Shifting Cultivation in the Mountainous Mainland Southeast Asia:
The search for appropriate and sustainable land use, and its contribution to the improvement of rural livelihoods

Kanok Rerkasem
Focus

- Changes in land use under shifting cultivation
- Government policy and implementation for alternative land use
- Farmers’ management of sustainable land use and improved livelihoods
Questions

• What went “wrong” and how did it happen?

• What are the key factors and trends in land use?

• What are the problems on the ground?

• What sort of attempts have been made so far to solve the problems?

• How do people cope with the changes and uncertainties?
Background of the Mountainous Mainland Southeast Asia: the MMSEA
Cultural Connectedness during the Lanna Civilization with 5 Centres: Chiang Mai, Chiang Rai, Chiang Saen, Chiang Tung and Chiang Rung

(>700 years ago)

MAP OF LĀN NĀ AND VICINITY
A typical feature of the mountainous mainland Southeast Asia (MMSEA): the biophysical setting and priority area for national and international watershed protection.
### Table 1. Extent of land under shifting cultivation in mountainous areas of mainland Southeast Asia region.

<table>
<thead>
<tr>
<th>Country</th>
<th>Total Land Area</th>
<th>Total Forest Area</th>
<th>Shifting Cultivation Area</th>
<th>% Forest under Shifting Cultivation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cambodia</td>
<td>17,652</td>
<td>12,163</td>
<td>n.a.</td>
<td>n.a.</td>
</tr>
<tr>
<td>Laos</td>
<td>23,080</td>
<td>13,173</td>
<td>400</td>
<td>3.04</td>
</tr>
<tr>
<td>Myanmar</td>
<td>65,774</td>
<td>28,856</td>
<td>181</td>
<td>0.63</td>
</tr>
<tr>
<td>Thailand</td>
<td>511,770</td>
<td>12,735</td>
<td>400</td>
<td>3.14</td>
</tr>
<tr>
<td>- Northern</td>
<td>16,966</td>
<td>7,523</td>
<td>400</td>
<td>5.32</td>
</tr>
<tr>
<td>Vietnam</td>
<td>32,536</td>
<td>8,312</td>
<td>3,500</td>
<td>42.11</td>
</tr>
<tr>
<td>China (Yunnan Province)</td>
<td>39,410</td>
<td>9,533</td>
<td>130</td>
<td>1.36</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>229,629</strong></td>
<td><strong>84,772</strong></td>
<td><strong>&gt; 4,611</strong></td>
<td><strong>5.44</strong></td>
</tr>
</tbody>
</table>

### Table 2. Ethnic diversity and population of the MMSEA member countries.

<table>
<thead>
<tr>
<th>Country</th>
<th>Number of Ethnic Groups</th>
<th>Population (10^6 persons)</th>
<th>% Total</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Ethnic Minority</td>
<td>Total</td>
</tr>
<tr>
<td>Cambodia</td>
<td>36</td>
<td>0.31</td>
<td>9.45</td>
</tr>
<tr>
<td>Laos</td>
<td>47</td>
<td>2.01</td>
<td>4.88</td>
</tr>
<tr>
<td>Myanmar</td>
<td>&gt;12</td>
<td>&gt;6.8</td>
<td>46.55</td>
</tr>
<tr>
<td>Thailand</td>
<td>10</td>
<td>0.79</td>
<td>58.27</td>
</tr>
<tr>
<td>Vietnam</td>
<td>53</td>
<td>9.88</td>
<td>73.81</td>
</tr>
<tr>
<td>Yunnan</td>
<td>18</td>
<td>8.68</td>
<td>39.90</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>176</strong></td>
<td><strong>28.47</strong></td>
<td><strong>192.96</strong></td>
</tr>
</tbody>
</table>

Sources: Data taken from Kampe (1997), WRI (1994) and Yin (1989)
## Traditional Shifting Cultivation in Northern Thailand by ethnic minority groups

### I. Pioneer Type:

1. Hmong
2. Lisu
3. Lahu
4. Akha
5. Yao

Slashing and burning of primary forests and plots used exhaustively before moving to a new site.

### II. Rotational Type (Established Swidden):

6. Karen
7. Lua
8. Khamu
9. H’tin

Farming in secondary forests on rotational basis. Fixed cultivation within village territories.
Shifting Cultivation: the dominant land use in the mountainous landscape
Diversity of forest products for local consumption and external markets
DIVERSITY OF CROPS IN SHIFTING CULTIVATION
Table 1. Species diversity in different land use by ethnic groups.

<table>
<thead>
<tr>
<th>Ethnic Groups/ Cultivation Area</th>
<th>Home Garden</th>
<th>Hill Farms</th>
<th>Paddy Fields</th>
<th>Forest Patches</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Haw</td>
<td>60</td>
<td>59</td>
<td>4</td>
<td>15</td>
<td>56</td>
</tr>
<tr>
<td>Hmong</td>
<td>27</td>
<td>43</td>
<td>24</td>
<td>39</td>
<td>105</td>
</tr>
<tr>
<td>Lisu</td>
<td>55</td>
<td>69</td>
<td>-</td>
<td>22</td>
<td>110</td>
</tr>
<tr>
<td>Yao</td>
<td>21</td>
<td>54</td>
<td>-</td>
<td>44</td>
<td>92</td>
</tr>
<tr>
<td>Ahka</td>
<td>23</td>
<td>34</td>
<td>9</td>
<td>65</td>
<td>108</td>
</tr>
<tr>
<td>Black Lahu</td>
<td>20</td>
<td>51</td>
<td>-</td>
<td>12</td>
<td>61</td>
</tr>
<tr>
<td>Red Lahu</td>
<td>32</td>
<td>45</td>
<td>-</td>
<td>28</td>
<td>80</td>
</tr>
<tr>
<td>Karen</td>
<td>106</td>
<td>65</td>
<td>45</td>
<td>58</td>
<td>369</td>
</tr>
<tr>
<td>Red Karen</td>
<td>15</td>
<td>6</td>
<td>4</td>
<td>21</td>
<td>62</td>
</tr>
<tr>
<td>Lawa</td>
<td>7</td>
<td>25</td>
<td>1</td>
<td>13</td>
<td>52</td>
</tr>
<tr>
<td>Tai Yai</td>
<td>32</td>
<td>18</td>
<td>3</td>
<td>5</td>
<td>49</td>
</tr>
<tr>
<td>Khon Muang</td>
<td>166</td>
<td>42</td>
<td>22</td>
<td>56</td>
<td>286</td>
</tr>
<tr>
<td>Ethnic Groups</td>
<td>Rice</td>
<td>Sticky Rice</td>
<td>Maize</td>
<td>Bean</td>
<td>Sesame</td>
</tr>
<tr>
<td>---------------</td>
<td>------</td>
<td>-------------</td>
<td>-------</td>
<td>------</td>
<td>--------</td>
</tr>
<tr>
<td>Hmong</td>
<td>7</td>
<td>5</td>
<td>9</td>
<td>10</td>
<td>2</td>
</tr>
<tr>
<td>Lisu</td>
<td>6</td>
<td>2</td>
<td>4</td>
<td>10</td>
<td>2</td>
</tr>
<tr>
<td>Yao</td>
<td>6</td>
<td>5</td>
<td>8</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Khamu</td>
<td>4</td>
<td>20</td>
<td>-</td>
<td>5</td>
<td>-</td>
</tr>
<tr>
<td>Karen</td>
<td>15</td>
<td>11</td>
<td>6</td>
<td>7</td>
<td>3</td>
</tr>
</tbody>
</table>
Some Main Crops in the Traditional Shifting Cultivation Systems

1. For Subsistence:
   - **Upland rice** (*Oryza sativa*), more than 200 landraces or cultivars of non-glutinous type. Rice is the most preferred grain for staple food crop.
   - **Maize** (*Zea mays*), many types for food and animal feeds
   - **Cassava** (*Manihot esculenta*), diverse types from staple food (mixed with rice) to animal feed (pigs)
   - **Taro** (*Colocasia antiquorum*)

2. For cash
   - **Opium Poppy** (*Papaver somniferum*)
Government policy on illicit crop cultivation

- Eliminate opium growing and stop/suppress shifting cultivation
- Promote alternative (cash) crops to replace opium and shifting cultivation
- Stop village movement and promote permanent farming with dominant cash crops; annuals, perennials, fruit trees and plantations

**National and international campaign to eradicate opium**
Drug (opium and opiates) smugglers and trafficking in the “Golden Triangle”
Figure 1. Changes in opium growing area and production in Thailand.

Sources: Department of Public Welfare (1962), United Nations Survey Team 1967 and ONCB.
Estimated opium production in Southeast Asia

<table>
<thead>
<tr>
<th>Country</th>
<th>Area (ha)</th>
<th>Yield (kg/ha)</th>
<th>Production (metric tonnes)</th>
</tr>
</thead>
<tbody>
<tr>
<td>China (1995)</td>
<td>0 - 1,275</td>
<td>14.9</td>
<td>0 - 19</td>
</tr>
<tr>
<td>Laos (1996)</td>
<td>21,600</td>
<td>6.5</td>
<td>140</td>
</tr>
<tr>
<td>Myanmar (1996)</td>
<td>51,000 - 163,100</td>
<td>15.6</td>
<td>800 - 2,540</td>
</tr>
<tr>
<td>Thailand (1996)</td>
<td>386</td>
<td>13.8</td>
<td>5</td>
</tr>
<tr>
<td>Vietnam (1995)</td>
<td>2,590</td>
<td>4.0</td>
<td>10</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>79,215 - 188,951</strong></td>
<td></td>
<td><strong>991-2,714</strong></td>
</tr>
</tbody>
</table>
Outline of Presentation

• Drivers of land use change
• Government Policies
• Some consequences and trends
• Concluding remarks
Major Drivers

- Population
- Land Tenure
- Commercialization
- Government policies
The myth of population-environment nexus: pressure on land and the surrounding natural forests

- **Internal Population Increase**

- **Migration**
  - Migrants from the lowlands
    - Planned migration (resettlement): Vietnam and Yunnan of China
    - Spontaneous migration (everywhere in the sub-region)
  - Cross-border migration (critical issue on border security in N. Thailand)
Resettlement policy

- Mass migration of lowland population
- Amelioration of population pressure in the lowlands
- Capturing unused resources and biophysical advantages of the highlands and village relocation

Examples:
1. Decree 327 of Vietnamese government *(issuing September 15, 1992)*:
   - Fixed Cultivation and sedentarization of ethnic minorities
   - Restoration of barren hills
   - Resettlement goal for ameliorating population pressures in the lowlands
2. Movement of Han Chinese to State Rubber Plantation in Yunnan of China
3. Relocation of people out of large scale development project (dam, mining etc) or conservation areas in Laos and Thailand
Land Tenure

The lack of tenure often leads to land use conflicts and land disputes at all levels.

**Insecurity of land and/or use permit** (the formal arrangement)
- Illegal encroachment
- Leasing arrangements (inconsistent and terms of leasing, taxing and etc)
- Subsidies and supports (amount, conditions and continuity)

**Customary rights** (the traditional arrangement)
- Traditional tenure systems
- Customary rules and regulations on land use and land allocation, e.g., communal management of swidden fields, community and conservation forests in the village
Big pushes from the government and the private sectors:

- road construction
- installation of other infrastructures
- access to external markets and credits
- Supports and subsidies, e.g., inputs, prices, transportation and so on.
Government Policies that are common to governments in MMSEA

Against traditional shifting cultivation
• “Bad” practice
• Primitive
• Destructive

Promotion of cash crops
• “Good” practice
• Modernization
• Alternative to illicit opium poppy
• Permanent land use
• Sedentarization
Government Support to Stop Shifting Cultivation in Simao, Yunnan province of China
Large scale transformation of shifting cultivation in Simao and Lancang of Yunnan province in southwest China

Maize in Lancang

Sugarcane and tea in Simao
Rapid transformation of swidden in Vietnam due to opium eradication and fixed cultivation and sedentary settlement policies in 1994.

Maize in Moc Chau

Canna edulis in Mai Chau
Transformation of shifting cultivation to teak plantation in Luang Prabang, Laos
A cross border transfer of Chinese rubber plantation ("blueprint") to Wa territory in Myanmar and Udomxay and Luang Namtha in Lao PDR
Large scale expansion of cash crop in a former opium growing area: 
Maize in Mae Chaem site for livestock feed industry in Thailand and the neighbouring countries
Transformation of former opium fields to patchworks of cash and subsistence crops in northern Thailand
Intensive Systems with High Inputs and Increasing Cost of Production
Degradation process of shifting cultivation in MMSEA

- Mature forests
- Young forests
- Degraded forests
Consequences of alternative land use to shifting cultivation

**Threats to Forest Ecosystems:** Sustainability and degradation
- Monoculture of large scale farming and diverse systems of dominant cash crops by smallholders
- Forest and watershed destruction
- Loss of ecosystem integrity (structure, organization and functions) and biodiversity (domesticated and wild species)

**Increasing resource use and conflicts:** Strong competition for natural resources
- Land
- Water
- Forests (both natural and community managed systems)
Land Use Conflict Resolutions

Paradigm shift in mountain development activity since 1990s

• People participation and bottom up planning
• Grass-root planning and stakeholder analysis
• Recognition of “Good” practices” from local innovations and traditional knowledge
• Support farmers’ coping ability
• Community empowerment
Alternative Cash Crops in Mae Tho and Community-Based Land Use Planning and Local Watershed Management

Land use conflict and disputes:
- Expansion of cash crop area
- Declaring areas under strictly protected forests
- Encroachment into community forests and village conservation areas
Development of highland paddy as alternative land use and reduce pressure on the natural forests: **physical limitations, e.g., soils, water and steep slopes**
Decree 327: Policy initiative in the restoration of Barren Hills in the Midlands of North Vietnam during early 1990s
Farmers’ management of sustainable land use and improvement of their livelihoods
Patchworks of agrobiodiversity in diverse village landscapes

Pah Poo Chom in Chiang Mai, Thailand

Baihualing, Gaoligongshan in Baoshan, China
Interface between agriculture and forest lands in a village landscape

Gravity-fed sprinkler irrigation for dry season cash crops
Comparative advantages:

• Lower elevation as comparing to other major cabbage production sites
• Possible to delay planting until late September for higher prices
• Taming *Mimosa invisa*, an invasive species for green manure crop in the wet season
Spiny Mimosa: The live mulching system in Pah Poo Chom village

**Total Amount of Nitrogen = 67 kgN/ha**
- From Spiny Mimosa = 47 kgN/ha
- From Corn Trashes = 20 kgN/ha
Forest patches in agricultural landscape: the Hmong traditional systems for production, conservation and other services
A complex AF edge managed by Mr. Sao-phang Saetao of Pah Poo Chom

- Highest species richness (114) vs. other edges (38)
- Highest utility (firewood, food, construction material, and making tools)
- Conservation of headwater for production of cash crops
Management of Agroforest plots in Pah Poo Chom Project site

MAINTAIN INTACT TO PROTECT/CONSERVE WATER RESOURCE

A Stream channel
B All edges with mixture of perennial and shrubs
C Lychee orchard / Lychee & Vegetable
D Intense land use
### Biodiversity assessment of AF edges.

<table>
<thead>
<tr>
<th>Names of responsible persons who manage the AF edges</th>
<th>Total Individuals</th>
<th>Species Richness</th>
<th>Shannon Index</th>
<th>Margalef Index</th>
</tr>
</thead>
<tbody>
<tr>
<td>Local expert: Saophang Saetao</td>
<td>717</td>
<td>114</td>
<td>2.77</td>
<td>17.19</td>
</tr>
<tr>
<td>Non-experts: (average)</td>
<td>315</td>
<td>38</td>
<td>2.35</td>
<td>6.39</td>
</tr>
<tr>
<td>- Juk Saehang</td>
<td>332</td>
<td>33</td>
<td>2.29</td>
<td>5.51</td>
</tr>
<tr>
<td>- Joint managed by Chao/Chang Seng</td>
<td>315</td>
<td>18</td>
<td>1.54</td>
<td>2.96</td>
</tr>
<tr>
<td>- Unidentified person</td>
<td>300</td>
<td>62</td>
<td>3.24</td>
<td>10.69</td>
</tr>
</tbody>
</table>
Utilization of tree species in AF edge managed by local expert in *Pah Poo Chom*.

<table>
<thead>
<tr>
<th>Utilization</th>
<th>Number of Species</th>
<th>Utilization</th>
<th>Herbs/Spices</th>
<th>Construction</th>
<th>Farm Tools</th>
<th>Firewood</th>
<th>Others</th>
</tr>
</thead>
<tbody>
<tr>
<td>Food</td>
<td>25</td>
<td>1</td>
<td>6</td>
<td>6</td>
<td>14</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>Herbs/Spices</td>
<td>16</td>
<td>3</td>
<td>1</td>
<td>5</td>
<td>2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Construction</td>
<td>24</td>
<td>8</td>
<td>20</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Farm Tools</td>
<td>18</td>
<td>14</td>
<td>2</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Firewood</td>
<td>78</td>
<td>4</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Reintroducing bambo for making *Hmong* pipe in AF edge, managed by Saophang Saetao of *Pah Poo Chom* village
Products from wild banana for cash income of the poor households sold in Chiang Mai markets (Kaad Muang Mai)
Products from agricultural fields with high demand in the city markets
Management of Posa (mulberry paper: *Broussonetia papyrifera* Vent.) agroforest in Ban Ta Hae of Luang Prabang, Lao PDR
Shifting cultivation and fallow fields in Tee Cha Village, Sop Moei District, Mae Hong Son Province
Managing forest species in agricultural landscape: Local innovation to restore productivity of reduced rotation in traditional shifting cultivation in Tee Cha Village, Sop Moei District, Mae Hong Son Province
Management of a pioneer tree species, Pada (*Macaranga denticulata*)
Upland rice yields (t/ha) across farms with densely and sparsely populated pada in the reduced fallow

<table>
<thead>
<tr>
<th>Pada in fallow</th>
<th>Dense</th>
<th>Sparse</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Mean yield</strong> (8 fields, 6 farms)</td>
<td>3.04</td>
<td>1.15</td>
</tr>
<tr>
<td><strong>Range</strong></td>
<td>2.48-4.53</td>
<td>0.71-1.56</td>
</tr>
<tr>
<td><strong>SD</strong></td>
<td>0.71</td>
<td>0.33</td>
</tr>
</tbody>
</table>

Source: Narit Yimyam et al 2003
Diversity of arbuscular mycorrhizal fungi in the rhizosphere of *M. denticulata*

<table>
<thead>
<tr>
<th>Genus</th>
<th>Number of species found</th>
</tr>
</thead>
<tbody>
<tr>
<td>Acaulospora</td>
<td>6</td>
</tr>
<tr>
<td>Archaeospora</td>
<td>1</td>
</tr>
<tr>
<td>Gigaspora</td>
<td>2</td>
</tr>
<tr>
<td>Glomus</td>
<td>18</td>
</tr>
<tr>
<td>Paraglomus</td>
<td>1</td>
</tr>
<tr>
<td>Scutellospora</td>
<td>2</td>
</tr>
</tbody>
</table>

**A. laevis**

**G. multicaule**
Responses to arbuscular fungi in *Macaranga denticulata*

Innoculation Treatments:

- Uninnoculated
- *Glomus fasciculatum*
- *Glomus spp.*
- *Acaulaspora spp*
- Mixed species
Trends in Land Use

• Intensity of land use with permanent agriculture is increasing and encouraged

• Forest land and resources will continue to decline

• Inappropriate practice with unsustainable forms of land use will be expanding as long as policy perception remains unchanged

• Sustainability of rural livelihoods is decreasing

• Land disputes and land use conflicts are extending on a larger scale
  - Between local upland communities
  - Between upland and lowland communities
  - Between community and government agency
Remaining questions

- What are the appropriate land use alternatives that work for the mountain communities?
- When do they work? Where, why and how?
Final remarks

1. Farmers and communities have capacity to manage land on sustainable basis as long as local knowledge, traditions, customary rules and regulations are effectively functioning.

2. Sustainable land management can be seen in many ways at different levels and different scales.

3. Better understanding of “best practices” in sustainable land management is urgently needed in order to promote the systems with wider scales and overcome site specific problem relating to the best practices.
Thank You for Your Attention