

Study Sessions on Land Use Planning, Land Issue Working Group 5th Oct. 2016

Labor-Saving Practices for External Extension of Slash-and-Burn Upland Rice Agriculture in Laos



Hidetoshi Asai

(Japan International Research Center for Agricultural Sciences)

□ Rice in Laos

(Lao.PDR)

Stable food : Glutinous Rice

Rice Consumption: 170 kg per capita
(70% of total calorie intake)

Slash-and-burn systems:

Important rice source in northern part

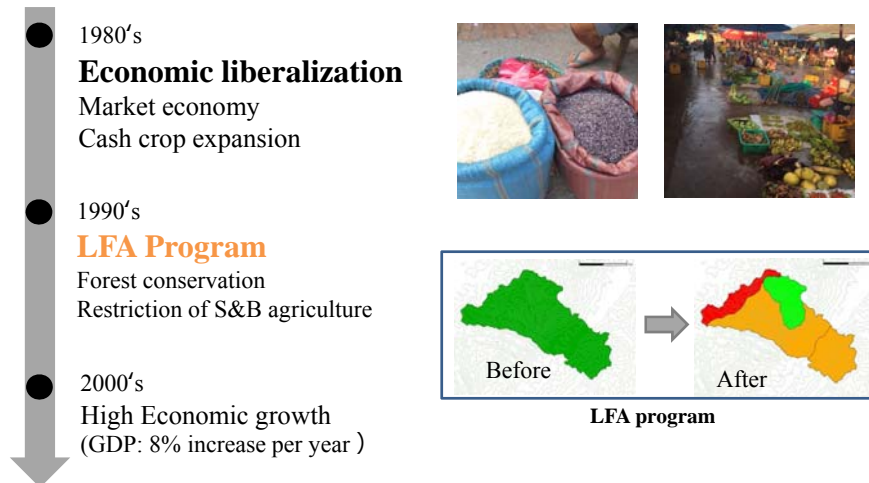


Slash-and-burn systems

- Rotation systems
1~3yr cropping + Fallow period
- Negative image as
Undeveloped agricultural system
Cause of deforestation

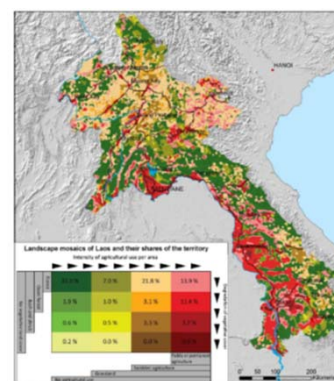


□ Political change during past 30yrs



□ Past Study on S&B agriculture land use.

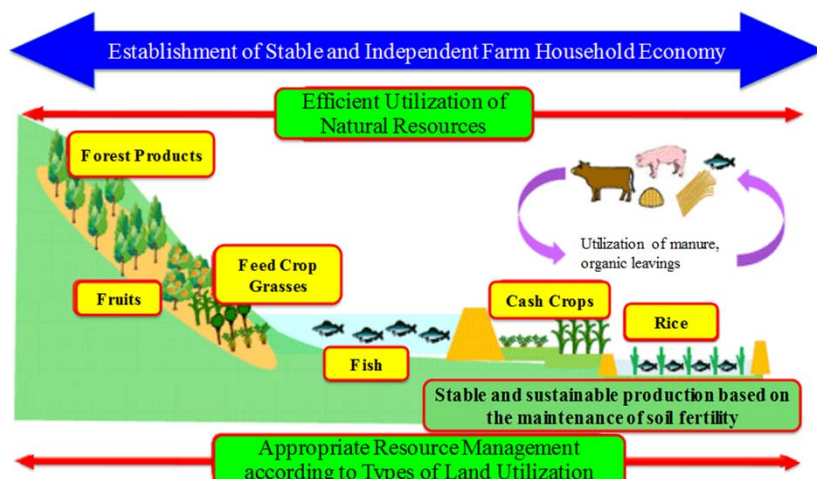
- Land use study at national scale
 - Satellite image and statistic data
 - Extent of S&B agriculture
29% of land territory
17% of population
 - High poverty ratio in S&B area
 - Overall, decreasing trend, but
 - **Persistence or Expansion in remote area with poor access and few alternatives**
- (Messeri et al. 2009, Heinmann et al. 2013 etc.)



(Figure from Messeri et al. 2009, Hum Ecol.37)

□ JIRCAS Project in Laos (2011 - 2015)

Interdisciplinary project in one pilot village in Vientiane province.



□ Upland rice study (2013 - present)

- **Cropping technology (~2015)**

Seed fertilizer technique
Utilization of soil microbe (VAM), etc

- **Genotypic resource (~2014)**

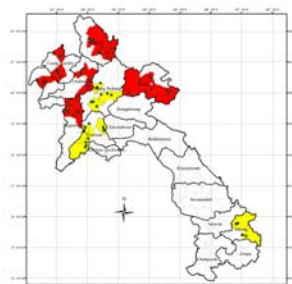
Variety Collection (1000 accession)
Selection of promise variety
Genotypic diversity

- **Land use survey (~2013)**

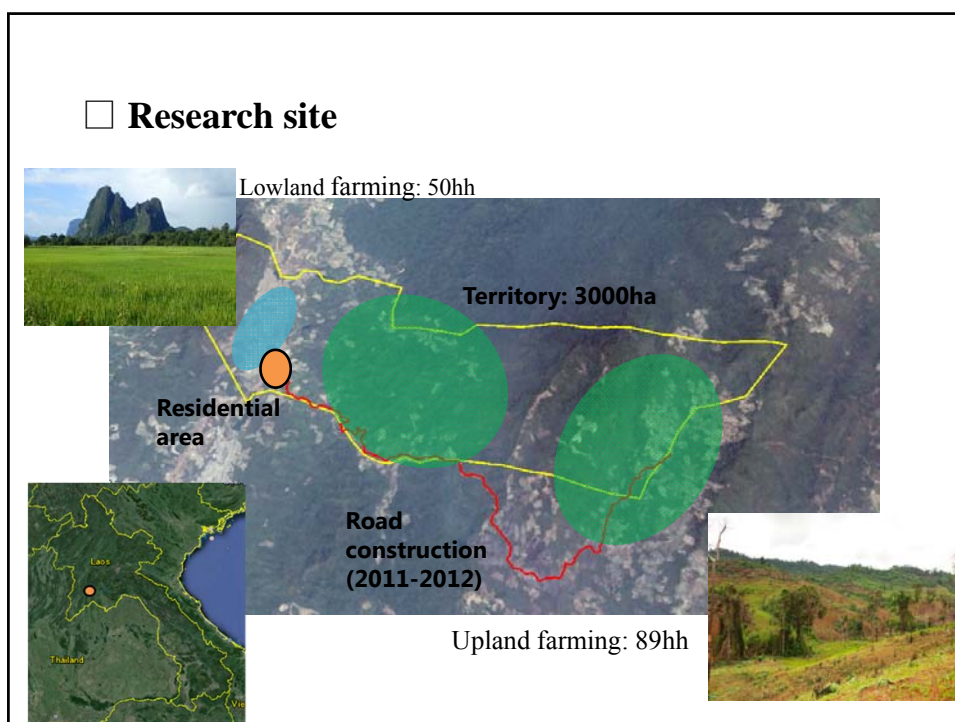
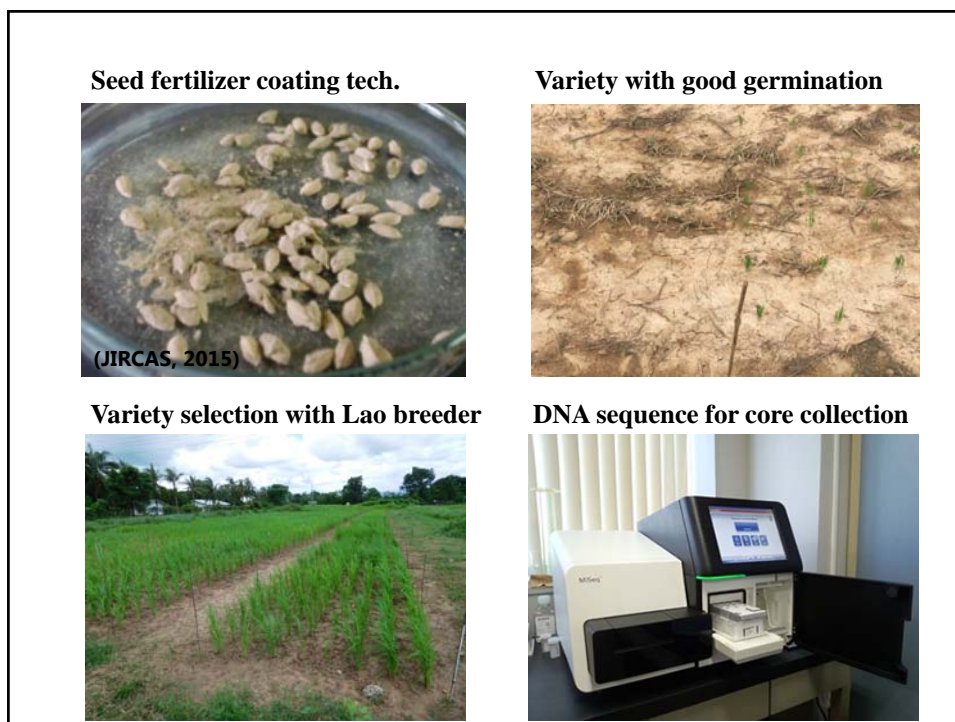
Impact of labor-saving practices on upland land use
Role of upland rice in farmer's livelihood.



On-farm trial in study village

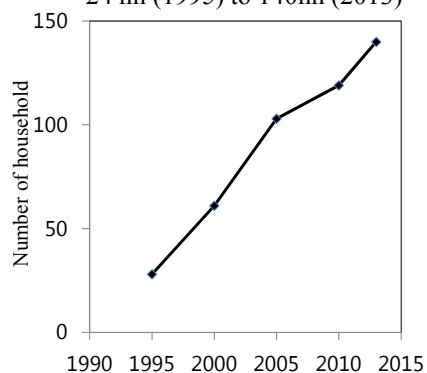


9 provinces for variety collection



□ Population increase and Road construction

Migrants from Northern area
24 hh (1995) to 140hh (2013)



Road construction in 2011-2012
Field access was drastically improved.



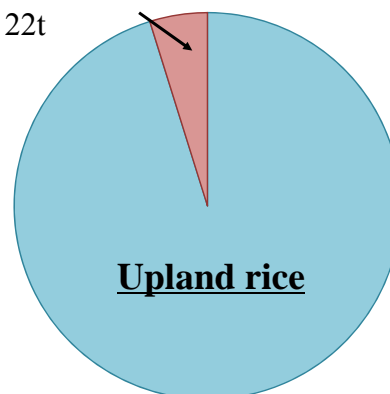
□ Upland farming in study village

Upland activities

- Upland farmers: 89 hh
- Upland rice: 89 hh
 - Jobs' tear: 9 hh
 - Cassava: 1 hh
 - Rubber: 3 hh (start from 2013)



Jobs' tear
22t



Crop Production in study village

□ Data Collection in 2013



● Field survey

Field location data
Owner information
Field map by GIS



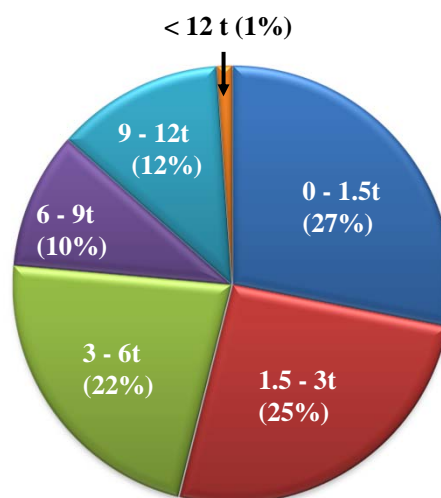
● Interview survey

household information
Farming activities.
Labour input etc.

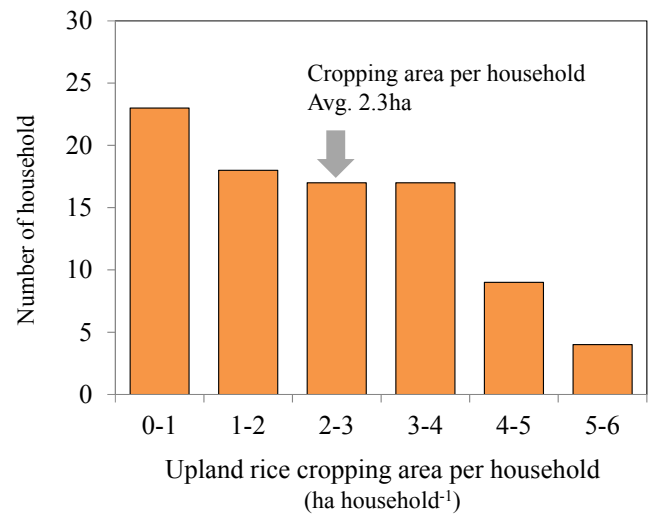
□ Upland Rice as food or cash?

- Upland rice production
Avg. 4.8 t/hh
- Consumption
Avg. 1.4 t/hh
- Selling
87% of Farmers

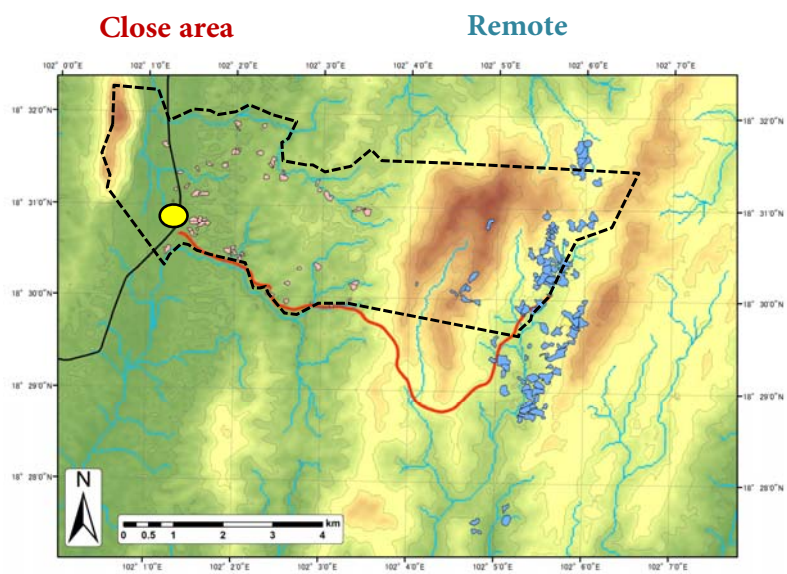
**Upland rice as
Cash income source!**



□ Cropping area per household



□ Field distribution into Remote Area.



☐ Landscape | Close area and Remote area

Close area

- Small size field
- Poor growth (Low fertility)



Remote area

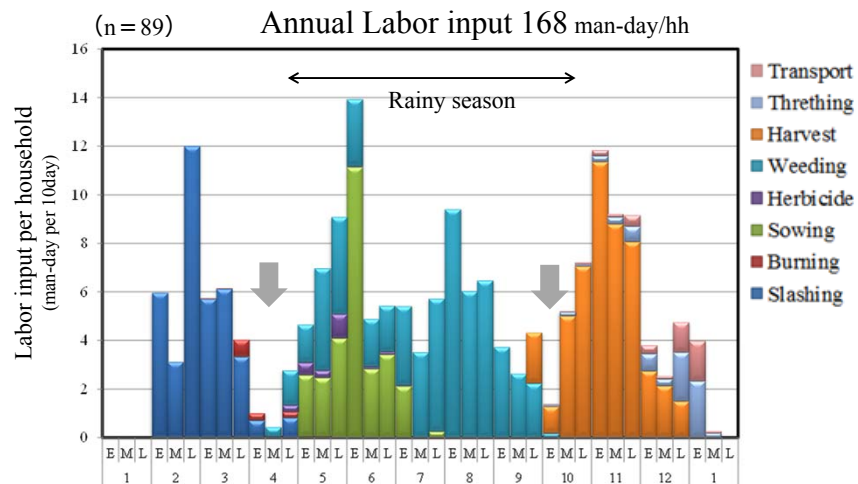
- Large size field
- Good growth (High fertility)



☐ Upland rice cropping in Close area and Remote area

	Close		Remote
Num. of hh	24	<<	65
Upland rice production (t/hh)	1.2	<<	6.3
Cropping area (ha/hh)	0.92	<<	2.95
Upland rice yield (t/ha)	1.4	<<	2.3

□ Seasonal Trends in Labor Input



□ Labor input in Close and Remote area

	Close (n=29)		Remote (n=53)
Labor input (man-day per hh)	121	<<	190
Family	101		125
Exchange	Large field !		64
Employment	2		4
% of exchange Labor	16.8%		33.8%
Labor input per ha (man-day per ha)	154	>>	69
		High labor efficiency	

□ Herbicide use in S&B agriculture.

- Herbicide users: 46 hh (55%)
- Start from 2010.
- Reason for application
 - Field size expansion (32hh)
 - Labor deficit (28hh)
 - Delayed sowing (8hh)
- Reason for non-application
 - Health damage (32hh)
 - Pollution of NTFP and vegetable (10 hh)
 - No demand (12 hh)
- Type of herbicide
 - Paraquat (44hh) : Fast-acting**
 - Glyphosphate (9hh) : Good weed suppression
- Accident: One case of fatal accident
(leakage from splayer)



□ Herbicide use in S&B field

Sowing just after herbicide use



Herbicide use by handy sprayer



(Motorized sprayer were also used.)

□ Out-sourcing service in S&B field

- Operation for out-sourcing service
Threshing, Transport
- Service users: 69 hh
- Start from 2010.
- Provider
External contractor
- Period
Late Dec. to Middle Jan.
- Expensive cost for out-sourcing
Threshing: 1 bag per 16 bag (6%)
Transport: 1 bag per 6 bag (16%)



□ Late-Maturity (LM) variety for labor-saving

- 18 - 20 Varieties in study village
- Primary variety: cv. **Tampi**
Late-maturity (Pi)
Semi-dwarf (Tam)
(Strong resistance to lodging)
- Num of grower: **53 hh**
- Sowing amount: **4.5t** (**51%** of total amount)
- Harvesting start from late Oct. (in dry season)
- Reason for **Tam pi** (or late variety)
Efficient harvest
(without rainfall interruption)



□ Cost payment for Labor Practices

	Close (n=29)		Remote (n=60)
Herbicide	33%		65%
Threshing (Out-sourcing)	34%	< <	85%
Transport (Out-sourcing)	17%		97%
Tampi var	14%		82%
Cost payment	92 kg		1,240 kg
Cost per total production	6.2%	< <	18.2%

□ Labor productivity in **Close** and **Remote** area

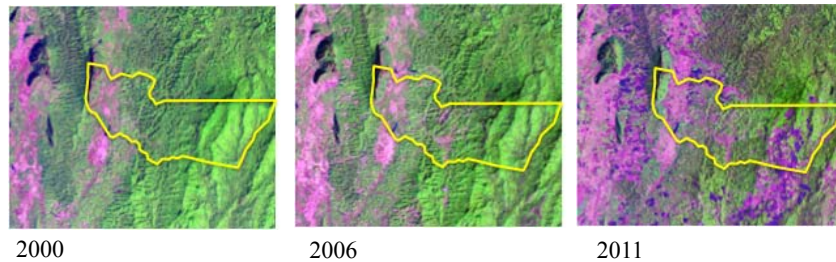
$$\text{Labor Productivity} = \frac{(\text{Production}) - (\text{Cost payment})}{\text{Labor input}}$$

(kg /man-day)

	Close (n=29)		Remote (n=53)
Labor Productivity (kg/man-day)	14.3	< <	30.5

□ Deforestation during past 10 years

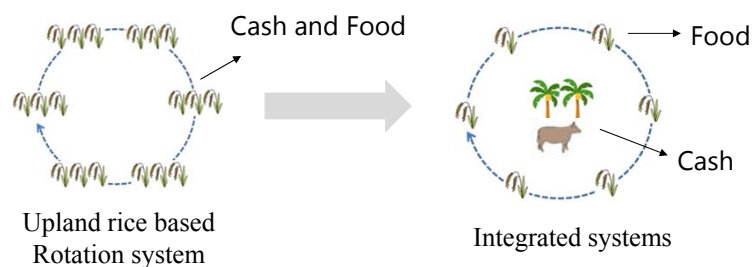
Chronosequence change in forest coverage (by Landsat image)

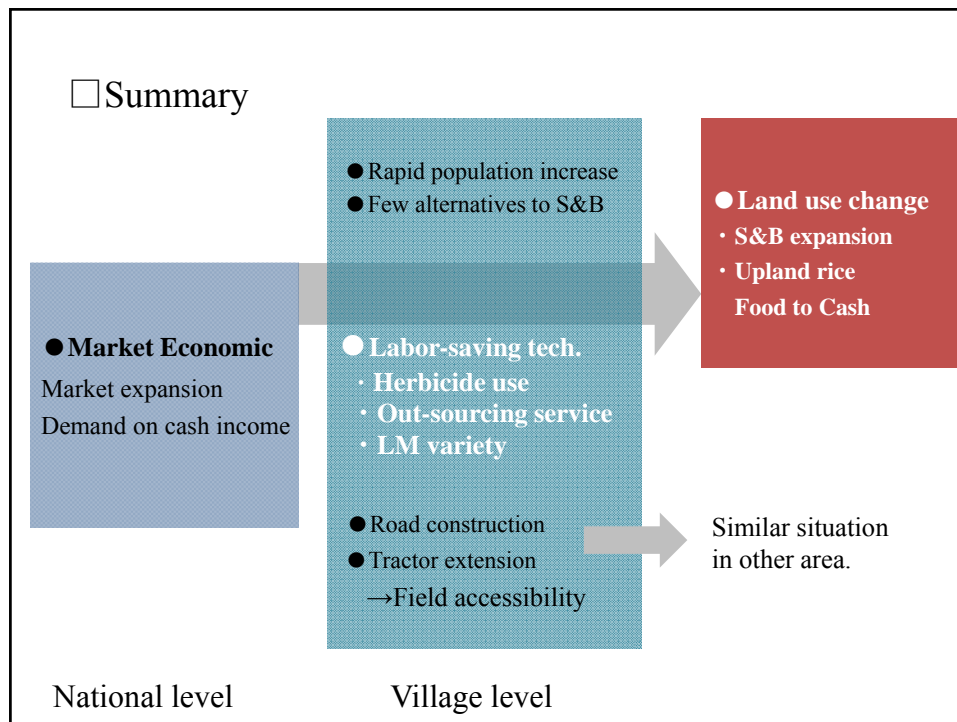


(Kimura et al. 2014)

□ Summary

1. Upland rice as **cash income**.
2. Massive rice production by **field size extension** in fertile **Remote** area
3. Field extension: High demand on labor-saving
 - ➡ Introduction of Labor-saving practices irrespective of high cost.
4. Labor-saving practices
 - ➡ **Achieving high labor productivity.**
5. Expansion of upland rice production (Rotation system)
 - ➡ **Deforestation and forest degradation**





□ Acknowledgements

National Agriculture and Forestry Research Institute

- Mr. Hounchirsavat Sodarak
- Dr. Bounthanh Keobualapha
- Dr. Bounthong Bouahom
- Dr. Khamdoke Sonygykhangthor