

Land Use Analysis using satellite imagery



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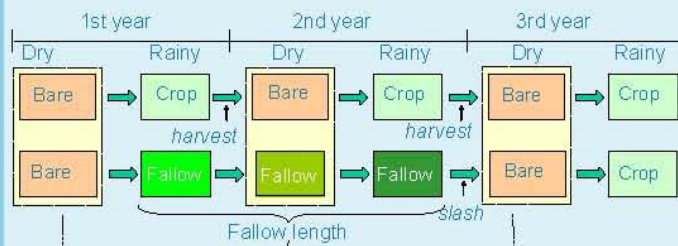
Introduction

Increasing population pressure and the need for greater agricultural production to reduce poverty have increased the pressure on subsistence slash-and-burn systems, including those in northern Laos. Understanding the crop-fallow cycle is critical for identifying the driving variables for changing land use patterns and to identify reduced-risk livelihood strategies. This study evaluated remote sensing techniques to develop such analyses - one is reported here.

Identifying cropping and fallow cycles with TM/ETM+

Dry season vegetation cover (NDVI) measurements were used to estimate the length of crop and fallow cycles of a 442,000 ha site in Luang Prabang Province of northern Laos (N20°00';E101°45' to N19°30';E102°30') during the period from 1995 to 2003 (although data for 1998 were not available).

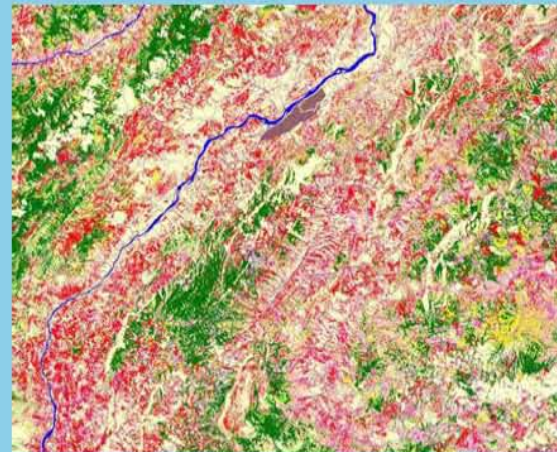
Concept to identify cropping and fallow phases from dry season land surface pattern



Vegetation cover (NDVI) was tracked every dry season

Period of cropping

Fallow length and quality

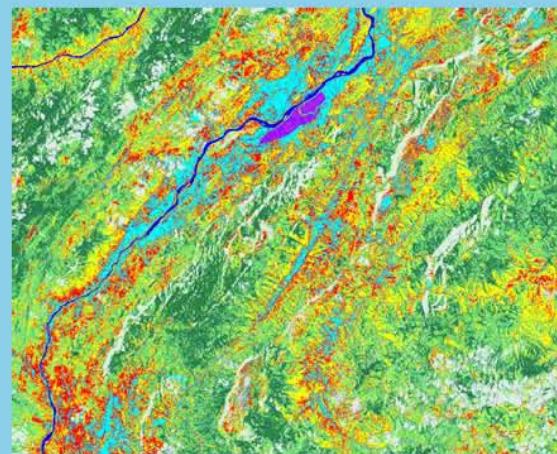


Fallow age in 2003

Age	%
1	31
2	6
3	23
4	17
5	6
6	14
7	3
Forest	
River	
Town	
Other	

Conformity of estimated fallow age and field investigation

Field Investigation	Estimated fallow age					Conformity (%)
	1	2	3	4	5	
1 - 2 years	7	29	2	8	3	73.5
2 - 3 years	4	14		1	2	66.7
3 - 4 years		5	1	4		50.0
4 - 5 years				1		100.0
Total Conformity (%)						69.1

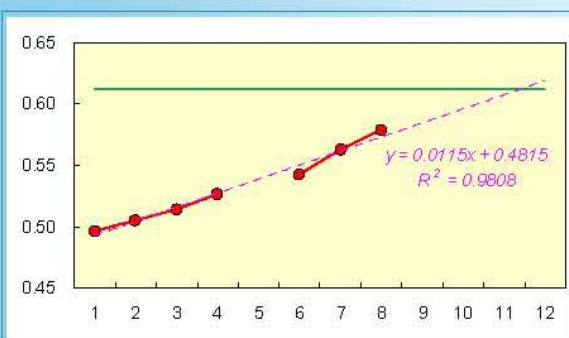


Length of cropping cycle 1995-2002

Age	%
0	17.3
1, 2	29.1
3, 4	18.7
5, 6	12.2
7	9.2
River	2.7
Town	0.4
Other	10.3

Fallow regeneration potential – affected by fallow age and cultivation period

Over the last 40 years, fallow periods have declined and the length of the cropping cycle has increased. This study revealed that the mean vegetation cover increases linearly with fallow age, equaling the mean forest biomass after approximately 11 years. The potential for fallow regeneration, assessed as the variation from the mean age-NDVI, is likely to be affected by climate, soil, and topography, however, a major driving variable appears to be the length of cultivation.



Potential for regeneration vs Fallow age

		Cultivation frequency		
		1-2 yrs	3-5 yrs	5-6 yrs
High	High	80.1	59.7	49.9
	Low	19.9	40.3	50.1

Conclusion:

Current and archived TM/ETM+ (Landsat) images have great potential for use in analysing cropping and fallow cycles to understand changes in land use management and to aid in the development of more sustainable land management systems.