



LCLUC in Mainland Southeast Asia

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Outline of talk

- Background on Mainland Southeast Asia
- Changes in land cover and land use
 - Agriculture
 - Deforestation/afforestation
 - Loss of shifting cultivation
 - Expansion of perennial agriculture
 - Urbanization/industrialization
- Other changes—roads, dams, and mines
- Summary

1,959,292 Sq
Km.

241,265,700
people

123 people/
Sq km



Population Growth

Country	2015	Growth Rate 2015	Pop density (sq km)
Cambodia	15,708,800	1.58	89
Laos	6,911,500	1.55	30
Myanmar	56,320,200	1.01	86
Thailand	67,976,400	0.34	133
Vietnam	94,348,800	0.97	301
Total	241,265,700		

Population density in mainland Southeast Asia, 2000

Population Density in the Greater Mekong Subregion, 2000



ADB. 2004. Atlas of Greater Mekong Subregion. Manila

200,000 100,000 0 200,000 400,000 Meters
1:10,000,000

The boundaries are not necessarily authoritative.
Source: ADB, based on ADB, UNEP, Mekong River Commission, and Stockholm Environment Institute 2001.

LEGEND

- ★ Capital
- Major City
- Water Body
- Main River
- Mekong River
- International Boundary
- Border

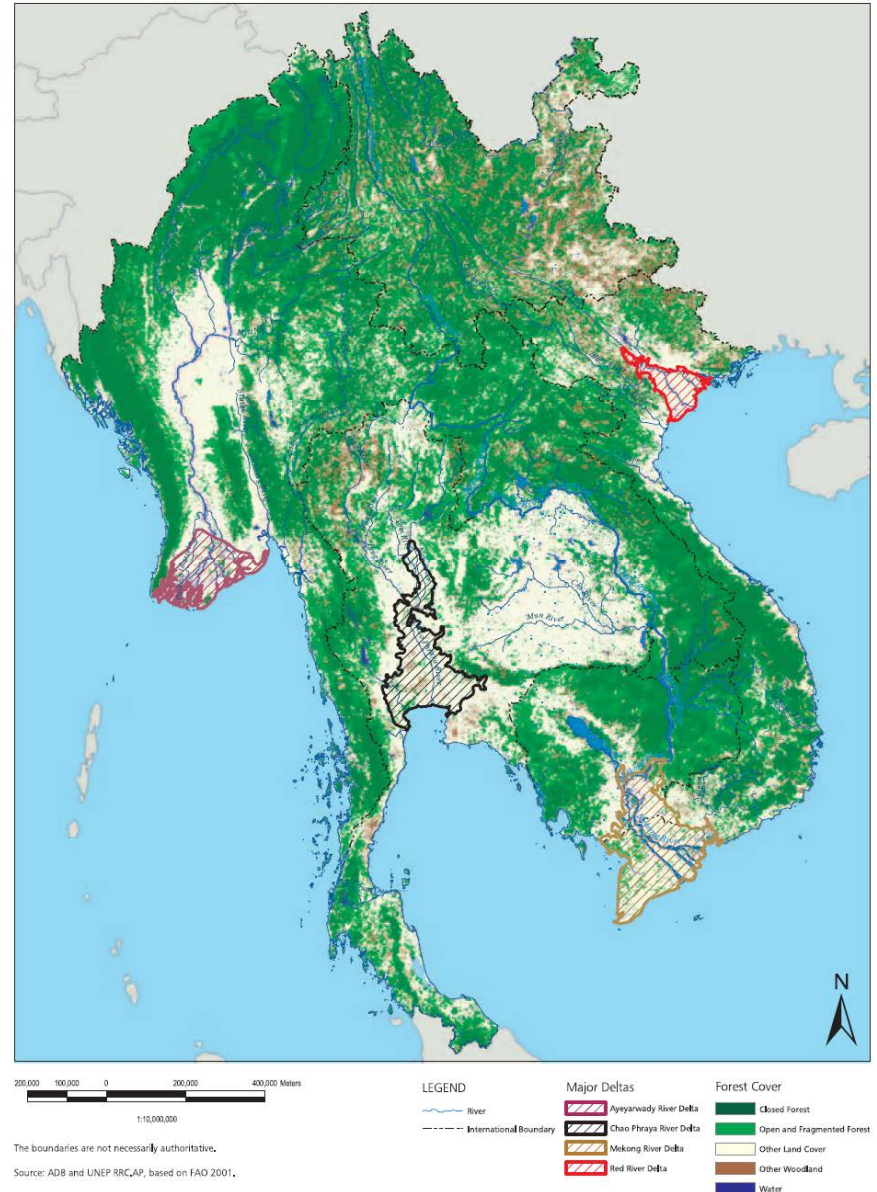
Persons per square kilometer

- 0 - 50
- 50 - 100
- 100 - 500
- 500 - 1,000
- 1,000 - 4,042

Changes in Agriculture

Major Rice-growing Deltas in the Greater Mekong Subregion

Major deltas
where paddy is
grown and other
dryland crops



ADB. 2004. Atlas of Greater Mekong Subregion. Manila

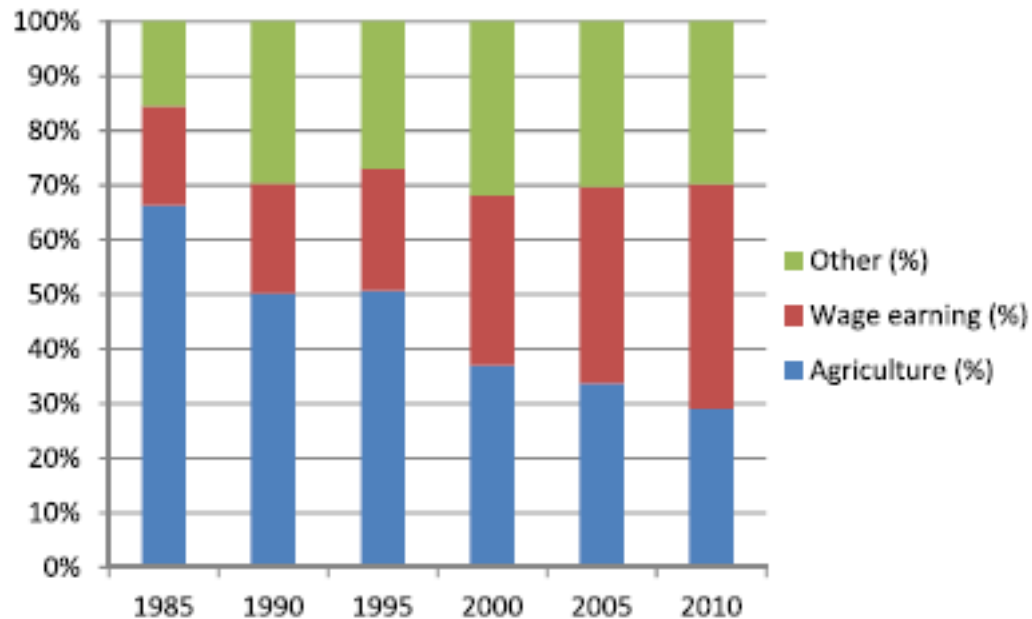
LCLUCs are intertwined: Change in one place leads to changes in other places

- Looking at agriculture in isolation is a recipe for misunderstanding economic transformations.
- To understand how farm land is used we also have to understand the nature of non-farm opportunities and employment.

The Farming Puzzle in SE Asia

- People are less dependent on land and farming for their livelihoods;
- They are engaging more deeply with non-farm activities and non-rural spaces;
- They are farming with less intensity;
- They are spending more time away from their farms;
- Yet they stubbornly cling to their small farms.

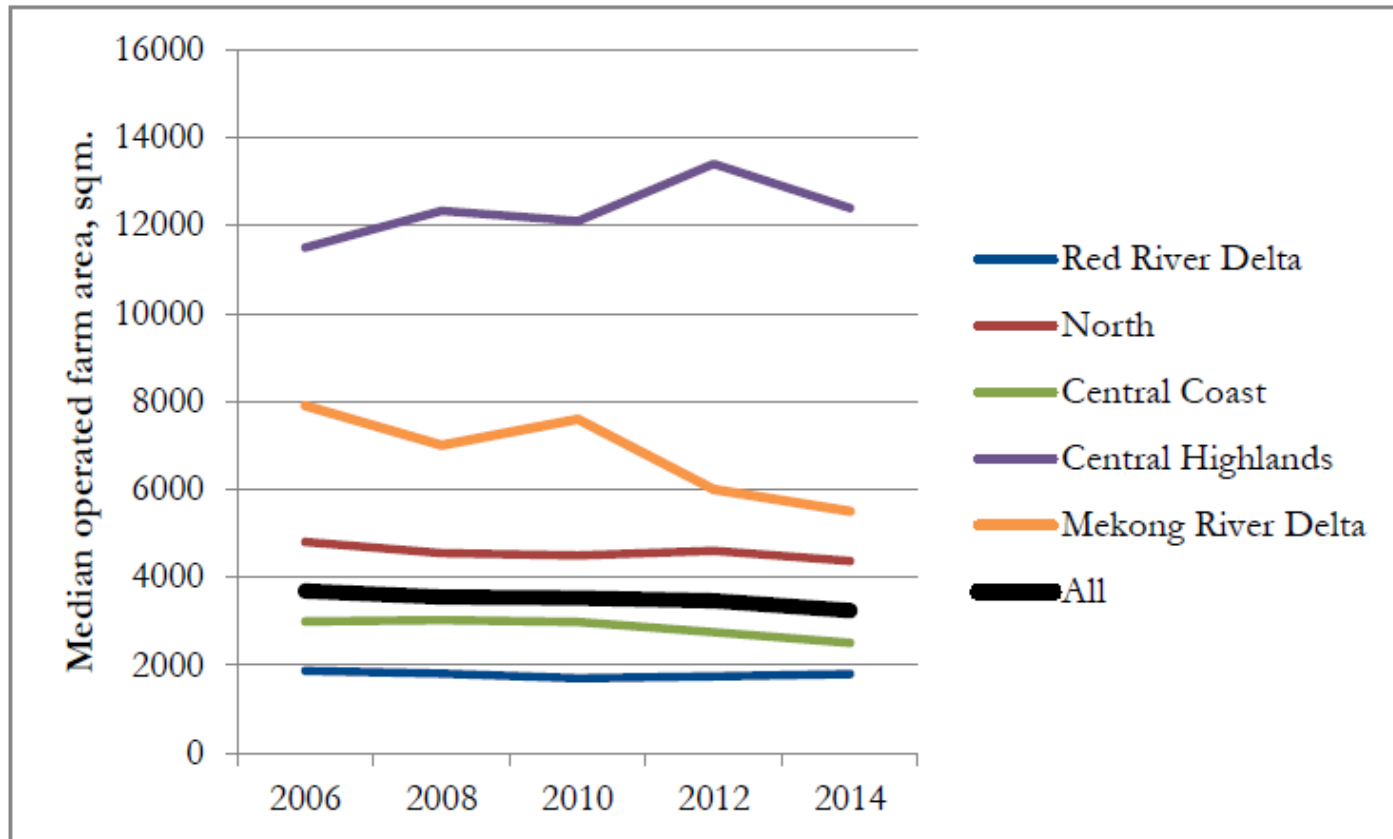
Income share of Chinese rural households; 1985-2010



Huang et al. 2012

Farm Size in Vietnam

Figure 3: Farm size, by region



Farmers and the precariousness of off-farm income

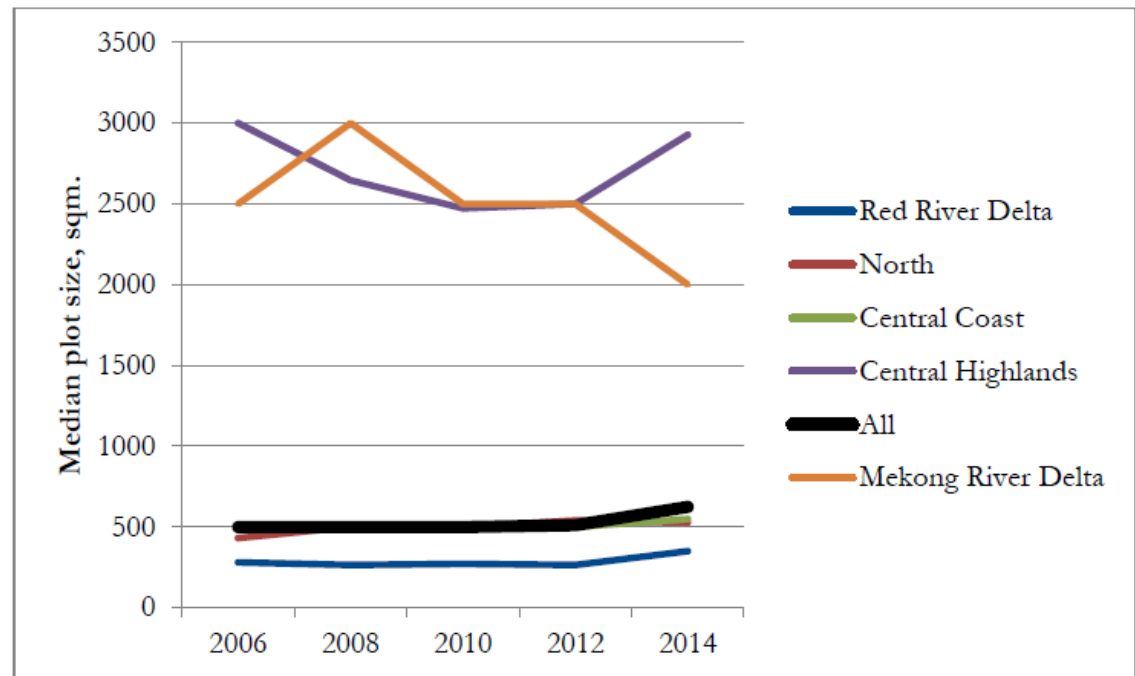
- Before farmers will exit agriculture they need to find productive, secure and remunerative work in the non-farm sector.
- SE Asia lacks social safety nets and welfare systems;
- Security lies in the hand and farms of individual families and households.

Four future directions for agricultural land use

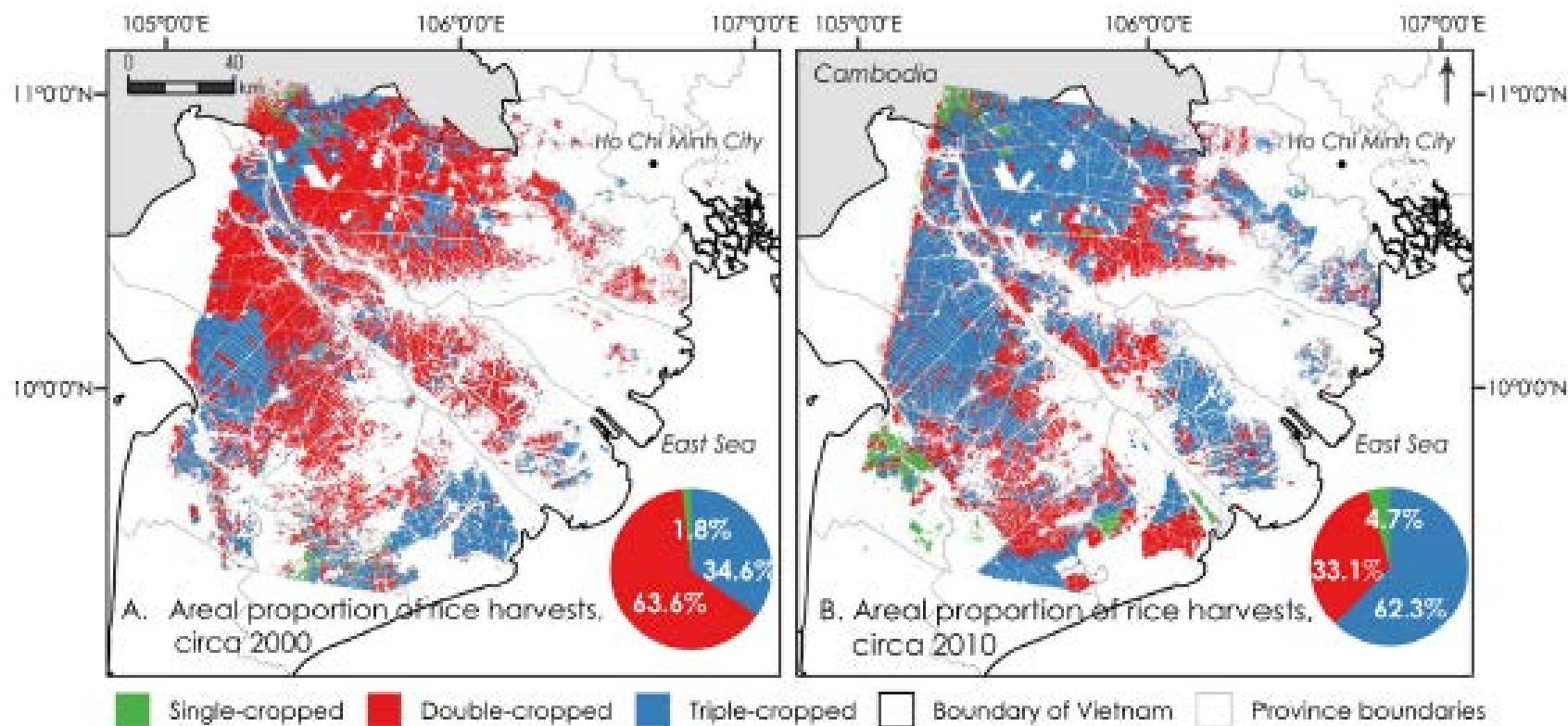
1. Farmers will eventually sell their land leading to modernization: consolidation, intensification (multiple cropping), mechanization.

Field Consolidation in Vietnam

Figure 6: Plot size, by region



Changes in paddy cropping intensity in the Mekong Delta



Kontgis, C. A. Schneider, and M. Ozdogan. 2015. Remote Sensing of Environment.

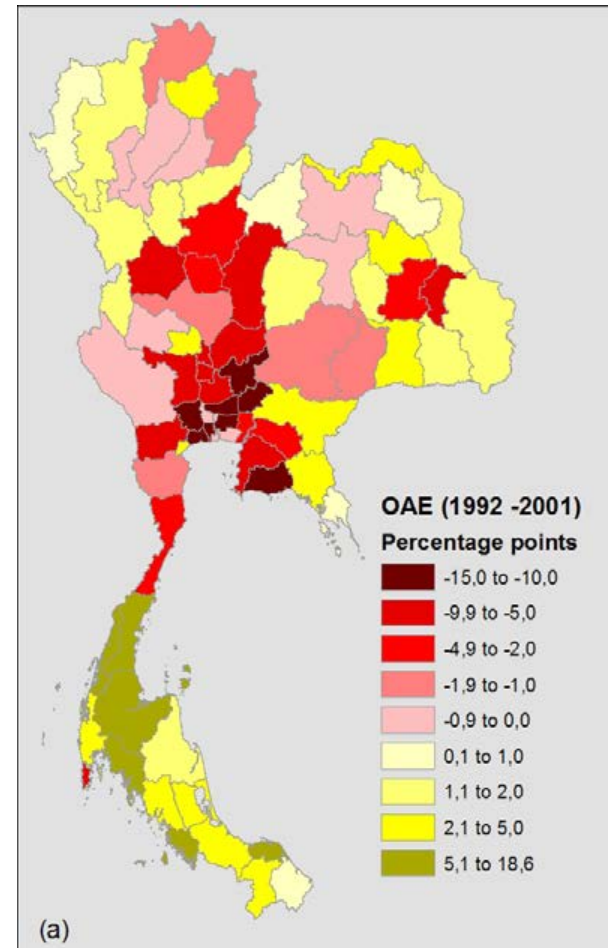
Mechanization



2. Farmers retain their land but become part-time farmers—fallow land, labor saving crops (trees—eucalypts), and mechanization

Change in the percentage of provincial areas occupied by farms (1992-2001)

OAE : *Agricultural Statistics of Thailand* (cited in Leblond. 2008).



3. Farmers embrace new crops (high value—organic, vegetables, bananas);



Farmer watering a vegetable plot in northeast Thailand. Note tractor in background.

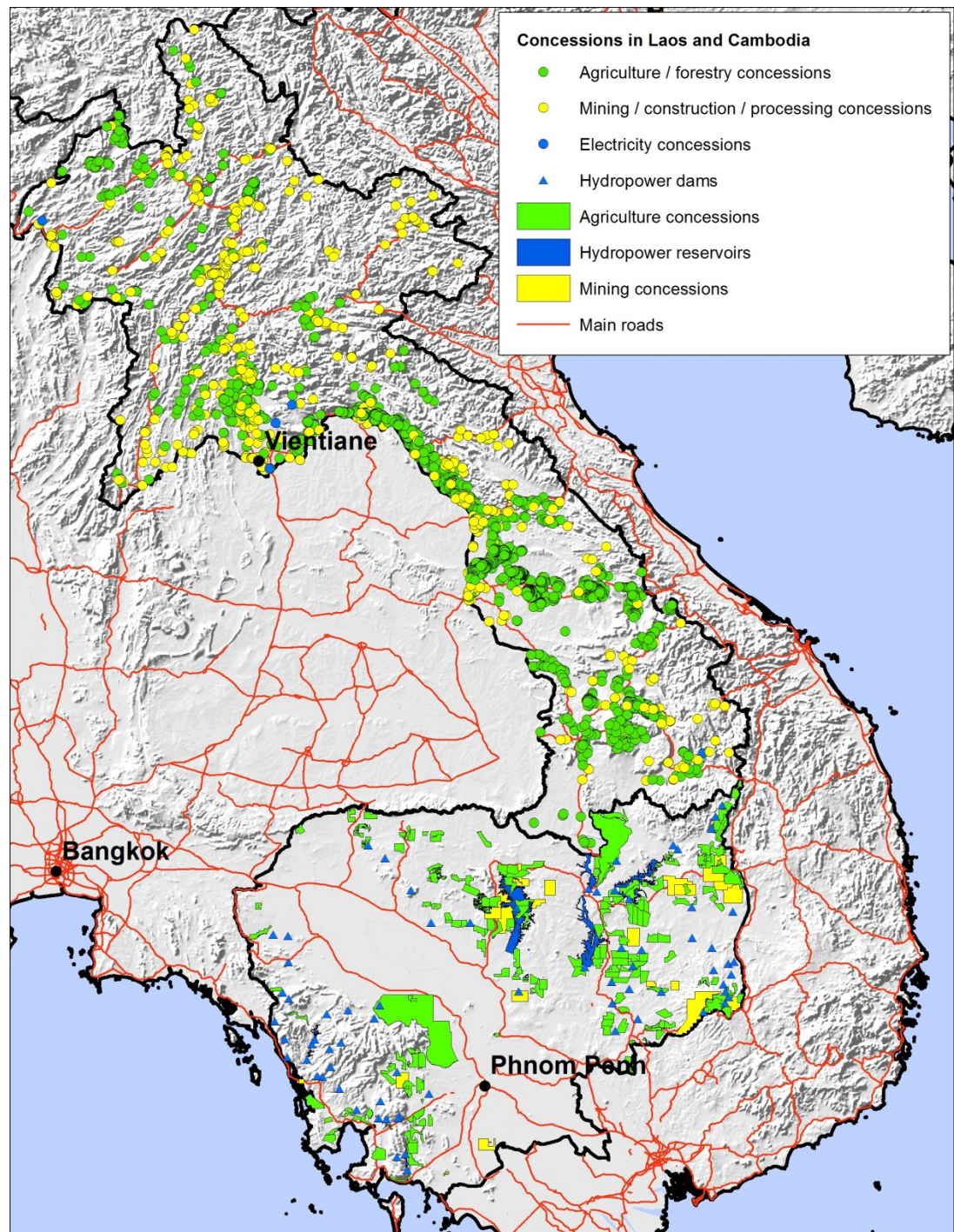


Sukanlaya, Fox and Rambo, 2014

4. The state confiscates the land and contracts it to private industry

Agricultural concessions in Laos and Cambodia

<http://www.opendevdevelopmentcambodia.net>



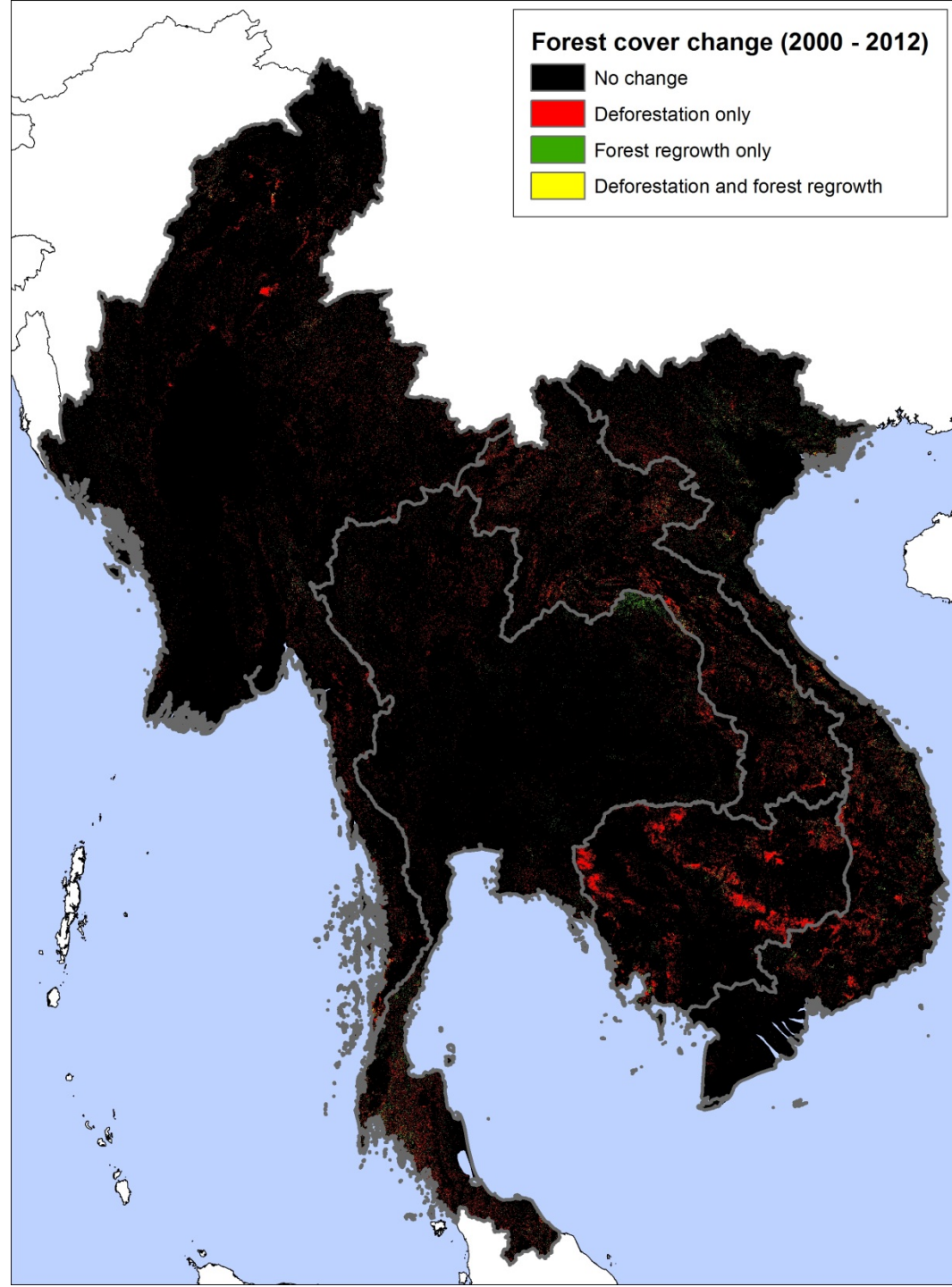
Summary

- Changes in lowland farming
 - Consolidation, intensification, mechanization;
 - Fallowing fields, labor saving crops
 - Switch to high value crops
 - Confiscation and development of agricultural concessions

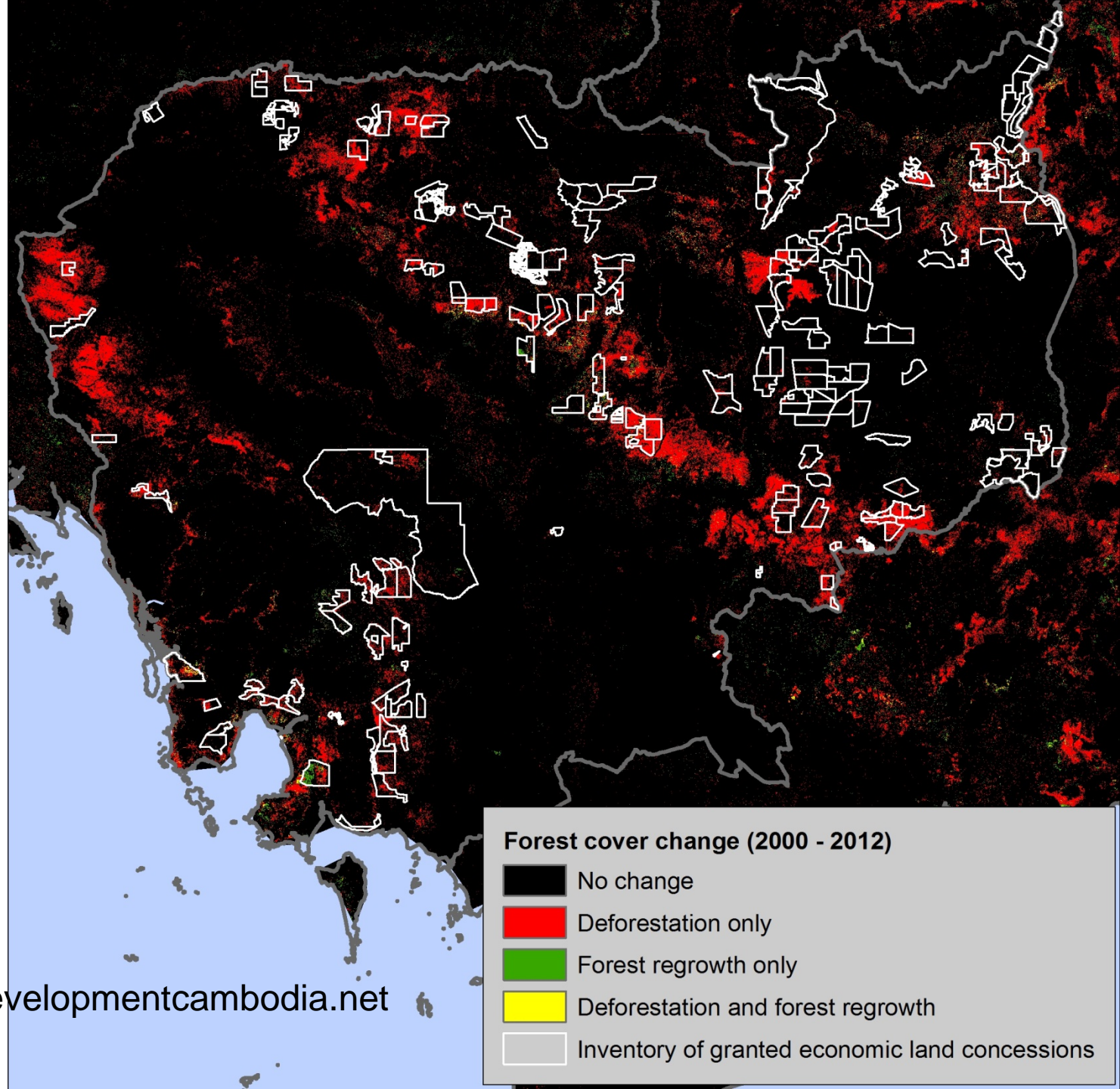
Forest Cover change (2000-2010)

Country	Hansen (00 to 12)	FAO (00-15)
Cambodia	-6.7	-1.73
Laos	-4.6	+1.07
Myanmar	-2.1	-1.38
Thailand	-2.2	+0.18
Vietnam	-3.4	+1.23
Total		-0.18

Hansen et al. 2013



Forest Cover change and land concessions in Cambodia



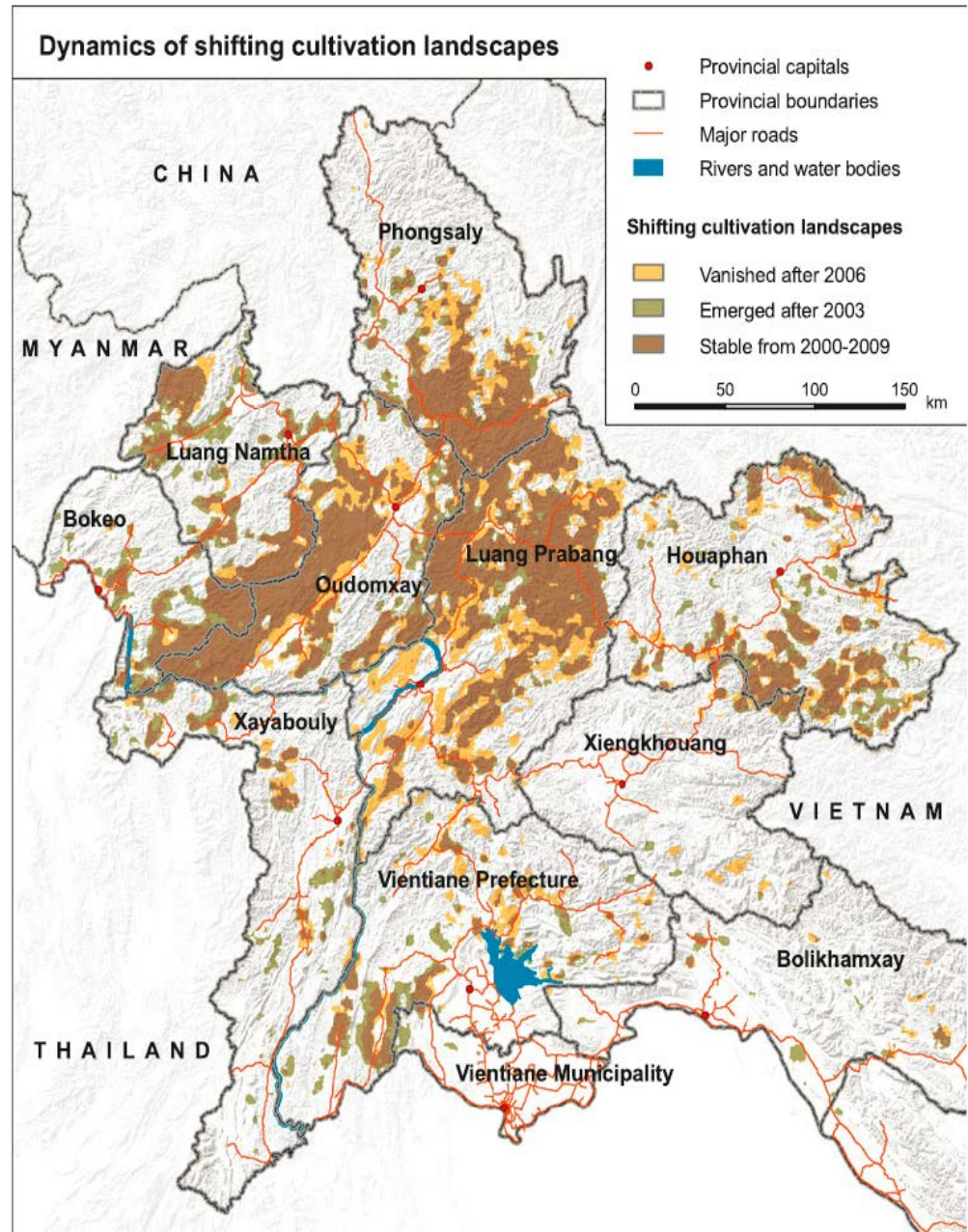
<http://www.opendevelopmentcambodia.net>

The Lost of Swidden

- Throughout Southeast Asia shifting cultivation is rapidly giving way to commercial agriculture driven by domestic demand and regional trade agreements.
- But swiddeners have always been dynamic, migrating, adopting new crops, and frequently changing the ways they farmed.
- What is different now is the scale and magnitude of the change.

Dynamics of shifting cultivation in Northern Laos (decrease of 2.2% between 2000 and 2009)

(Hurni *et al.* 2013)



Plantations and people



- The plantation manager reported they plant 550 trees per ha and 1 person can tap about 500 trees per day or about **1 person per ha**. The company currently employs **300** workers to tap 1000 ha of trees or **1 person per 3.3 ha**.
- The average rubber tapper at Sopheak Nika has a family of 4.6 members of which at least 2 people collect rubber. Hence for every rubber tapper we have an additional 1.3 people in the household, or a total of **700** tappers and family members
- In addition to rubber tappers there were approximately 49 households of farmers who had migrated nearby Sopheak Nika to buy land. Each household had 4.25 members suggesting a population of **210** additional migrants.

- The impact of large migrant populations on the landscape is not limited to the area of the plantation but will affect the larger landscape through shops and food outlets, schools, medical facilities, and other infrastructure

- The migrants we interviewed originated from 8 provinces with the largest numbers coming from Kampong Cham (35%), Tbong Khmum (16%), and Kandal and Prey Veng (13%). Other provinces with few migrants included Kampong Thom, Svay Reing, Takeo, and Siem Reap.
- We know little about the impact of migrants from these places on the place from which they came.
- We haven't yet done any multi-site ethnography to follow up on the households from where migrants originated from.

- Remittances do not appear to be playing an important role on land-use practices elsewhere
- Overall, 40% of households reported sending remittances home at least occasionally. These remittances were used to pay bills (33%), education (33%), food (13%), and farming (13%).
- Rubber tappers--60% of tappers report sending remittances to family regularly.
- Farmers--25% of farmers report sending remittances to family—only 50% of these sent regularly.

- We suspect that households receiving remittances are more dependent on the market for their food supplies (grow less of their own food than before) and hence may be at risks to downturns in rubber market and disease outbreaks.
- But about how agricultural land use is changing we know nothing. It could be intensifying—fewer people, consolidation of fields, and modernization; or it could be disintensifying—fewer people, abandonment of fields, perhaps conversion to an emphasis on livestock?

- Rubber concessions in Cambodia, Laos, and Myanmar are affecting places elsewhere.
- We know something about how plantations affect places nearby—displacement of agriculture to marginal lands, short-term borrowing of land, reordering of landscape to meet the needs of migrant laborers.
- We know little about how plantations affect places at a distance—both domestically and internationally.
- This should be an important topic within land-use and land-cover research

Expansion of urban and periurban areas

Urbanization in MSEA 2000-2010

	# of Cities > 100K	Urban Land 2000 km2	Urban land 2010 km2	Urban Pop 2000 persons	Urban pop 2010 persons	Annual Urban land change %	Annual Urban pop change %
Vietnam	32	4,201	5,098	22,854,276	33,863,070	2.0	4.0
Thailand	12	4,616	5,366	15,451,438	19,947,409	1.5	2.6
Myanmar	17	1,838	2,030	8,452,657	11,235,349	1.0	2.9
Cambodia	3	218	291	1,195,233	1,806,264	2.9	4.2
Laos	3	162	223	296,091	629,370	3.2	7.8
Total	67	11,036	13,007	48,249,695	67,481,464	1.7	3.4

Landsat-based maps developed for five study sites undergoing urban and periurban expansion in the Southeast Asia region.

Land cover map of Hanoi: 1993-2010

Classification of Red River Delta c 2006

Share of Households expelled from land

■

Farm Households in the Red River Delta

	Farmers	Workers	Professionals	Other	Total
Number/%	48 (38%)	31 (24%)	23 (18%)	26 (20%)	128 (100%)
Mean Age	50	30	38	36	39
% females	65	61	43	35	55 (70/128)

75% of households interviewed reported losing land to the government

We interviewed 7 young people from elsewhere who rent rooms in the village and work in nearby factories. Of these 3 sent remittances home worth approximately \$450 per year. Only one of these respondents reported this money was invested in agriculture.

Other 'hotspots' of change

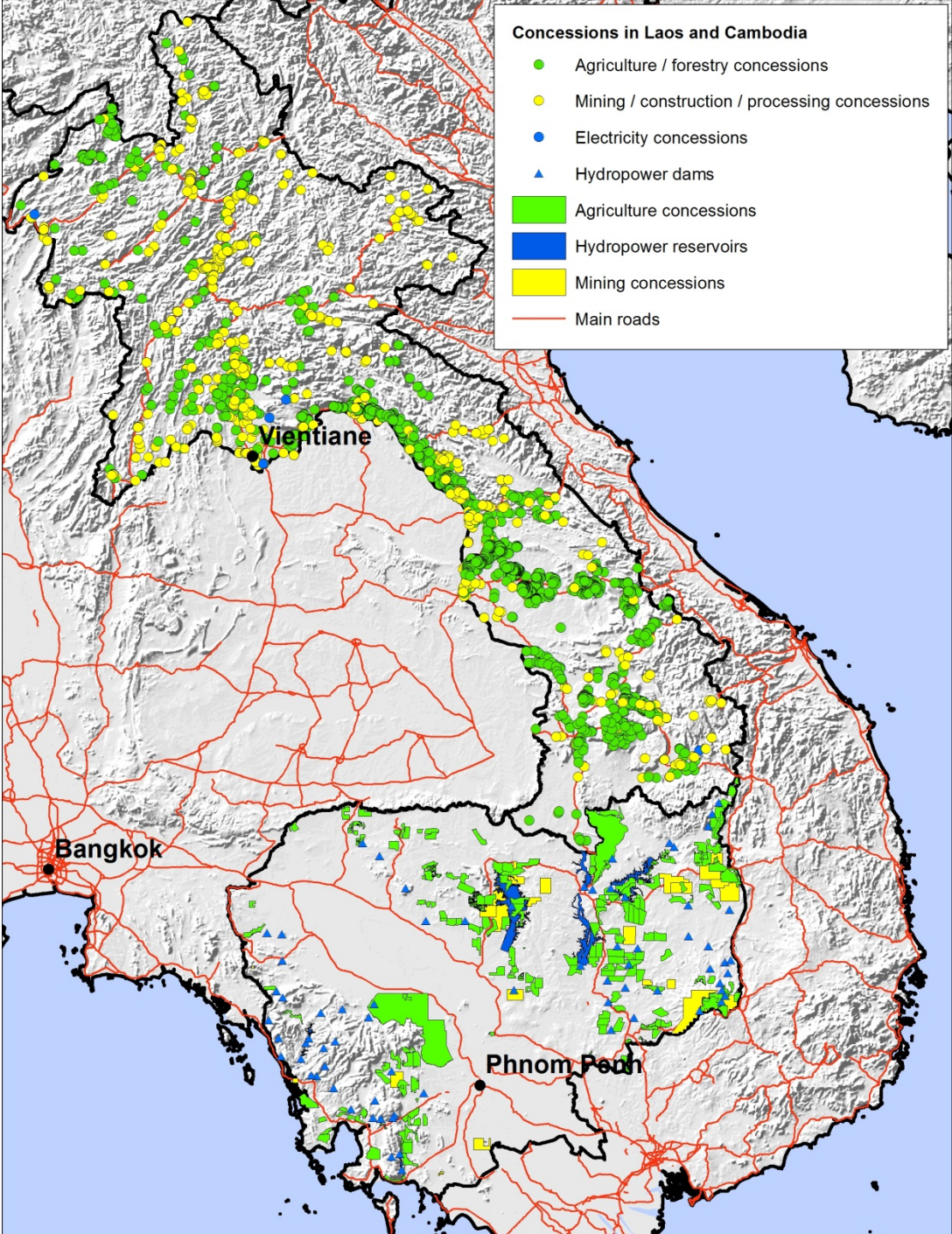
- Roads
- Dams
- Mines

Upland fields in Klu (pre/post Highway 9 upgrade)

Existing and Proposed Dams

Hydropower and Mining concessions in Laos and Cambodia

<http://www.opendevelopmentcambodia.net>



LCLUC in Mainland Southeast Asia

- LCLUC is occurring rapidly across all of mainland Southeast Asia
- Some of these changes (consolidation, mechanization) are difficult or impossible to monitor from space
- Some of the changes are not being monitored in meaningful ways (expansion of fallow land, labor saving crops, high value crops)
- Drivers of change are diverse but capitalism and national policies are key
- In the less developed countries and the uplands we are witnessing a complicated instance of agrarian transitions to capitalism.

- Change in one place leads to changes in other places—changes in agriculture and industrialization are intertwined, so are rubber plantations and migrant laborers; This is telecoupling.
- Where the environmental and socioeconomic consequences of change are being documented and studied, they tend to be viewed individually (i.e., deforestation or spread of rubber; old farmers or young factory workers) not holistically, and not coupled with feedback loops.
- In reality these changes are related and their consequences may be greater than the sum of the individual parts.

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