

Study Sessions on Land Use Planning, Land Issue Working Group 5<sup>th</sup> 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**

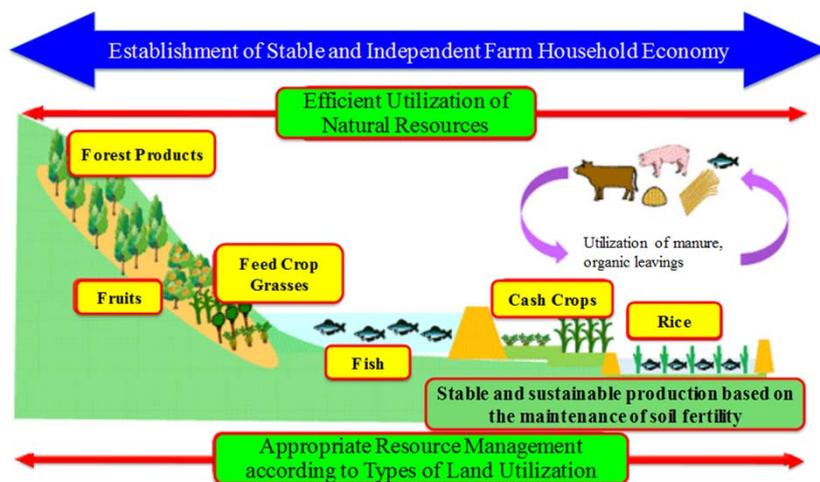
- Rotation systems  
1~3yr cropping + Fallow period
- Negative image as  
Undeveloped agricultural system  
Cause of deforestation





## □ 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)**

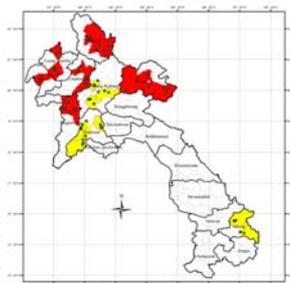
Variety Collection (1000 accession)  
Selection of promise variety  
Genotypic diversity

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

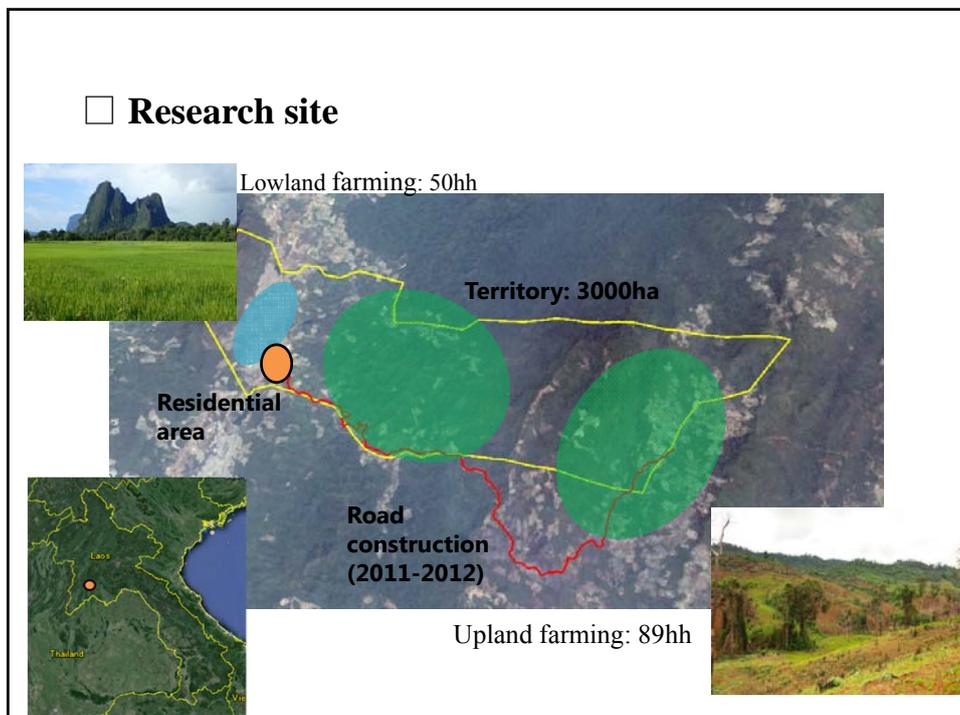
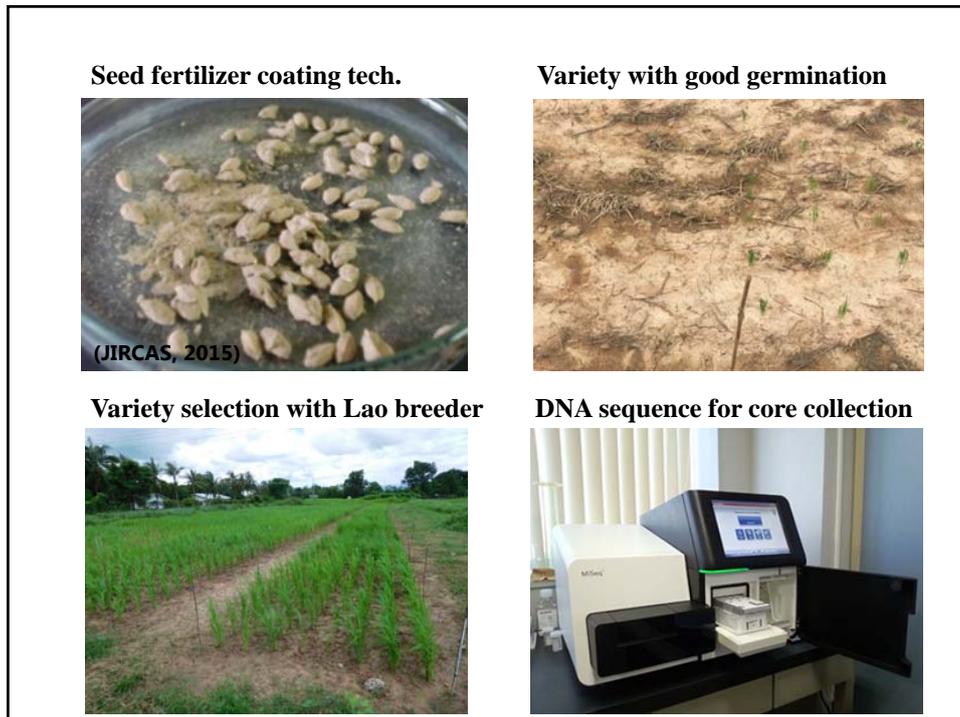
**Impact of labor-saving practices on upland land use**  
**Role of upland rice in farmer's livelihood.**



On-farm trial in study village

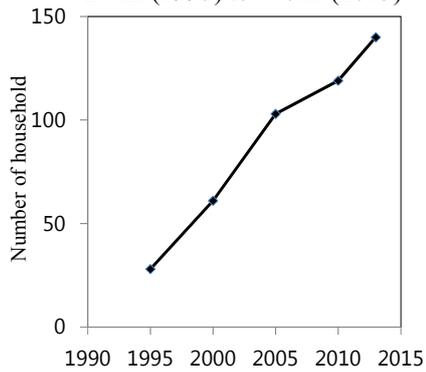


9 provinces for variety collection



□ **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)



Crop Production in study village

Data Collection in 2013



- Field survey
  - Field location data
  - Owner information
  - Field map by GIS

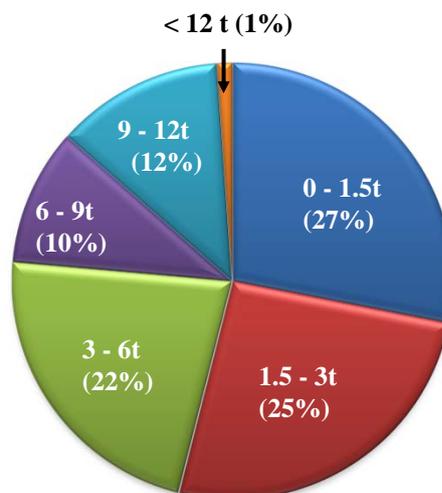


- Interview survey
  - household information
  - Farming activities.
  - Labour input etc.

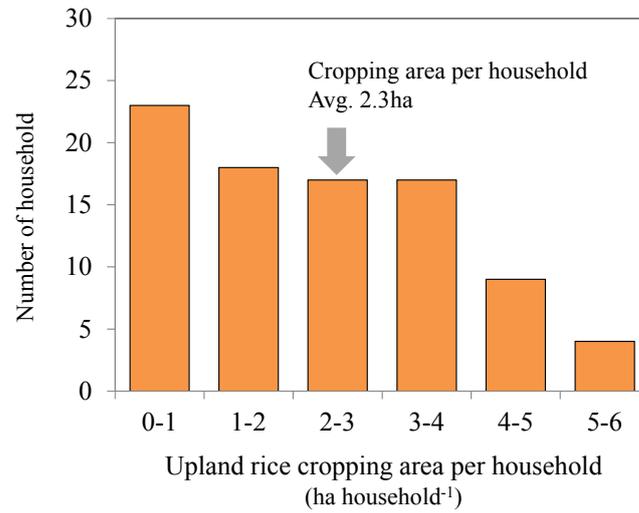
Upland Rice as food or cash?

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

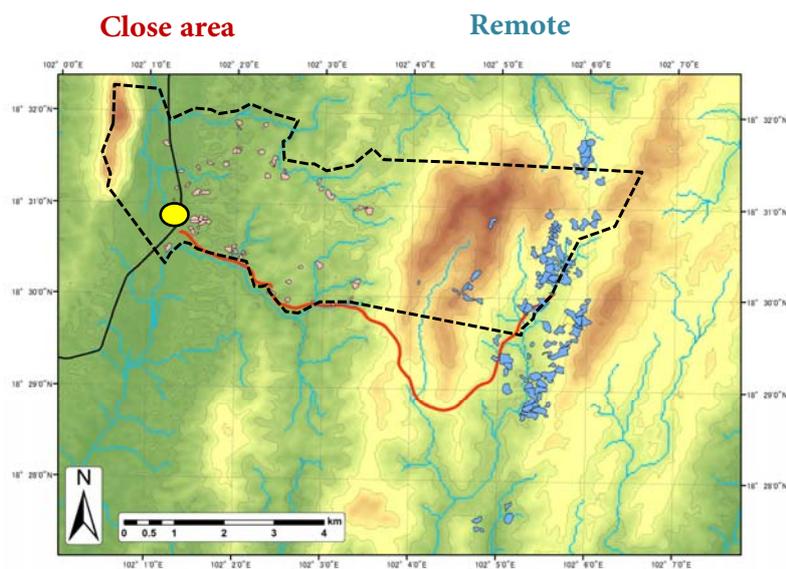
**Upland rice as  
Cash income source!**



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**

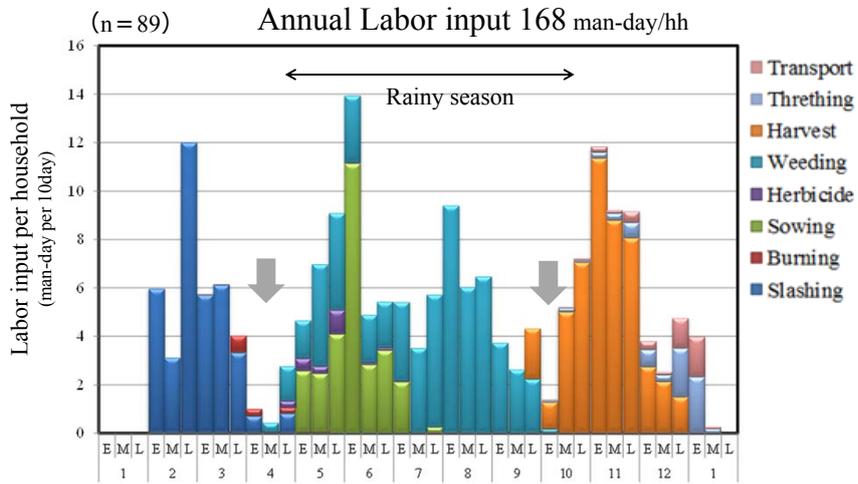
- Large size field
- Good growth  
(High fertility)



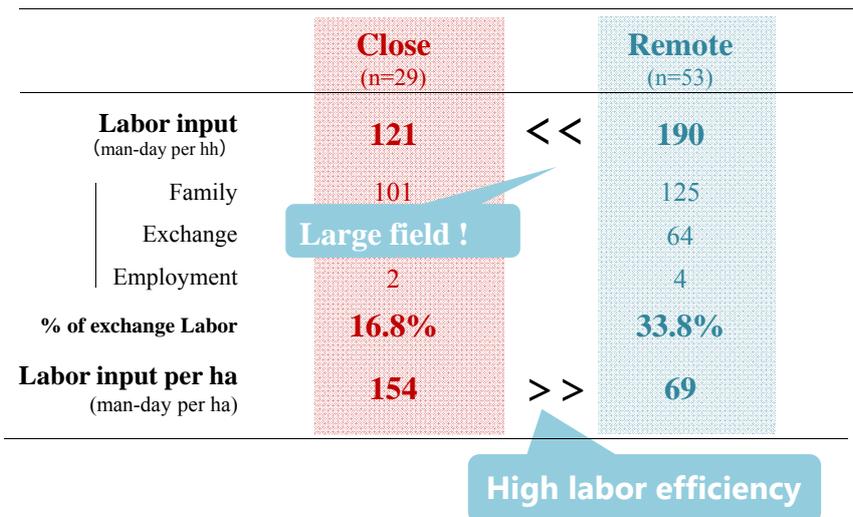
□ Upland rice cropping in **Close** area and **Remote** area

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

### □ Seasonal Trends in Labor Input



### □ Labor input in Close and Remote area



## □ 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

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

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

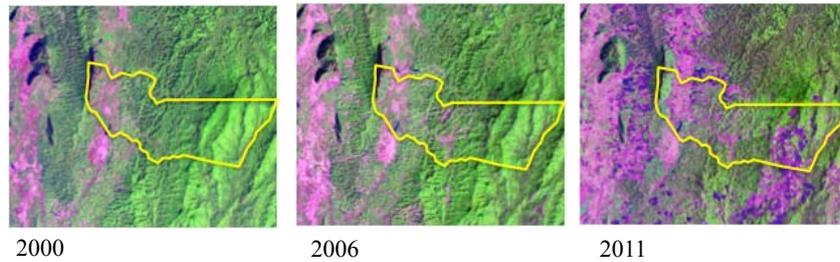
$$\text{Labor Productivity} = \frac{(\text{Production}) - (\text{Cost payment})}{\text{Labor input}}$$

(kg /man-day)

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

## □ Deforestation during past 10 years

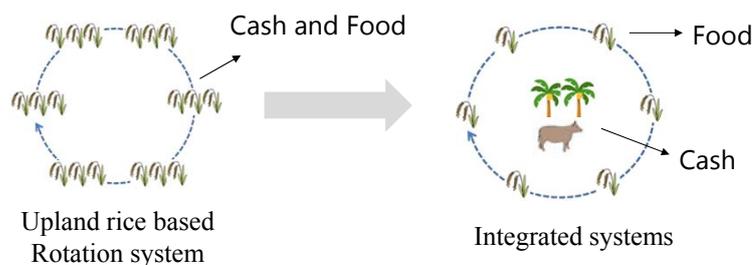
Chronosequence change in forest coverage (by Landsat image)

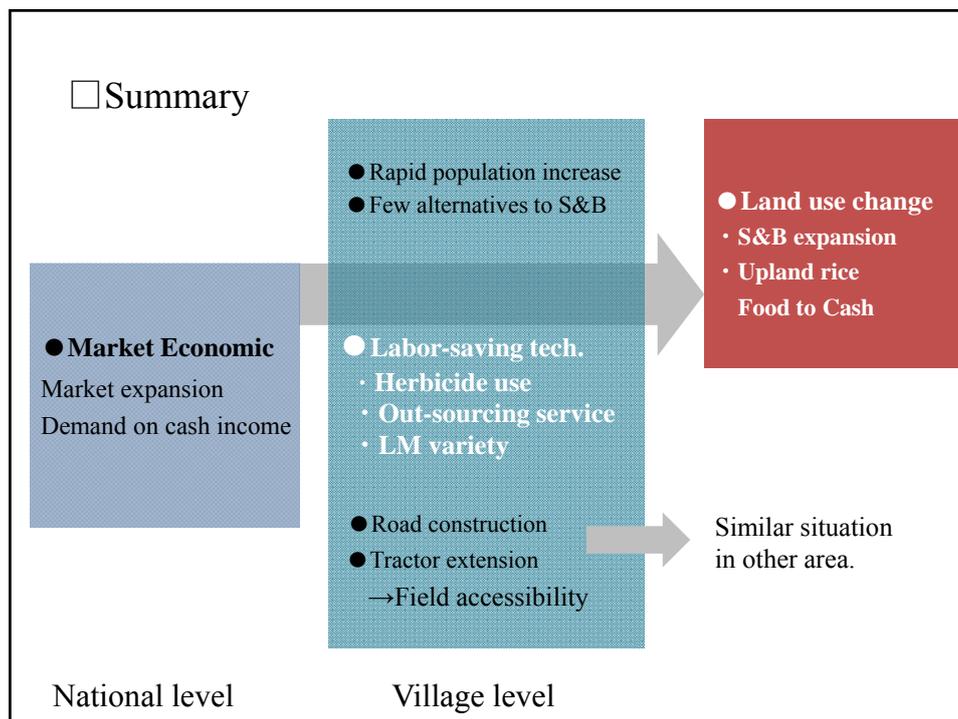


(Kimura et al. 2014)

## □ 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

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