GIS Application in the Lao PDR

Assoc. Prof. Dr. Sithong Thongmanivong
Faculty of Forestry
National University of Laos
Presentation Outlines

1. History of GIS Application in Laos
2. GIS application at the FOF
3. GIS and research: a case study from the northern Laos
History of GIS Application in Laos

- GIS introduced since the 1989 by the DOF for forest cover mapping
- More sectors apply for NRM and development in 1990s
- The application is mainly driven by external organizations/donors
- Many sectors failed to sustain and maintain their application due to the lacking of
  - human resource
  - hardware and software upgrade
GIS application in Laos

1. Environment Data Center; WREA
2. National Geographic Department
3. National University/ Faculty of Forestry and the Faculty of Geography
4. Department of Forestry (FIPD)
5. Department of Irrigation
6. Living Aquatic Resource Research Center
7. National Land management Authority
8. Soil Survey and Land Classification Center
9. Urban Planning Research Urban Planning Research Institute
10. UXO LAO;
11. Department of Road/MCTPC
12. IUCN
13. Department of Mining
14. Department of electricity
15. National Agriculture and Forestry Research Institute
16. National Statistic Centre
GIS Teaching and Application at FOF

Training and Model forest at Sangthong District

- Forest cover mapping (Aerial photo 1995)
- Identify convention area for management
- Land use capability assessment
- Land suitability mapping

Establishment of Research Centre for NR and Climate Change
Training and Model Forest
GIS and Research

Case Study from the Northern Laos
Land Cover and Land Use Change
Sing District, Luangnamtha Province, Lao PDR

Sithong Thongmanivong, Khamla Phanvilay, Houngpheth Chanthavong, Thoumthone Vongvisouk, Yayoi Fujita, Jeff Fox
Background of the Study

Key government policies since 1980s that affect rural population and resources

- **Natural resource management decentralization** through land use planning and land allocation

- **Poverty reduction**

- **Eradication of opium cultivation**

- **Land as capital** for investment (i.e. land titling, land market)

- **Increased international and regional collaboration**
Objectives

Examining patterns of change

- Forest cover and land use
- Demographic distribution
- Rural livelihood and people’s relationship with land and forest resources
Methods

- Policy review
- Secondary data collection
- Spatial analysis
  - Demographic change
  - Forest cover change
- Village land use history
- Household interviews
- Key informant (stakeholder) interview and discussions
Forest and Land Cover Change

- Forest loss and fragmentation (degradation)
- Expansion of rubber plantation on shifting cultivation and fallow forest area

Source: Spatial analysis by Thongmanivong (2005)
Process of Forest Conversion

- Secondary forest
- Fallow forest
- Rubber plantation
- Shifting cultivation
- Primary forest
- Lowland paddy rice/permanent agriculture
Demographic Change: 1995-2005

Concentration of population along the road network
Ethnic Distribution

Upland ethnic groups => concentration along the road network
<table>
<thead>
<tr>
<th>Main Characteristic of Farming System</th>
<th>Upland</th>
<th>Lowland</th>
</tr>
</thead>
<tbody>
<tr>
<td>Farming system</td>
<td>Shifting cultivation and NTF collection, livestock, commercial crop (i.e. rubber, sugarcane)</td>
<td>Paddy, cash crop (i.e. watermelon, cucumber, chili, etc.) and rubber</td>
</tr>
<tr>
<td>Farm size (average)</td>
<td>3-5 ha</td>
<td>1-3 ha</td>
</tr>
<tr>
<td>Land tenure</td>
<td>Temporary title, tax paper, open access</td>
<td>Temporary title, tax document</td>
</tr>
<tr>
<td>Access to Market</td>
<td>Local and regional</td>
<td>Local and regional</td>
</tr>
<tr>
<td>Off-farm activities</td>
<td>Weaving textile, NTFP collection, wage labour</td>
<td>Weaving textile, wage labour, trade, handicraft</td>
</tr>
<tr>
<td>Mechanization</td>
<td>Manual</td>
<td>Manual, tractor</td>
</tr>
<tr>
<td>Labor</td>
<td>Family and some hired labour</td>
<td>Family and hired labour</td>
</tr>
<tr>
<td>Livestock</td>
<td>Pigs, cattle, and poultry</td>
<td>Cattle, buffalo and poultry</td>
</tr>
<tr>
<td>Constrains</td>
<td>Water shortage, high labor for weeding</td>
<td></td>
</tr>
</tbody>
</table>


Changing of Livelihood and Farming System

- Declining upland swidden field
- Subsistence farming => food and commercial crop production
- Less dependence on livestock and non-timber forest products

Rice planting area (ha)

Source: DAFEO (2005)
Cash Crops and Rubber Plantation in Sing District

Source: DAFEO (2005)
## Changing of Livelihood and Farming System

<table>
<thead>
<tr>
<th>Before</th>
<th>After</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Upland</strong></td>
<td><strong>Upland</strong></td>
</tr>
<tr>
<td>Subsistence</td>
<td>Subsistence and commercial</td>
</tr>
<tr>
<td>Shifting cultivation</td>
<td>Shifting cultivation</td>
</tr>
<tr>
<td>Livestock raising</td>
<td>Paddy</td>
</tr>
<tr>
<td></td>
<td>Off-farm activities</td>
</tr>
<tr>
<td></td>
<td>NTFP collection</td>
</tr>
<tr>
<td></td>
<td>Rubber</td>
</tr>
<tr>
<td><strong>Lowland</strong></td>
<td><strong>Lowland</strong></td>
</tr>
<tr>
<td>Subsistence agriculture</td>
<td>Market oriented</td>
</tr>
<tr>
<td>Cooperative rice farming</td>
<td>Commodity crops</td>
</tr>
<tr>
<td>Livestock</td>
<td>Off-farm activities</td>
</tr>
<tr>
<td></td>
<td>Rubber plantation</td>
</tr>
</tbody>
</table>
Land Investment: Commodification of land

- Self-investment
- Concession
- Collaborative investment (villagers and company)
  
  1. **Two-plus-three (2+3)**
     - “3” refers to capital, technique and market (companies)
     - “2” refers to land and labor (farmers)
  
  2. **One-plus-four (1+4)**
     - “1” refers to land (farmer/government)
     - “4” refers to capital, labor, technique and market (companies)
Emerging Issues on Land Investment

- Shortage of skilled labor for tending and managing plantation
- Difficulties of finding land for investors and negotiating with local villagers
- Delay of investment and no agreement for future negotiations
- From concession to contract farming?
## Land Tenure and Equity

- Different understanding on legal status of land ownership among villagers and local authorities
- Most affected group = poorest households (because of their inability to mobilize labor and influence in defense of their livelihoods)

<table>
<thead>
<tr>
<th><strong>Different communities</strong></th>
<th><strong>Early settlers</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>have different ability access to land</td>
<td>have more access to agricultural land (both lowland and upland)</td>
</tr>
<tr>
<td>Different groups within the community have different ability access to land</td>
<td>New migrants have limited access to agricultural land</td>
</tr>
<tr>
<td></td>
<td>Wealthier households have more access to land and labour for agricultural production</td>
</tr>
<tr>
<td></td>
<td>Poor households concentrate on staple food production and have limited resources (land and labour)</td>
</tr>
</tbody>
</table>
Conclusion

- Commercial crops and rubber affect forest cover and rural livelihoods
- Land use planning and land allocation vs. land investment for rubber plantation (i.e. securing smallholders’ rights to land vs leasing land to investors for concession)
- Development of road and infrastructure
Consideration

- Mandatory Social Impact and Environmental Impact Assessment for investment and concession
- Strategies to promote small-scale investment
- Land use planning and management involving multiple stakeholders discussions, avoiding overlap and encouraging integrated planning
- Strengthen local agencies’ capacity to follow-up land use plan
For future research

- What type of forestry are beneficial for local farmers and environmentally sustainable (i.e. concession-based versus smallholder)?

- What kind of process and procedures are necessary to ensure compliance of investment companies to fulfill their responsibilities?

- What are distinction between state, customary village land and degraded forest land? Where are these land located?

- What are village assets and how should its legal claims by villagers be recognized? How should loss of assets be compensated?

- What are the options for land use planning and natural resource management in the future that considers changing socio-economic environment?
Thank you for your attention