

Future Directions in LCLUC Research

Emilio F. Moran
Indiana University

Reconcile Global Models and Local Empirical Models of Human-Environment Interactions

- There needs to be greater emphasis on meso-scale and regional modeling approaches capable of integrating data from global and local empirical models
- In particular, attention to how people make decisions that affect LCLUC and H-E interactions
- Connection of global models to what is happening on the ground is still weak

How well is social science research integrated in LCLUC community now, as compared with the 1990's?

- When LCLUC started in the mid 1990's there was an effort to consider land use (social science domain) and land cover (remote sensing) equally
- Is that still the case? Has there been erosion? Improvement? How can the integration of these two communities move forward in coming decade?
- Land Use is a Social Sciences issue, particularly to understand the dynamics of people's decisions in LU as they affect LC

Is this community doing Land Use Research? Or mostly land Cover?

- This relates to the previous one, as it remains common for research to present as LCLUC what is mostly LC research
- This is associated with a still insufficient integration, and consideration, of land use or how people use LC for their own purposes
- The latter tends to be given much less attention and funding, even though this is the greater challenge for this research community
- LU vs LC focus may (tend to) pertain to distinct scales of analysis/explanation
- Has the review process changed? Is LU and social science less important today for LCLUC program?

For Example

- What have we learned about deforestation as a dynamic process that we did not know before the LCLUC program began?
- Are we better able to distinguish between pastures and crops? Between types of crops? In types of regeneration or secondary succession?
- Is the scale favored by many in the LCLUC community led us away from discriminations that really do matter? Are the scale priorities right or is it time to make a correction?

Land Grabs

- The growing phenomenon of land grabs at very large scale is changing LCLUC dynamics and its consequences for earth system science
- Land grabs by China in Africa and elsewhere

Table 1 Large Land Acquisitions in Select Countries

Country	Projects	Area (1,000 ha)	Median size (ha)	Domestic share ^a
Cambodia	61	958	8,985	70
Ethiopia	406	1,190	700	49
Liberia	17	1,602	59,374	7
Mozambique	405	2,670	2,225	53
Nigeria	115	793	1,500	97
Sudan	132	3,965	7,980	78

Source: Country project inventories collected for this study.

Note: Data are for the 2004–09 period except for Cambodia and Nigeria where they cover 1990–2006. Liberian figures refer to renegotiation of concessions that had been awarded much earlier.

a. Domestic share is the proportion of the total transferred area allocated to domestic investors (vs. foreign investors) rather than the share of the number of investments.

Source: The World Bank 2011

Land Grabs

- Land grabs, LCLUC dynamics and consequences for earth system science
 - what are consequences of grabs in the country where acquisitions are taking place?
 - what factors drive nations/firms to acquire large overseas holdings? (including LCLUC in purchasing countries)
 - Interactions with food security (as driver or impact of grabs-LCLUC)

Table 1—Examples of media reports on overseas land investments to secure food supplies, 2006–09

Country investor	Country target	Plot size (hectares)	Current status	Source
Bahrain	Philippines	10,000	Deal signed	<i>Bahrain News Agency</i> , February 2009
China (with private entities)	Philippines	1,240,000	Deal blocked	<i>The Inquirer</i> , January 2009
Jordan	Sudan	25,000	Deal signed	<i>Jordan Times</i> , November 2008
Libya	Ukraine	250,000	Deal signed	<i>The Guardian</i> , November 2008
Qatar	Kenya	40,000	Deal signed	<i>Daily Nation</i> , January 2009
Saudi Arabia	Tanzania	500,000	Requested	<i>Reuters Africa</i> , April 2009
South Korea (with private entities)	Sudan	690,000	Deal signed	<i>Korea Times</i> , June 2008
United Arab Emirates (with private entities)	Pakistan	324,000	Under implementation	<i>The Economist</i> , May 2008

Source: IFPRI has compiled this table from media reports. The responsibility for the accuracy of the information presented here, however, lies with the reporting media.

Note: A more extensive listing of media reports on overseas land investments is available on IFPRI's website at <http://www.ifpri.org/pubs/bp/bp013Table01.pdf>. Well-documented examples are scarce, details on the deals are often murky, and some reports are contradictory. IFPRI invites observers to share evidence-based information on the listed and on new land deals by posting a contribution on IFPRI's blog at <http://ifpriblog.org/2009/04/24/landgrab.aspx>.

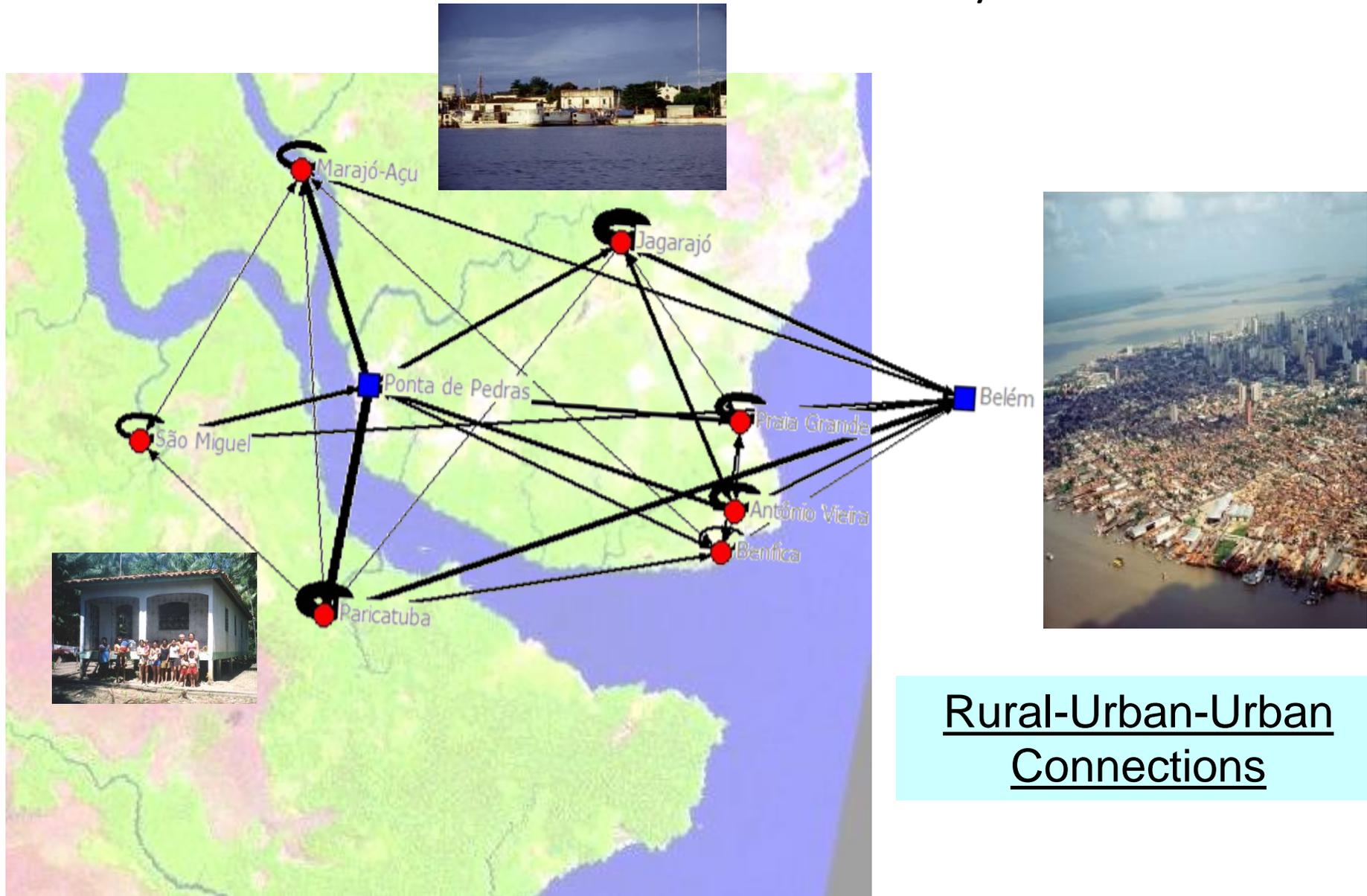
Source: IFPRI 2009

<http://www.ifpri.org/sites/default/files/publications/bp013all.pdf>

Rural-urban migration Impact on rural and urban LCLUC

- The observed growth of cities is a function of massive movements of people from rural to urban areas in search of employment, education, etc.
- This results in reallocation of land tenure and in land uses across the world so that future LCLUC will differ in non-linear ways to present ones
- LCLUC impacts of reverse and cyclical/seasonal rural-urban-rural migration, and multi-local households, are not well understood

The emergence of multi-sited households and rural-urban social networks in the Amazon estuary



Rural-Urban-Urban Connections

What are the Implications of LCLUC Research for food security?

- The use of croplands for biofuels may (1) engender carbon emissions through LCLUC (see Fargione et al. 2008) and (2) endanger food security
- LCLUC interactions with climate change poses new challenges to agro-ecosystems, and therefore food security
- Both scenarios above necessitate greater attention to **land use**, and the social and economic context of LCLUC
- How is food security affected by the growing phenomenon of land grabs by countries and firms across the world?

Contributions of smallholders to food production and rural employment

(IBGE Agropastoral Census 2006) (IBGE 2009)

- Properties <10ha=2.4% area → 75% of rural employment
- (compared to Properties >1000ha=44% area)
- Family production (all sizes): 24% agropastoral area
- Percentage of national prod.:
 - -87% Manioc -38% Coffee -21% Wheat
 - -70% Beans -34% Rice -16% Soybean
 - -46% Corn -58% Milk



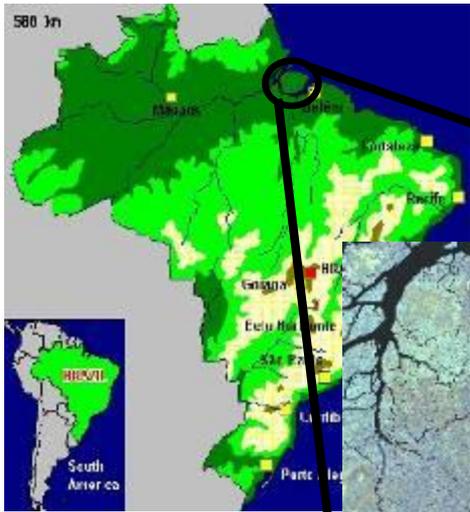
Do we understand the impacts of policy on LCLUC dynamics?

- We need to understand this in rigorous ways, such as the impacts of international donors, multilateral institutions, NGO and private foundations, the roles of government policy at various scales, regional and local non-state institutional regimes
- This requires sophisticated social science approaches integrated with LCLUC research (e.g. institutional analysis, economic decision making, environmental treaties, experiments)

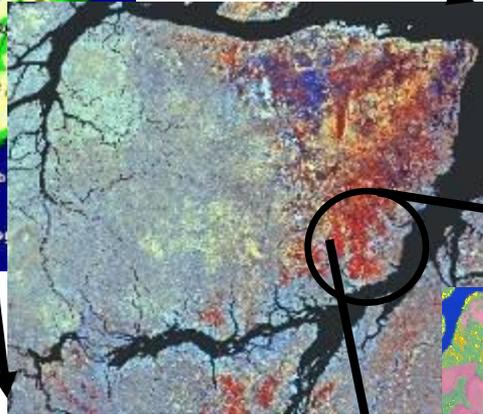
Using Multiple Methods

- We need to use a greater mix of methods in LCLUC research: experiments in the lab and in the field with land users; survey research integrated with RS; ethnographic with spatial approaches
- We need a variety of modeling approaches that test against empirical data and are capable of making real-time and realistic forecasts—without forgetting to include human dimensions, even when this introduces greater uncertainty.
- What have we really learned from agent-based modeling efforts to date?

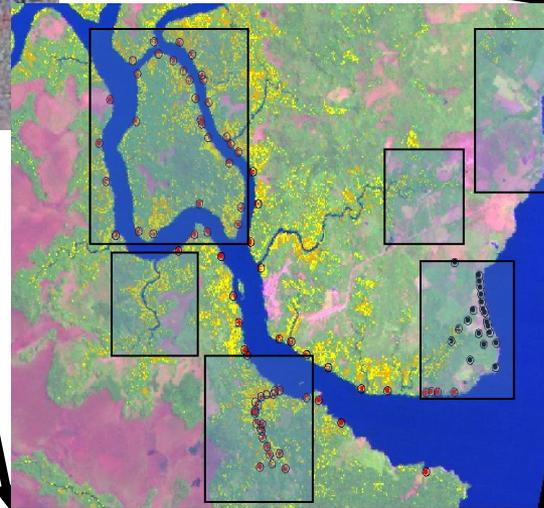
Local-Regional contextualization Community level sampling



**Marajo Island,
Amazon Estuary**



Ponta de Pedras, Para State



Land tenure
Pattern of settlement
Land use strategies
Environmental resources
Landscape patterns

Community



Farmer

Multiple Resolution Data sets

- We need more effort devoted to constructing multiple resolution data sets that make use of advances in very fine resolution data and analysis with coarser resolutions in order to scale up
- Global land cover data products often are neither precise nor accurate and rarely tested against detailed empirical data. Using multiple resolution data sets in an integrated fashion would go a long way to improving accuracy and validation both external and internal

What are the gaps remaining?

- One is to understand urban land use, an area that remains poorly represented in the LCLUC portfolio
- Another is to have a clear understanding of what methods are appropriate for what applications (e.g. agent based modeling has been used for scaling but is a broader methodological approach, other approaches such as multi-level modeling also apply in hierarchically-scaled data and relations)
- We need scalable case studies
- We need more dynamic system models that are scalable, use empirical data with ease, and that use multiple resolution and multiple methods (e.g. Britaldo Soares' model).

Gaps, cont.

- While we produced a large number of case studies in the first decade of LCLUC, we still need case studies. These will need to be a new generation of case studies, made up of sets of case studies, they need to be scalable, and linked to dynamic and scalable modeling efforts
- We need to ask for LCLUC research: is it useful to society? Is it externally valid (not just internally valid)?
- WE NEED THEORIZING OF LCLUC PROCESSES (we HAVE to do better than myriad case studies)