

# Using Farmer Decision Rules for Mapping Historical Land Use Change Patterns from 1954 to 2007 in Rural Northwestern Vietnam

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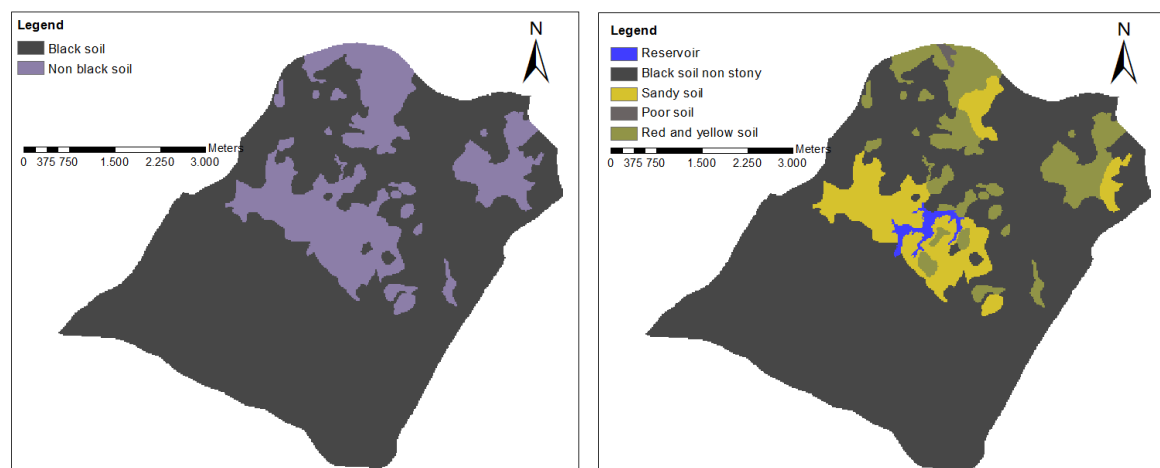
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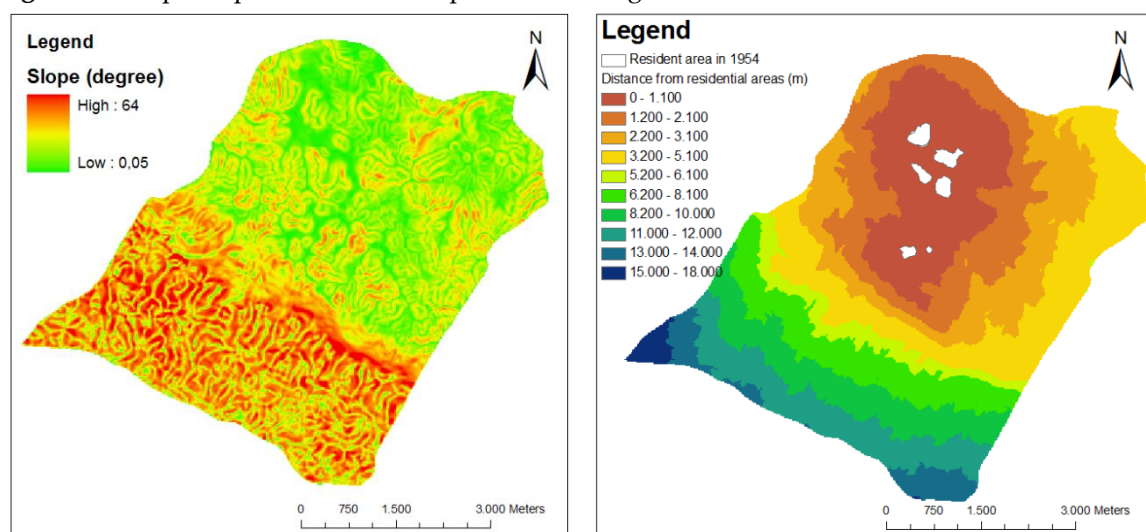
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**Figure S1.** Local soil map of the Chieng Khoi commune for reference year 1954, modified from Clemens et al. [36]. The left image presents the black and non-black soil map, the right map represents a detailed soil map with stony properties (sandy, poor, red, and yellow soils) and black soil non-stony.



**Figure S2.** Slope map and distance maps of the Chieng Khoi commune.



**Table S1.** Crop choice matrixes developed during focus group discussions; abbreviations refer to the choice-crop as a result of the pairwise ranking exercises; crops with a higher score refer higher farmers' choice; crop choice matrixes refer to different years and stages representing participants agreements during focus group discussions.

Ban Ngoang

<b>1986</b>	Paddy Rice	Upland Rice	Maize	New Cassava	Old Cassava	Sweet potato	Sesame	<b>Rank</b>
Paddy rice	X	PR	PR	PR	PR	PR	PR	<b>7</b>
Upland rice		X	UR	UR	UR	UR	UR	<b>6</b>
Maize			X	NC	OC	SP	M	<b>4</b>
New cassava				X	OC	SP	NC	<b>1</b>
Old cassava					X	OC	OC	<b>5</b>
Sweet potato						X	SP	<b>3</b>
Sesame							X	<b>2</b>

<b>1954</b>	Paddy Rice	Upland Rice	Old Cassava	Sticky Maize	Sweet potato	C/Silkworm	<b>Rank</b>
Upland rice	X	UR	UR	UR	-	UR	<b>5</b>
Paddy rice		X	PR	PR	-	PR	<b>4</b>
Old cassava			X	OC	-	OC	<b>3</b>
Sticky maize				X	-	C/S	<b>1</b>
Sweet potato					X	-	<b>-</b>
Cotton/silkworm						X	<b>2</b>

Ban Hiem

<b>2011</b>	Paddy Rice	Sticky Maize	New Maize	3yr Cassava	1yr Cassava	Sesame	Peanut	Soybean	<b>Rank</b>
Paddy rice	X	PR	PR	PR	PR	PR	PR	PR	<b>8</b>
Sticky maize		X	NM	3YC	1YC	SM	PN	SM	<b>3</b>
New maize			X	3YC	NM	NM	NM	NM	<b>7</b>
3yr cassava				X	1YC	3YC	PN	3YC	<b>5</b>
1yr cassava					X	1YC	1YC	1YC	<b>7</b>
Sesame						X	PN	SS	<b>2</b>
Peanut							X	PN	<b>5</b>
Soybean								X	<b>1</b>

<b>2011</b>	Paddy rice	1yr Cassava	New maize	Banana	2yr Cassava	Sticky Maize	Mango	Tamarind	<b>Rank</b>
Paddy rice	<b>X</b>	PR	PR	PR	PR	PR	PR	PR	<b>8</b>
1yr cassava		<b>X</b>	1YC	1YC	1YC	1YC	1YC	1YC	<b>7</b>

Maize	<b>X</b>	M	M	M	M	M	<b>6</b>
Banana		<b>X</b>	2YC	BN	BN	BN	<b>4</b>
2yr cassava			<b>X</b>	2YC	2YC	2YC	<b>5</b>
Sticky maize				<b>X</b>	SM	SM	<b>3</b>
Mango					<b>X</b>	TM	<b>1</b>
Tamarind						<b>X</b>	<b>2</b>

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<b>1999 and 1986</b>	Paddy Rice	Maize	2 yr Cassava	Banana	Vegetable	Mango	Sticky Maize	<b>Rank</b>
Paddy rice	X	PR	PR	PR	PR	PR	PR	<b>7</b>
Maize		X	2YC	M	M	M	M	<b>5</b>
2yr cassava			X	2YC	2YC	2YC	2YC	<b>6</b>
Banana				X	BN	BN	BN	<b>4</b>
Vegetable					X	MG	SM	<b>1</b>
Mango						X	SM	<b>2</b>
Sticky maize							X	<b>3</b>

30 **Table S2.** Comparison of identifying areas after the adjustment process with defined areas, as  
31 cropping areas to produce the required food intake according to farmers; positive values indicating  
32 that estimated cropping areas were higher than the defined target area\*, while negative values  
33 indicate estimated cropping areas lower than the defined targeted values.

34 The calculation of the sixth year fallow area received the largest deviation from the "defined  
35 value", in this case -0.78 ha, the smallest different areas were the calculation for the second year of  
36 fallow, fifth year fallow (+0.02 ha), and second year maize and cassava (-0.02 ha). While increasing  
37 the distance to reach the defined areas, upland rice crop (in first and second year) had the closest  
38 distance to residential areas (1.1 km) while fallow (at all stages) revealed the longest distance to  
39 residential areas (2.14 km). The area resulting from all calculations slightly differed with defined  
40 areas. For validating the map, four out of six participants agreed with the resulting crop-level maps,  
41 while one participant disagreed, and one participant only partly agreed (this farmer mentioned that  
42 he gave the grade 5/10 for the result).

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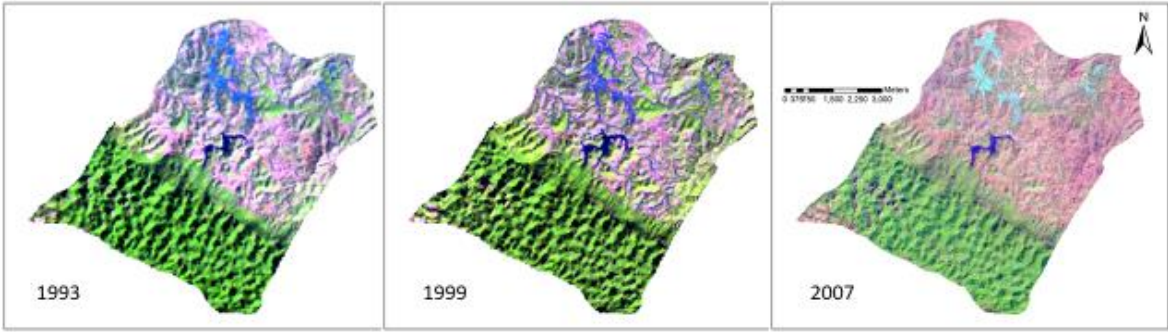
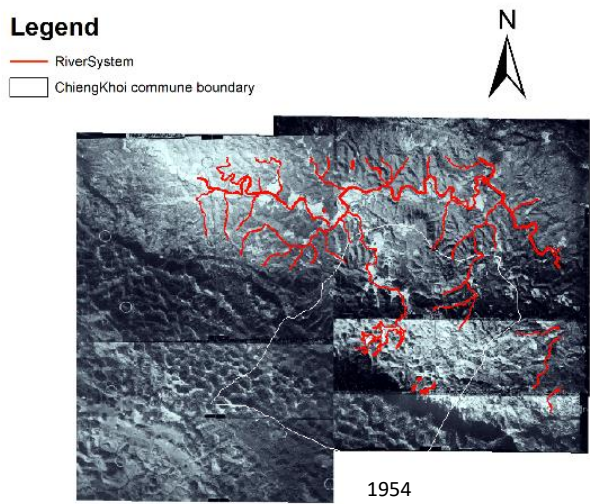
Order of calculation	Target upland crops to calculate in order	Calculated area** (ha)	Defined area (ha)	Difference with defined area** * (ha)
1st	Upland rice first year	31.64	31.5	-0.14
2nd	Upland rice second year	31.40	31.5	+0.10
3rd	Maize/cassava first year	31.84	31.5	-0.34
4th	Maize/cassava second year	31.52	31.5	-0.02
5th	Fallow first year	31.12	31.5	+0.38
6th	Fallow second year	31.48	31.5	+0.02
7th	Fallow third year	31.36	31.5	+0.14
8th	Fallow forth year	31.60	31.5	-0.10
9th	Fallow fifth year	31.48	31.5	+0.02
10th	Fallow sixth year	32.28	31.5	-0.78

44 \* Defined area equal to a value derived from the total upland area divided into 10 (crops)

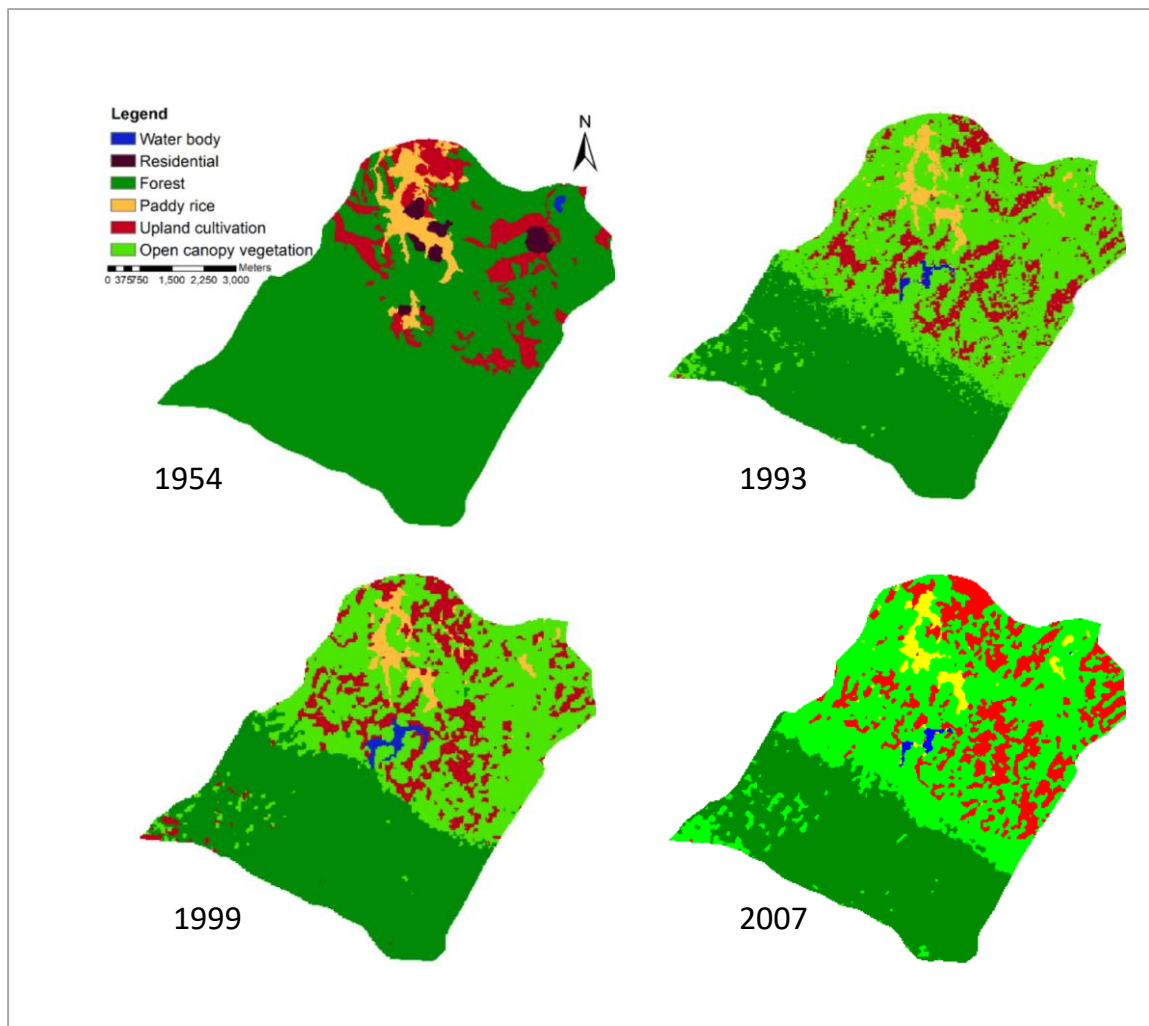
45 \*\* Calculated area, the values resulting from adjustment processes

\*\*\* Difference area <1 ha was accepted at the commune level (Statistic Department Yen Chau district, 2012)

**Figure S3.** A-Remote sensing data (aerial photograph 1954, Landsat 1993, 1999 and LISS III 2007).



**Figure S4.** Land use map of 1954, 1993, 1999, and 2007 classified from remote sensing data in Appendix 5a using the supervised classification method.



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