

Large-Scale Infrastructure Projects in the Southwestern Amazon: Demographic Processes and Rural and Urban Resilience and Vulnerability



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Introduction

- ▶ Global economic integration
 - Formation, expansion of capital and commodity chains/webs
 - Urban/industrial processing nodes, and...
 - ...Incorporation of rural/remote regions
 - Natural resource exploitation
- ▶ Integration initiatives
 - Common markets
 - Trade agreements
 - Infrastructure projects

Introduction

► IIRSA

- The Initiative for Regional Infrastructure Integration in South America
- Formalized in 2000 by presidents of 12 countries
- Organized around “axes of integration”
- Strategic corridors to expand commerce, exports

► The Inter-Oceanic Highway

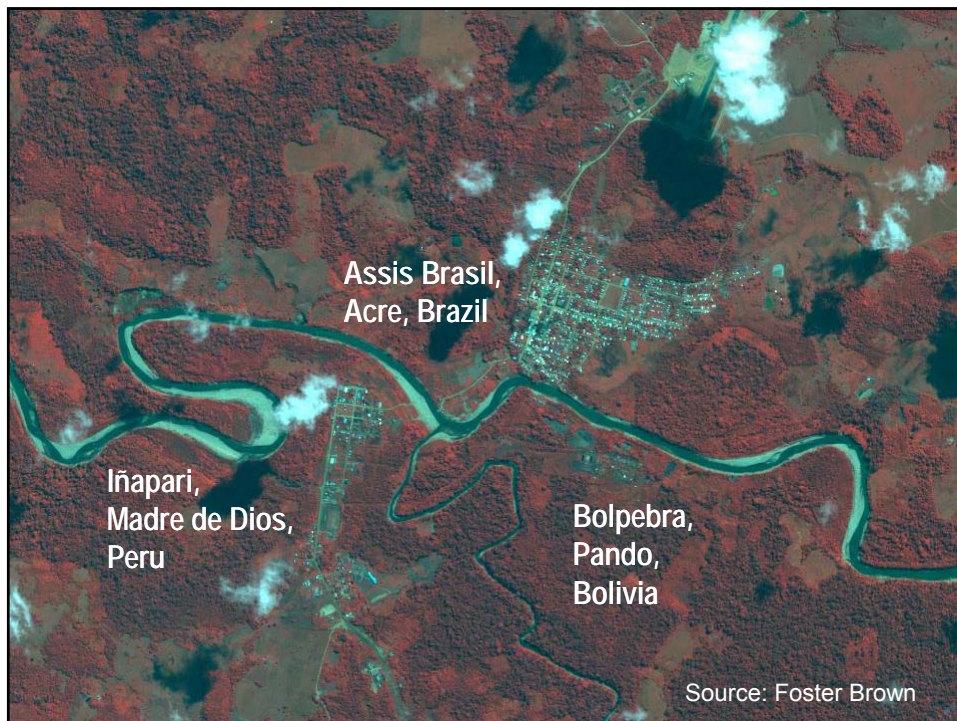
- Part of the “Peru-Brazil” axis
- Goal to facilitate access from the southwestern Amazon...
- ...to Atlantic ports in Brazil and Pacific ports in Peru



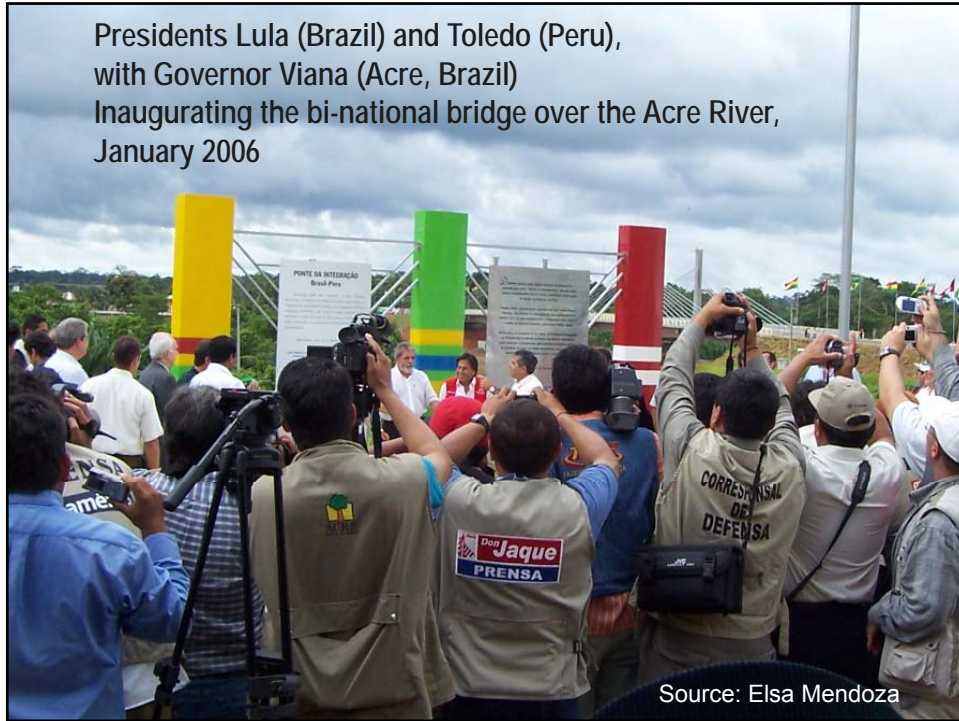
Introduction

► The “MAP” Region

- The tri-national frontier in the heart of the southwestern Amazon
- Madre de Dios (Peru), Acre (Brazil), Pando (Bolivia)
- Well-known for its high biological and social diversity
- Now experiencing paving of the Inter-Oceanic Highway
- Changes in resource use, population underway



Presidents Lula (Brazil) and Toledo (Peru),
with Governor Viana (Acre, Brazil)
Inaugurating the bi-national bridge over the Acre River,
January 2006



Source: Elsa Mendoza

Bridge over the Acre River, Brazil-Peru



Source: Perz

Introduction

- ▶ The “MAP” Region
 - Debate about the prospective changes due to road paving
 - But the extent of road paving differs among the three sides
 - Basis for comparative analysis





Introduction

▶ Road Impacts

- Economic: largely positive; increased employment, GDP (e.g., Straub 2008)
- Ecological: largely negative; habitat fragmentation, species loss (e.g., Forman, et al. 2003)
- Social: scattered literature; social inequality, tenure conflicts
- Demographic: smaller literature; varying outcomes (Chi, et al. 2006)
 - ▶ Focus here on demographic changes

Analysis

▶ Four-part analysis:

- ▶ 1. Review past demographic changes in the MAP region
 - Rural and urban growth, for each of the three sides
- ▶ 2. Project future demographic changes
 - Detailed data available for Acre, projections from 2000 to 2020
- ▶ 3. Evaluate demographic change in rural communities
 - Net migration and turnover; rural change due to migration
- ▶ 4. Perspectives on road paving and future change
 - Qualitative information from rural leaders

1. Past Demographic Changes in MAP

Location	Time 1	Time 2	Time 3	Time 4
Madre de Dios, Peru	1981	1993	N/A	2007
Total	33,007	67,008	N/A	109,555
Rural	17,047	28,575	N/A	29,246
Urban	15,960	38,433	N/A	80,309
Acre, Brazil	1980	1991	2000	2007
Total	301,276	417,098	557,526	655,385
Rural	169,346	158,230	187,259	190,705
Urban	131,930	258,869	370,267	464,680
Pando, Bolivia	1976	1992	2001	N/A
Total	34,493	38,072	52,525	N/A
Rural	30,843	28,071	31,705	N/A
Urban	3,650	10,001	20,820	N/A

Sources: IBGE, INE, INEI, population/household censuses

1. Past Demographic Changes in MAP

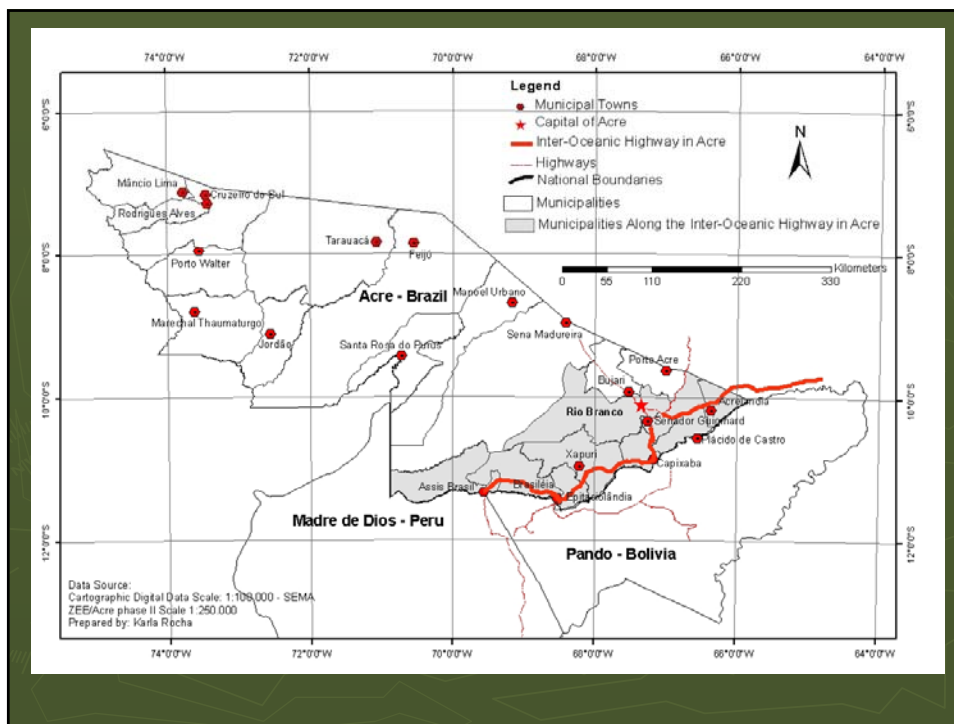
- ▶ Selected key findings:
 - ▶ 1. Larger population in Acre than Madre de Dios, than Pando
 - ▶ 2. Rapid urbanization of population in all 3 sides via differential growth
 - ▶ 3. Rural growth slowing

2. Future Demographic Changes

- ▶ Census data available for municipalities in Acre
 - 2000 Demographic Census of Brazil (IBGE)
 - Microdata files with household, individual information
 - Rural and urban population
 - Age-specific and total fertility
 - Life expectancies based on child survival
 - Migration information for residence 5 years before
 - Includes information for rural/urban previous residence

2. Future Demographic Changes

- ▶ Population projections
 - For rural and urban and total populations, by municipality
 - 2000 census data for population age-sex structure
 - Fertility and mortality and migration assumptions based on estimates from census data
 - Projections forward to 2020
 - Comparison of growth in Inter-Oceanic Highway municipalities to non-IOH municipalities



2. Future Demographic Changes

Area	2000 Population	2020 Projection	Growth Rate
Total Population			
IOH	344,670	508,111	1.94
Non-IOH	213,262	328,968	2.17
Acre Total	557,882	837,079	2.03
Urban Population			
IOH	271,617	390,106	1.81
Non-IOH	99,606	155,090	2.21
Acre Total	371,223	545,196	1.92
Rural Population			
IOH	73,003	118,005	2.40
Non-IOH	113,656	173,878	2.13
Acre Total	186,659	291,883	2.24

Source: population projections with IBGE, 2000 Brazilian demographic census microdata

2. Future Demographic Changes

- ▶ Selected key findings:
- ▶ 1. Comparable rural and urban growth rates
- ▶ 2. Non-IOH has higher overall and urban growth rates
- ▶ 2a. But if we exclude the state capital, which had lower growth rates, from the IOH calculations... the IOH total and urban rates are comparable to non-IOH rates
- ▶ 3. Rural growth is higher in the IOH corridor than in non-IOH municipalities

3. Rural Migration in the MAP Frontier

- ▶ Socio-economic component, NSF HSD project
 - Human and Social Dynamics
 - Survey of leaders of rural communities across the MAP frontier
 - In Madre de Dios, 88 interviews in 41 community associations
 - In Acre, 93 interviews in 25 state land tenure areas
 - In Pando, 111 interviews in 37 communal landholdings
 - Overall, 292 interviews in 103 communities



3. Rural Migration in the MAP Frontier

- ▶ Socio-economic component, NSF HSD project
 - Comparable data on community tenure, infrastructure, resource use, governance, external support, fire response, conflicts, perspectives on the highway and future change, etc.
 - Includes data on community population (in families), in-migrant families in the past 5 years, out-migrants in the same time period
 - Allows calculation of community net migration and turnover

3. Rural Migration in the MAP Frontier

- ▶ Tri-national demographic comparisons
 - Community size
 - Member families living elsewhere (connectivity to towns)
 - Net migration (population change via movement)
 - Turnover (gross population mobility)

3. Rural Migration in the MAP Frontier

	Madre de Dios, Peru	Acre, Brazil	Pando, Bolivia	MAP Frontier	F-test
Number of Families	118.52	146.51	52.83	109.24	3.07 +
Absent Families	36.93	25.54	22.85	28.80	2.39 +
Pct. Absent Families	23.35	5.77	13.82	19.73	3.48 *
Net Migration	+36.48	-15.49	+56.02	+35.79	15.55 **
Pct. Net Migration	+16.08	-0.71	+17.13	+11.41	14.82 **
Turnover	49.95	92.35	88.63	82.54	4.15 *
Pct. Turnover	25.04	20.40	32.20	24.71	2.45 +

3. Rural Migration in the MAP Frontier

- ▶ Selected key findings:
- ▶ 1. Larger communities in areas with paving complete or underway
- ▶ 2. Greater connectivity to towns via absent member families in areas with less paving
- ▶ 3. More positive net migration and greater turnover in areas with less paving

4. Perspectives on Road Paving and Migration

- ▶ Selected (translated) quotes from respondents from different sides of the tri-national MAP frontier
 - Focus on views on migration and related changes
 - Departure of local people and/or arrival of newcomers

4. Perspectives on Road Paving and Migration

- ▶ Expectations about impacts of road paving

	Madre de Dios, Peru	Acre, Brazil	Pando, Bolivia
Positive Changes	42%	43%	90%
No Change	6%	9%	2%
Mixed Positive and Negative Changes	32%	31%	5%
Negative Changes	20%	17%	3%

4. Perspectives on Road Paving and Migration

- ▶ Acre, Brazil (road paved):
- ▶ “Drugs have arrived in our community. In school there are drugs and weapons.”
- ▶ “Some people say that people from outside, different from us, will come here. I am afraid.”
- ▶ “Bad people will come here, which is bad for people in the community.”

4. Perspectives on Road Paving and Migration

- ▶ Madre de Dios, Peru, (road paving underway):
- ▶ “Principally because of the road. Negative: More outsiders with bad habits.”
- ▶ “Things will improve, because they are working on the roads. More visitors. More migration.”
- ▶ “There will be a change for the better, because more outsiders will arrive to make their homes. They and their new ideas will be welcomed.”



Source: Foster Brown

Concluding Observations

- ▶ Urban as well as rural demographic change pose challenges, threats to the MAP region

- ▶ 1. Rapid urban expansion is creating water management problems; shortages in drought; floods after heavy rains
 - Even with slow growth rates, Rio Branco's population will be larger in 2020 than now, and it already has water shortages
 - Emergent awareness of vulnerability of urban populations to climatic variability and change

Concluding Observations

- ▶ Urban as well as rural demographic change pose challenges, threats to the MAP region

- ▶ 2. Rural growth is also proceeding, including due to migration in communities along major roads
 - Growth due to migration is greater in areas anticipating or now receiving paving
 - Accelerated growth due to paving may be temporary

Concluding Observations

- ▶ Urban as well as rural demographic change pose challenges, threats to the MAP region

- ▶ 3. Rapid turnover in rural communities raises questions about community resilience and vulnerability
 - Population turnover may undermine “collective memory” of communities regarding established organization and practices
 - This may hamper effectiveness to respond to fires, handle conflicts, deal with rapid change

Concluding Observations

- ▶ Urban as well as rural demographic change pose challenges, threats to the MAP region

- ▶ 4. In areas with new infrastructure, the changes are viewed as mixed blessings
 - High hopes for growth, development, etc.
 - But serious concerns as regards migration and the changes it may bring

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