Population and Deforestation: Field Research in Guatemala

University of Colorado Environmental Demography Short Course

July 18, 2008

David L. Carr
Department of Geography
University of California, Santa Barbara
Goals: If we are successful, you will:

- Become familiar with an example of population and deforestation in Central America.
- **Become more mindful about how knowledge is produced.**
- Consider the importance of the researcher’s relationship with informants for:
  - Successfully acquiring data
  - Enhancing data quality
  - Appropriately representing your country, university, discipline, herself, and research subjects
  - Respecting informants
  - Ensuring safety
Outline

A. Issues of migration and deforestation in Latin America
   – Background to the problem
   – A case study: Colonization and deforestation in the Sierra de Lacandón National Park, Guatemala.

B. Linking research questions to field methods: Methodological considerations in the production of knowledge
   - Understanding the relative strengths of qualitative and quantitative research.
   - The importance of the relationship between the researcher and informants when conducting field work.
   - The importance of the researcher/informant relationship: data collection, data quality, integrity, respect, and safety.
A. Issues of migration and deforestation in Latin America: Background to the problem

One-fifth of the world’s original forest cover remains as large intact tracts—shown here in green.
In recent years, virtually all deforestation has occurred in the tropics.

Rapid forest clearing in the tropics is implicated in several trends:

- Reduction of biodiversity (increasingly in protected areas)
- Climate change
- Food production challenges
- Exacerbation of rural poverty
Why Study Migration and Deforestation Together?

- Migration is an immediate prerequisite to tropical deforestation
- Why people migrated to the frontier is as essential to understanding deforestation as what they are doing once they are there
- Internal vs. external forest frontiers
Research Question 1

What factors predict the proximate cause of deforestation in the SLNP? (What factors are associated with farmer land use?)

Research Question 2

What factors help explain the primary underlying cause of deforestation in the SLNP? (What factors are related to rural-frontier migration?)
Research Question 1
What are the Proximate Determinants of Forest Clearing in the Sierra de Lacandón National Park?
The SLNP boasts the richest biodiversity in the Maya Biosphere Reserve.
The Naranjo Road in 1987
The SLNP suffers some of the highest rates of population growth and agricultural expansion in the MBR.
Roads enabled colonization, but land use is determined at the household and local levels.
Question 1: Research Methods

a. **Interviews** with community leaders in 28 communities responsible for LUCC in the SLNP.

b. **Surveys** with 279 men and 220 women from 9 communities.

Land Use in the SLNP

Macro-Scale demographic, political-economic, social, and ecological dynamics

Local Variation

- Household Responses
  - Land Management
    - Agricultural Intensification
    - Agricultural Extensification
  - Fertility regulation
  - Migration
    - Urban or International Destinations
    - Rural Destination
  - Off-farm Labor

Other response??

Return to Top of Chart
The Research Team
**Nombre:**

**Comunidad:**

**Encuestador:**

### Seccion I: La familia y la casa

**Qué edad tienen? Ud._______ Su esposa (o pareja)_______**

**En que año se casaron (se unieron)?______**

Ha vivido casado o unido con otra mujer antes?
01 - SI 02 - NO [salte a la siguiente pregunta]

Cúantos hijos tuvo Ud. antes de vivir con su actual mujer?______

Cúantas personas viven en la casa actualmente? [indique hombre “H” o mujer “M”]

<table>
<thead>
<tr>
<th>edad</th>
<th>hijos/as</th>
<th>Hijos que están estudiando</th>
<th>hermanos/as</th>
<th>padres</th>
<th>tios/as</th>
<th>Suegros/as</th>
<th>cuñados/as</th>
<th>otros, especifique</th>
</tr>
</thead>
<tbody>
<tr>
<td>0-5</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6-12</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>12-18</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>18-49</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>50 o más</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

A qué trabajo le dedica más tiempo?
01 - agricultor 02 - extractor de recursos boscosos 03 - negociante 04 - otro, explique

Quién maneja los ingresos de la familia? 01 - el hombre 02 - la mujer 03 - los dos

Su religión es: 01 - Católica 02 - Evangélica 03 - Ninguna 04 - Otra, especifique

Cuando era niño, su mamá le hablaba en qué idioma?
01 Español 02 Q’eqchi 03 Otro, especifique_______

Y ahora, Ud. habla qué idioma en casa?
01 Español 02 Q’eqchi 03 Otro, especifique_______
Población y Uso de la Tierra en el Parque Nacional de Lacandón
Cuestionario de hogar - Para Jefes de Hogar (Q’eqchi)

La K’ab’á:
K’aleb’aaal;
Laa K’ab’á Laat laj Isihom Esil:

Jun Raqal: Li Junkab’al ut li ochoch.
Jaruq’chihab’ wankaawe? La Sun aatin jarub’ ahihab’ wankre
Li chihab’ xex Sumla wi’ Maraj li xelaq’wi’ erib’)? 01 – He’ He’ 02 – Inka’
Jarubi la Kok’al laat naq maji’ nakat wan rik’in li tz’aqal? 01 – li winq 02 – li Ixq 03 – Sa’ wiib’al.

La Paab’aal: 01 - Katoolk 02 - Wanjeel 03 - Manjun 04 - juna, chik

Naq toj kac’inot chaq K’achi aat’ b’aal nakat’ raatinalui?
   01 Kaxlan chi’ 02 Q’eqchi 03 Otro, especifique__________

ut najwak?
   01 l’aat K’aru 02 la waatina’ b’aal 03 nakat aatinak Sá la wochoch__________

Ma xat hulak? Sá Rochóchil li tzolok

Toj K’a chi Raqalil xa tzolok?__________

Ma nakat yaab’asinkru hu ut Manakat Tz’ib’ak? 01 – He’ He’ 02 – Inka’

Ma tawaj naq eb’la Kok’al te’ tzoloq? 01 – He’ He’ 02 – Inka’

[ Wi’ tsume hehe’ “| toj k’a chi Raqalil? a ) toj b’ar truuj b’

bar nuchal la si’? 01  sa’li kioche Sa’ lin K’anjelab’aal 02 sá lin parseel 03 sálin alk’al Reliwochoch’ 04 Sá K’iche?]
1998 Average Land Use in Hectares.
Farm Size = 34.38 hectares
Simplified Multi-level Equation

\[ y_{ij} = a + \beta X_{ij} + u_j + e_{ij} \]

- Community level random effect
- Household level random effect
## Two-Level Multivariate Regression

<table>
<thead>
<tr>
<th>Predictors</th>
<th>Cleared Land</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Expected</strong></td>
<td><strong>Estimated</strong></td>
</tr>
<tr>
<td><strong>1. Demographics factors</strong></td>
<td></td>
</tr>
<tr>
<td>Household size</td>
<td>+</td>
</tr>
<tr>
<td></td>
<td>0.3</td>
</tr>
<tr>
<td><strong>2. Political-economic factors</strong></td>
<td></td>
</tr>
<tr>
<td>No land title</td>
<td>?</td>
</tr>
<tr>
<td></td>
<td>-7.4</td>
</tr>
<tr>
<td>Cooperative</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td>-11.3</td>
</tr>
<tr>
<td><strong>3. Socioeconomic Factors</strong></td>
<td></td>
</tr>
<tr>
<td><em>Household socio-economic characteristics</em></td>
<td></td>
</tr>
<tr>
<td>Maya vs. Ladino</td>
<td>?</td>
</tr>
<tr>
<td></td>
<td>3.4</td>
</tr>
<tr>
<td>Educational level of HH Head</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td>0.1</td>
</tr>
<tr>
<td>Off-farm labor</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td>-3.0</td>
</tr>
<tr>
<td><em>Farm and Farming Characteristics</em></td>
<td></td>
</tr>
<tr>
<td>Size of total holdings</td>
<td>+</td>
</tr>
<tr>
<td></td>
<td>0.3</td>
</tr>
<tr>
<td>Distance to road</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td>-0.5</td>
</tr>
<tr>
<td>Duration on the Farm</td>
<td>+</td>
</tr>
<tr>
<td></td>
<td>0.2</td>
</tr>
<tr>
<td>Additional agricultural fields</td>
<td>+</td>
</tr>
<tr>
<td></td>
<td>4.5</td>
</tr>
<tr>
<td>Velvet Bean and/or herbicides</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td>1.4</td>
</tr>
<tr>
<td><strong>3. Ecological Factors</strong></td>
<td></td>
</tr>
<tr>
<td>Fertile Soil</td>
<td>?</td>
</tr>
<tr>
<td></td>
<td>1.2</td>
</tr>
<tr>
<td><strong>4. Community-Level Factors</strong></td>
<td></td>
</tr>
<tr>
<td>Community Population</td>
<td>+</td>
</tr>
<tr>
<td></td>
<td>2.9</td>
</tr>
</tbody>
</table>

**P values:**

< or = .01 < or = .10
Ecological Factors

- Forest abundance = Expansive swidden and avoidance of farming steep slopes
Demographic Factors

- 10% Annual Growth mid 1990s
- Larger Communities → More Forest Cleared.
- 8 Births per Woman
- Larger Households → More Forest Cleared.
Political-economic Factors

Peten’s Capital, Flores: Home of 30+ NGOs

- Land Title ➔
  - More Forest Cleared.

Squatter Settlement in the SLNP
Socio-economic Factors

- 25% Maya
- Maya Farmers ➔ More Forest Cleared. But…
- Gender Differences

- Extreme Poverty
- Poor farmers ➔ Less Forest Cleared.
Research Question 2
Where did the SLNP colonists come from and why from there?

- Most skewed land distribution in Latin America
- Demographic Pressures
- Civil War
Research Question 2: Migration to the SLNP

Macro-Scale demographic, political-economic, social, and ecological dynamics

Local Variation

Household Responses

Migration

Fertility regulation

Rural Destination

Urban or International Destinations

Off-farm Labor

Land Management

Agricultural Extensification

Agricultural Intensification

Other response??

Return to Top of Chart
Departamentos of Guatemala and Migration Origin Municipios

Municipios in red are the three case studies explained in greater detail.

Original map source: http://www.inguat.net/redtp/map/indexe.html
### Origin Areas Migration Data

<table>
<thead>
<tr>
<th>Percent of adults permanently out-migrating from 1989 to 1999</th>
<th>Approximate %</th>
</tr>
</thead>
<tbody>
<tr>
<td>Men</td>
<td>10%</td>
</tr>
<tr>
<td>Women</td>
<td>10%</td>
</tr>
</tbody>
</table>

### Principal Destinations

<table>
<thead>
<tr>
<th>Principal Destinations</th>
<th>Primary employment</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Guatemala City</td>
<td>Factory or service worker</td>
<td>35%</td>
</tr>
<tr>
<td>Peten</td>
<td>Acquire land for farming</td>
<td>35%</td>
</tr>
<tr>
<td>USA</td>
<td>Factory, service, or agricultural worker</td>
<td>10%</td>
</tr>
<tr>
<td>Other</td>
<td>Plantation laborer</td>
<td>10%</td>
</tr>
</tbody>
</table>

### Principal pushes/pulls

<p>| | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Work</td>
<td></td>
<td>35%</td>
</tr>
<tr>
<td>Land</td>
<td></td>
<td>30%</td>
</tr>
<tr>
<td>Improve living standard/education</td>
<td></td>
<td>20%</td>
</tr>
<tr>
<td>Natural disasters/Env. Degradation</td>
<td></td>
<td>10%</td>
</tr>
</tbody>
</table>
Why did people migrate to the SLNP?

- Ecological Factors
- Demographic Factors
- Socio-economic Factors
- Political-economic Factors
Three Municipios of Guatemala and Migration Origin Municipios

- Sierra de Lacandón National Park
- Fray Bartolomé de las Casas
- Nueva Concepción
- Morales

Original map source: http://www.inguat.net/redtp/map/indexe.html
Three reasons why place matters:

Verapaces:
Fray Bartolomé de las Casas

Southeastern Coastal Plains: Morales

Pacific Coast: Nueva Concepción
Research Summary

- Demographic and Land Use literatures neglect rural migration and therefore how a process in one place and time affects another process in another place and time.

- Multiphasic Approach: Households migrate and clear forest. Neither are ultimate outcomes; household agency can be simultaneous and sequential.

- Space Matters: Land = #1 Migration incentive and #1 Predictor of deforestation. The values change but the variables remain the same.

- Place Matters: Fray, Morales, Nueva Concepcion.

- Future research: Examine proximate and underlying drivers of Population and LUCC; space, place and time are heuristics to distinguish recurrent patterns from place-based exceptions.
B. Linking research questions to field methods: Methodological considerations in the production of knowledge
B. Linking research questions to field methods: Methodological considerations in the production of knowledge

Quantitative methods:
• What is a survey and why use one?
• Advantages and disadvantages
Qualitative methods:
• Why use semi-structured interviews?
• Advantages and disadvantages
• Other qualitative methods

Mixed Methods
The Purpose of Sampling in Quantitative Surveys

Study Population

Probability sampling

Sample: Collection of Values (with measurement error and/or nonresponse effects)
The Purpose of Sampling in Qualitative Interviews

Study Population

Selected informants

Sample: semi-structured to understand processes and relationships
Survey and Interview Design

How will you design your research instruments to maximize data quality?

- Validity
- Time and financial constraints
- What else must be considered?
C. The importance of the relationship between the researcher and informants when conducting field work

If you were doing field work in Latin America, what ways might you establish trust with informants?

Goal: Maximize the quality of your data collection and data quality, represent yourself with integrity (you are representing more than just yourself), treat informants with respect, and ensure your safety.
Nueva Jerusalén II: Failure and success
How might your experience be different talking to the heads of these two households?
Would you speak the same to the women on the left as to the woman on the right?
What different insights might these two men offer?
Conclusion

• An example of population and deforestation in Central America: the Sierra de Lacandon National Park, Guatemala

• Linking research questions to field work.

• The importance of the relationship between the researcher and informants for:
  – Successfully acquiring your data
  – Enhancing your data quality
  – Appropriately representing your country, your university, your discipline, yourself, and your research subjects
  – Respecting your informants
  – Ensuring your safety