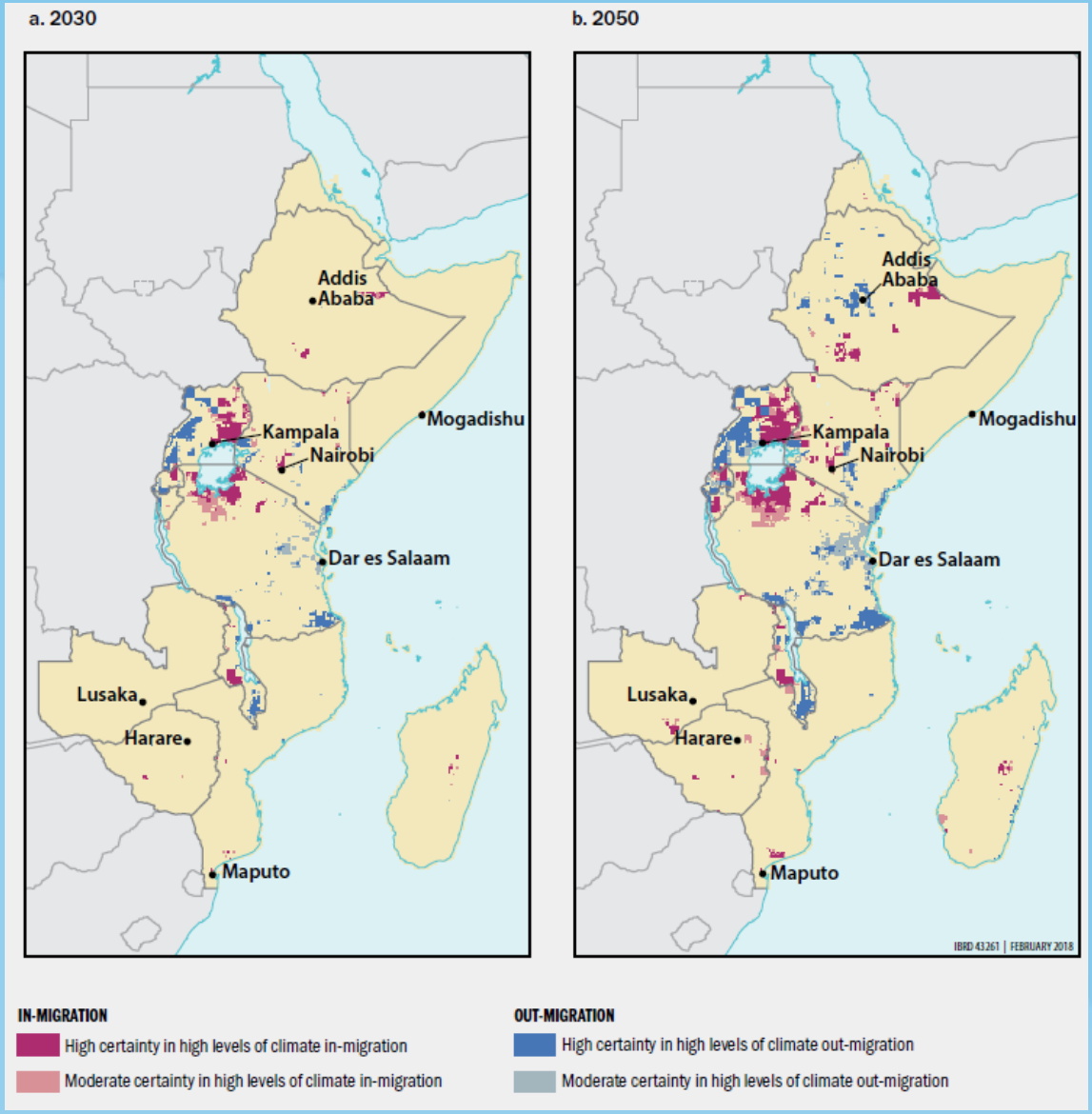
Results: Aggregate Numbers



Note: The whiskers on the bars in the charts represent the 95th percentile confidence intervals.

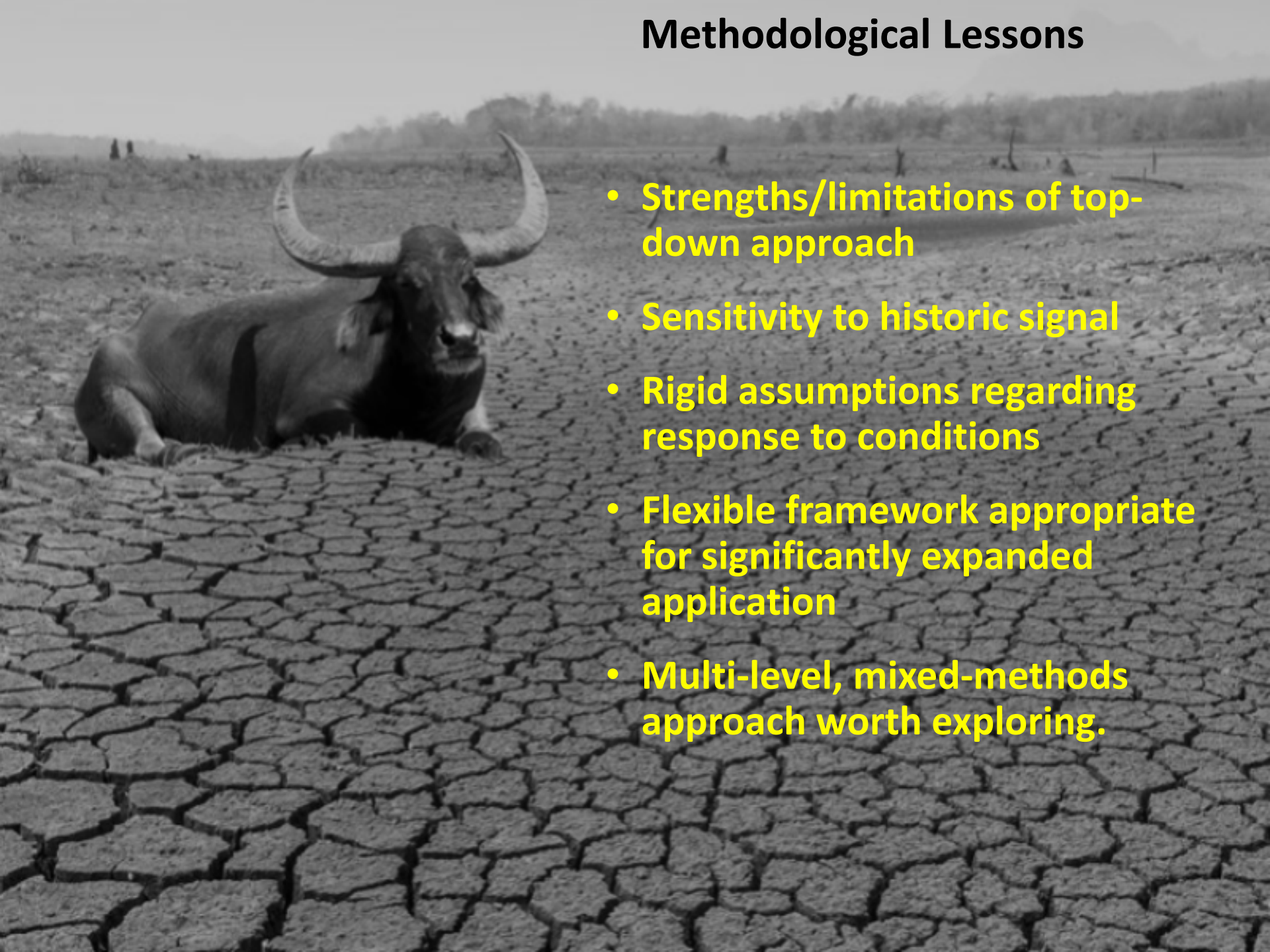
CUNY INSTITUTE FOR DEMOGRAPHIC RESEARCH

Results: Spatial Patterns



CUNY INSTITUTE FOR DEMOGRAPHIC RESEARCH

Methodological Lessons



- Strengths/limitations of top-down approach
- Sensitivity to historic signal
- Rigid assumptions regarding response to conditions
- Flexible framework appropriate for significantly expanded application
- Multi-level, mixed-methods approach worth exploring.

Recommendations

- To the degree possible, synchronize the large n / global-scale research to enable comparability.
  - This necessarily requires consensus regarding a working definition of an “environmental migrant”.
- Be clear about the sources and scale of uncertainty.
- The scenario process offers a framework to explore a range of possible futures at multiple spatial scales, and importantly, the opportunity to assess sensitivity to climate/societal outcomes.
- Work with policy makers to design models that will have policy relevance.
- Multi-level, mixed-methods approach worth exploring.
- Acknowledge the joint contributions of different modeling approaches towards a more holistic understanding of the spatial implications of alternative future pathways.

CUNY INSTITUTE FOR DEMOGRAPHIC RESEARCH