

Infobrief

Land uses, ecosystem services, and governance mechanisms for integrated landscape management in Na Nhan Commune, Dien Bien Province, Northwest Viet Nam



- A conceptual model with feedback loops that links the consequences of land cover/use change to agents and driving forces is essential in understanding and developing landscape governance options. Using this lens, a mosaic landscape of forest and agriculture land uses in Northwest Viet Nam was investigated.
- 2 Land cover changes, mostly upland forest conversion to rotational fallow-agriculture, have led to serious livelihood and environmental problems are well understood by local stakeholders who by themselves, are the agents of such change.
- **3** Trees and tree-based land uses are crucial to securing land productivity and ecosystem services but are not delivering sufficient economic benefits to local farmers. Lack of knowledge and experience on tree management, and concerns of seedling quality and agricultural inputs constrained farmer adoption of tree-based systems.
- 4 Governance structures for landscape management exist, but local people were not fully engaged due among others, to lack of clear participation mechanism and financial incentives for forest protection.

WAYS FORWARD

- Sustainable practices and intensification of agriculture and zero deforestation must be pursued with economic and policy incentives, as well as the necessary technological base and marketing infrastructure to support such development pathway.
- Integration of trees in the Na Nhan landscape is needed to improve ES provision and income generation. A wider range of tree-based 'best bet' alternatives for smallholders (e.g.agroforestry) should be examined for their environmental, agronomic and economic feasibility.
- The range of legal regulations, policies, and incentives must first be adjusted to allow flexible implementation informed by emerging knowledge about ecosystem services.
- Local people's participation in decision-making, and in the range of governance mechanisms need to be enhanced by providing a platform for effective participation, and representation in decision-making structures/bodies, as well as continuous learning and education of action-consequence and response options.



This information brief presents an overview of land use practices and land use changes--their links to the ecological and socio-economic conditions, and the actions and consequences of those actions by local actors in Na Nhan commune, Dien Bien province, in the northwest region of Viet Nam (Figure 1). It also presents analyzes of existing governance mechanisms and structures, including the legal mandates of governing actors and how they enforce them, as well as how they relate to stakeholders in the landscape. Stakeholders' perspectives on aspects of production, forest management, ecosystem services (ES), and landscape governance were generated to draw insights on improving the status quo. Our conceptual framework (Figure 2) is useful in understanding the consequences of land cover/use change to the agents of change, as well as the driving forces, and in identifying gaps and opportunities for improving the governance of Na Nhan landscape.



Figure 1. Location map of Na Nhan commune, Dien Bien province, Northwest Viet Nam



Figure 2. Conceptual framework of the study (Source: van Noordwijk et al., 2011)

The landscape at a glance

Na Nhan commune locates in Dien Bien district, Dien Bien province, Northwest of Viet Nam. The mean elevation of the commune is 850 m above sea level (asl). The commune's population is about 5,000 distributed in about 1,000 households. There are three ethnic groups: Thai (72% of total population), Mong (27%), and Kinh (1%). The commune is a degraded landscape where tree-based land uses are almost absent outside forests (Table 1).

Land uses	General description
Natural forest	Degraded, poor broad-leave evergreen forest at elevation of about 800- 1,000m asl, black soil (degraded), managed by forest management board and community
Planted forest	Mono-plantation and mixed plantation of Melia, Michelia, and Mangletia Conifera on ferallitte on red clay at 750m or above asl, managed mainly by individual households.
Upland agriculture	Cassava, canna, sweet potato, and rain-fed rice are the most common crops. This type of land is often found on clay soils at elevation of 750m or above asl. In some places where irrigation is available, terrace rice is also found at this elevation
Fallow	Fallow is often applied 3-4 years or longer depending on soil fertility, after 1-2 year of crop cultivation. This land use type occurs on the same soil type and elevation with planted forest and upland agriculture. Vegetation cover is mainly grass, shrubs, bananas, and small woody plants.
Lowland agriculture	Wet rice is the prominent type of crop. This type of land use is often found in flat valleys at elevation of about 700m asl. Depending on water availability, farmers can cultivate one or two crops a year.
Home garden and settlement	This land use type distributes mostly in low valleys and on relatively flat land. Most common tree species found are plum, pomelo, peach, and jack fruit. Tree products, if any, are mostly used for household consumption

Table	1.	Meta	land	uses	of Na	Nhan	commune
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Land use changes and associated changes in landscape C-stock

Although forest cover has been increasing recently (Table 2), most of the forests in Na Nhan is poor with moderate carbon stocks. Bareland area has been shrinking significantly due to expansion of both forests (natural regeneration) and annual

crop production (due to increasing demand on farmlands). The increased landscape's carbon-stock was about 61,000 tons, but rather low compared to the total change of all land use categories (Table 2).

Table 2. Land use changes in Na Nhan commune (2005-2015)

	Land use/cover type	Area 2005 (ha)	Area 2005 C-stock 2005 (ha) ^(ton)		C-stock 2015 (ton)	Change	
						На	Biomass C-stock (ha)
1	Natural forest - medium	137.6	10,916	158.0	12,534	+20.4	+1,618
2	Natural forest - poor	976.3	48,114	2.944.8	145,118	+1,968.4	+97,004
3	Mixed forest (timber + bamboo)	0	0	7.1	349	+7.1	+349
4	Planted forest	333.2	12,100	56.4	2,048	-276.8	-10,052
5	Bareland (scattered trees)	776.8	10,557	710.4	9,654	-66.4	-903
6	Bareland (grass and shrubs)	3,608.6	36,952	533.9	5,467	-3.074.7	-31,485
7	Perrenial crops	0	0	23.0	608	+23	+608
8	Annual crops	1,747,2	8,736	2,603,9	13,020	+856.7	4,284
9	Water bodies & other land uses	19,9	-	562.2	-	+542.3	-
	Total	7.599,6	127,375	7,599.6	188,797	0	+61,422

2005 land use (upper) and carbon (lower) maps

2015 land use (upper) and carbon (lower) maps



Figure 3. Land use and carbon maps of Na Nhan commune (2005 and 2015)



The population in Na Nhan commune is characterized by high poverty, insufficient agricultural incomes, and lack of landownership and participation in landscape governance. About half of households are considered either poor or near-poor. Farming is the main income source, but a significant number of households also reported other income sources such as employment and wage labor. For non-poor households, the later contributes to total income more significantly. The average total land size of households in the landscape is 1.8 ha, but it is unequally distributed across household groups. The poor and near-poor groups own only 0.3 and 0.55 ha/ household, respectively, while the non-poor group owns 3.7 ha of land/household, on average. About half of households have land use right certificates for wet rice, but much of upland annual crops (classified as forest land by the Government) are under de facto use—apparently, informal and/or customary property rights regimes have been practiced with no security of tenure for this land use type.



Figure 4. Sources of incomes by socio-economic status of households in Na Noi village (Unit: million VND/household/year)



The landscape is managed and governed through current policies and legal frameworks, and mechanisms such as community forestry (CF), land use planning (LUP), and payment for forest ecosystem services (PFES). Law enforcement to control illegal logging is considered ineffective by surveyed stakeholders, while the later three mechanisms are lacking in local stakeholder participation. According to stakeholders, involvement in community forest activities has not led to sufficient economic and cultural benefits for local people, and participation of households is low. In terms of LUP, only



Based on existing studies and frameworks, we identified 20 ecosystem services, and by eliciting residents' assessments for these 20 ecosystem services, we were able to compare their relative importance, their trends (declining, improving, or unchanged), and roles of key ecosystems in providing such services. The result suggests that stakeholders were aware of role of trees in providing environmental services:

3% of respondents said they have been informed about implementation results, while 26% said they have not been informed, and 71% said they have no idea. For PFES, almost all interviewed households in Na Noi village received PFES money at a flat rate of 200,000 VND/household/year, although not all of them participated in forest protection and development activities required by the PFES contract. It appears that a mix of governance mechanisms and blended structures would work in the landscape, as long as the stakeholders are properly informed, and actively engaged.

ecosystems with higher tree density were ranked higher than those with lower to zero tree density (Table 3). However, the tree-based ecosystems, especially natural forests, are also declining significantly in terms of services provision. Results of stakeholders' assessment of land use and ecosystem services suggest a disconnect between perceptions and actions. This issue will be further examined by our research.

Table 3. Stakeholders' assessment on the role of forest and agro-ecosystems in providing ecosystem services

Ecosystem services	Natural forest	Planted forest	Upland annual crops	Perennial plantation	Mixed home garden	Wet rice and flat land annu- al crops	Fallow	Water surface
Soil formation	5	4		1			2	0
Nutrients cycling	5	3		2			2	0
Biodiversity	5	1		2	1		4	1
Climate and weather regulation	5	4		2	2		1	2
Regulation of water flows	5	4		3	2		2	0
Mitigation of natural disaster	5	4		2	1		1	
Water purification and waste treatment	5	4		3	2		2	
Anti-soil erosion	5	4		2	1		2	
Carbon storage	5	5		2	1		3	
Biological control	5	3		2	1		3	3
Pollination	5	4	2	3	2	2	2	
Clean water	5	3		2			2	
Food	3	2	5	3	3	5		3
Fuel	5	3		2			2	
Wood and fiber	4	4	`	1			2	
Fodder and fertilizer	3		5		3	4	3	
Medicine	3				1		2	
Natural scenery	5	4	3	3	2	2	1	3
Tourism and entertainment	2	3	0	3	1		1	4
Cultural and spiritual values orig- inated or derived from nature/	2	2	2	2	4	2		2
natural resources	3	2	3	2	1	3	27	2
	88	61	18	40	24	10	37	18
Highest possible points/score	100							
Legend								
Current trend (color code) Score on re			ole of providi	ng ES				
Declining significantly Declining Declining slightly Improving slightly		Improving significantly not relevant Improving		5Vital4Important3Fairly important			1 N 0 I	/ery Minor Not relevant

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