

Climate Change and Population Migration in Brazil's Northeast: Scenarios for 2025-2050

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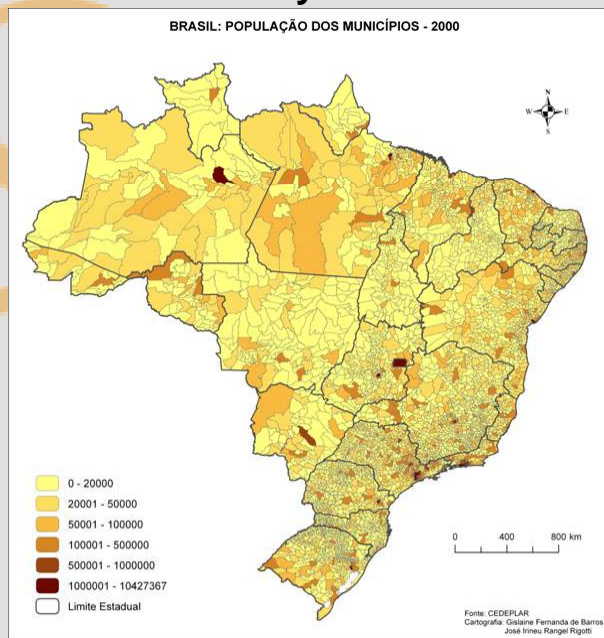
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Objectives

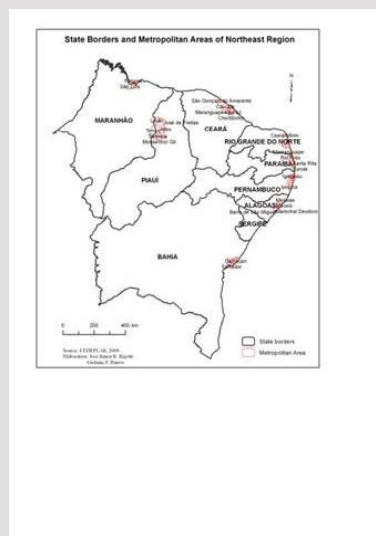
- Analyze potential economic and demographic scenarios resulting from climate changes in Brazil's Northeast until 2050
- Discuss how the results can inform adaptation policies and planning at different scales
 - Focus on most vulnerable populations

Study Area

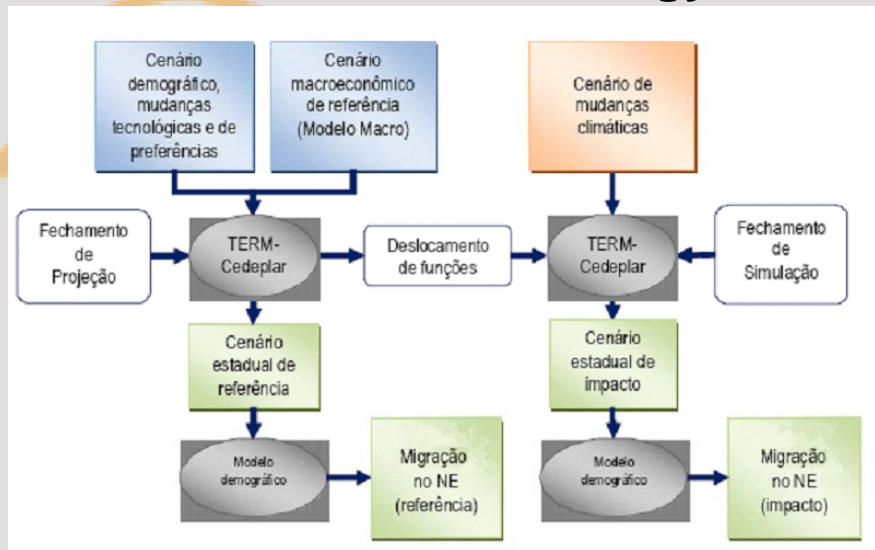


Study Area

- Why the Brazilian Northeast?
 - the second most populated among the 5 Brazilian regions (28% of the country's population, 49 million individuals in 2000)
 - Socioeconomic vulnerability: the poorest region in Brazil (HDI of 0.57 compared to 0.78 to the Southern region)
 - an extensive semi-dry area and a large population share working in the primary sector
 - Some of the most dramatic impacts of climate change predicted for Brazil



Data and Methodology

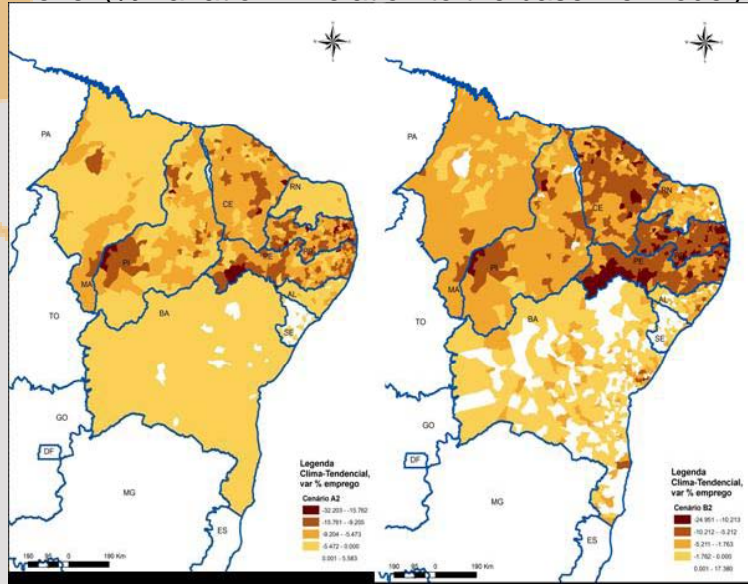


Data and Methodology

- Demographic and economic scenarios until 2050
- **Baseline Demographic-economic Model:**
 - Population projections (component method)
 - General Equilibrium Model (TERM-CEDEPLAR): economic indicators which help to define vulnerable populations (GNP, family consumption, employment, land supply). Population projections as input; (refined) migration component as an output
- **Alternative Model** (impacts of climate change):
 - A2 and B2 (IPCC) scenarios provided by Brazilian National Institute of Space Research (CPTEC/INPE) through the regional model HadRM3P
 - Impact of climate change on primary sector (collaboration with EMBRAPA)
 - Measure changes in economic scenarios and impacts on migration
- **Difference between Baseline and Alternative models:** net impact of climate change on population migration in the Northeast until 2050

Results: economic scenarios

Net impact of climate change on the Northeast's employment level (% variation in relation to the baseline model)



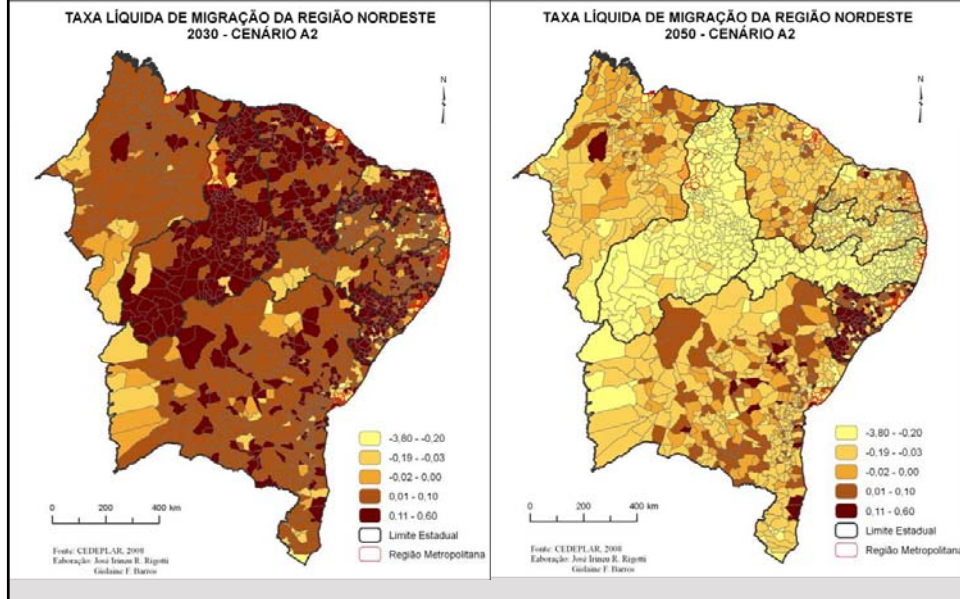
Results: demographic scenarios

Table 1 – Net Migration (NM), Net Migration Rate (NMR) and Total Population by Scenario (Baseline, A2 and B2) – Brazilian Northeast Region, 2025-2030, 2035-2040 and 2045-2050

Scenario	Net Migration			Net Migration Rate (%)			Total Population / Projected		
	2025-2030	2035-2040	2045-2050	2025-2030	2035-2040	2045-2050	2025-2030	2035-2040	2045-2050
Baseline	-192513	-203925	-208781	-0,29	-0,29	-0,29	65339961	68559267	70349764
A2	17752	-246777	-236065	0,03	-0,36	-0,34	65357713	68312491	70113699
B2	-6026	-13565	-20603	-0,01	-0,02	-0,03	65333935	68545703	70329161

Results: demographic scenarios

Net impact of climate change on the Northeast's Net Migration Rate (% variation in relation to the baseline model)



Conclusions and Policy Implications

- Baseline Demographic-economic Model: declining population growth with rates closer to zero in 2050
- Alternative model (with A2 scenario): increase this trend via out-migration from the Northeast
- A2 scenario *after 2030*: stronger impacts on the agricultural sector and on population migration
 - General pattern of out-migration in all classes of municipality size
 - highest negative impacts occur in areas with a strong articulation with the agricultural sector – especially in central part of the Northeast region (the core of the semi-arid area, particularly Pernambuco and Paraíba), and the states of Ceará, Piauí and Maranhão
- Mobility of people = mobility of diseases?
 - Historical examples in the Northeast: urbanward migration during periods of droughts leading the increase in leishmaniosis epidemic

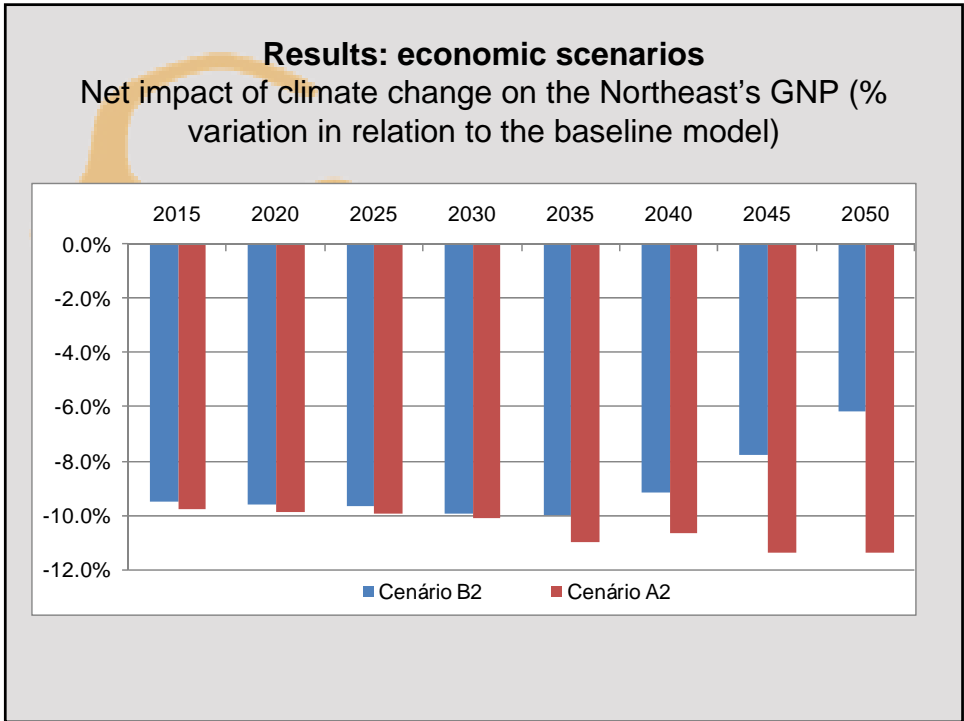
Conclusions and Policy Implications

- Proposing adaptation mechanisms:
 - anticipate impacts of population redistribution, considering that migration may (re)produce vulnerabilities across the territory
 - Incorporate climate dimension in urban & regional planning: health and infrastructure as key determinants of the magnitude of risks
 - Who migrates? Model assume those with income deprivation, but it is not always the case
 - Benign long-term impact of conditional public cash transfers to vulnerable families (but – fiscal limit)
 - Management of agricultural systems: innovation & technology, adequation of cultivation, better water management
 - Identification of economic alternatives at the local and regional levels

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Data and Methodology

- **Main limitations of the Alternative Model:**

- “Economist view” of migration
- Estimation of the impacts on the primary sector and its linkages to other sectors: underestimating total impacts

Conceptual Framework

