

Sustainability Impact Assessment (SIA) of alternative Forest-Wood Supply Chains (FWSCs) of Natural Forests in Vietnam

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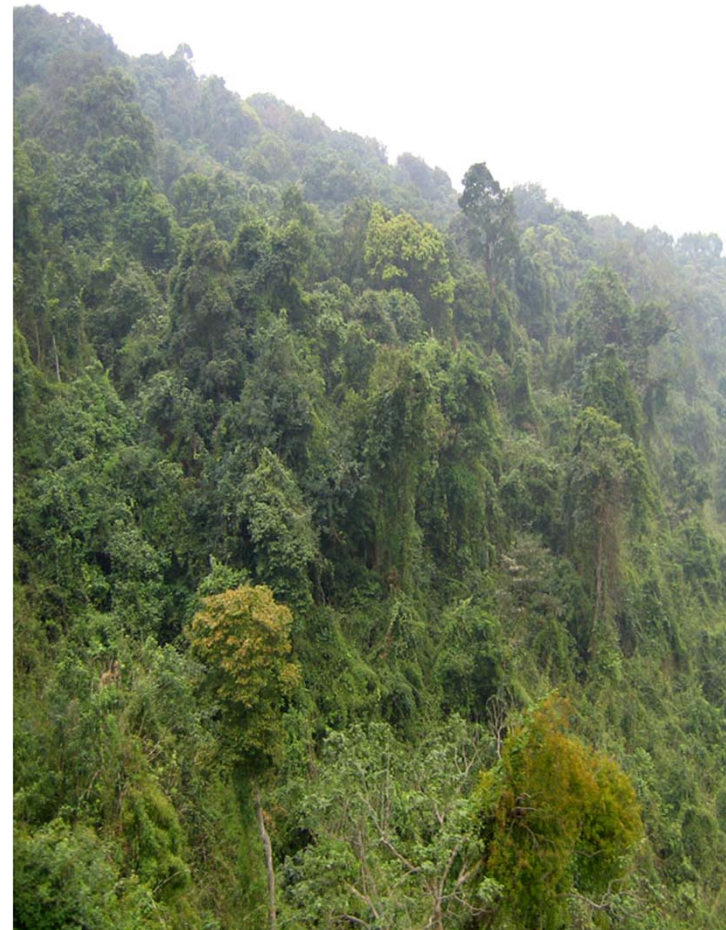


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Introduction & Problem outline



Introduction

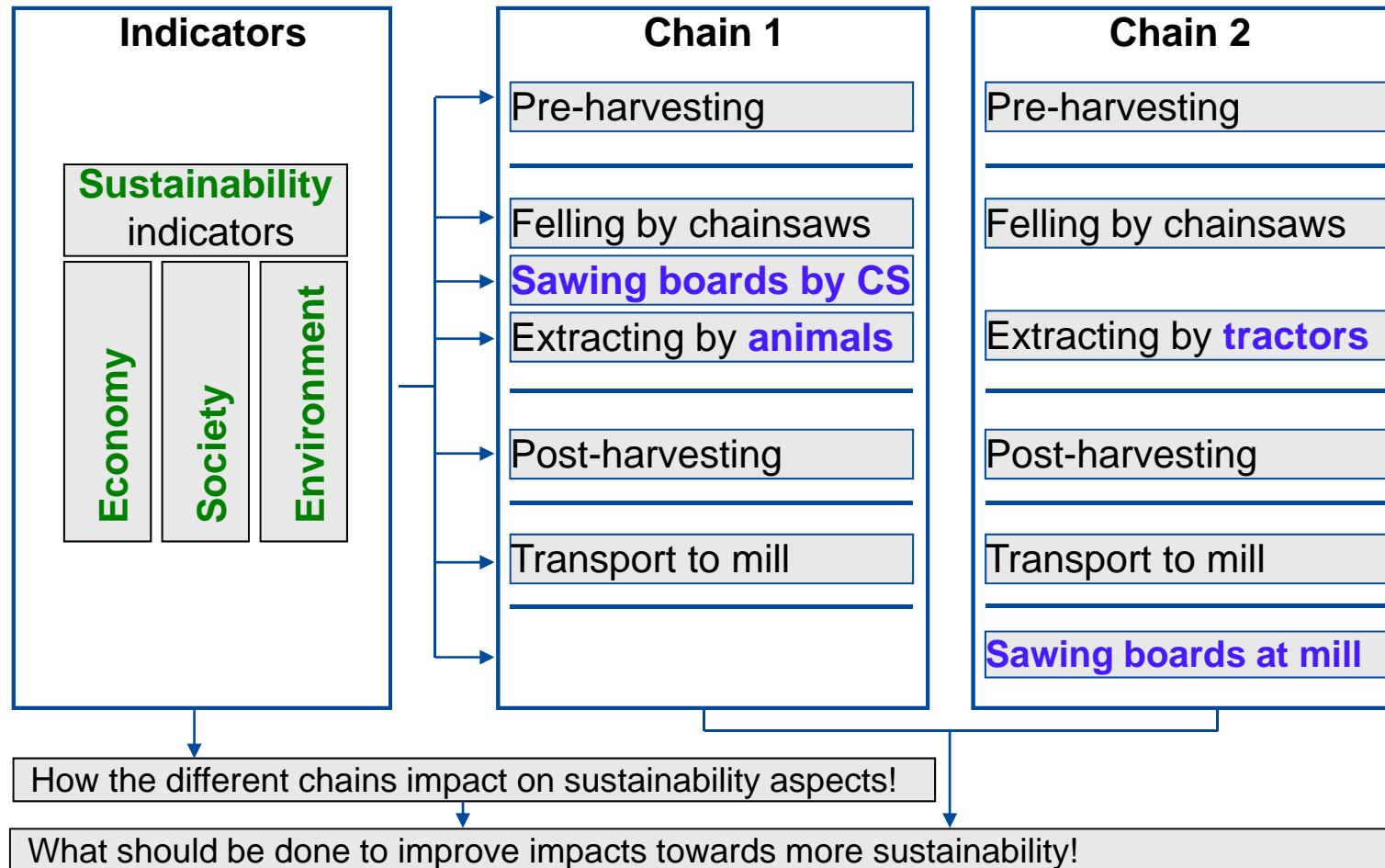
- 33 million ha of total land area, 39.1% is covered by forests.
- 10.3 million ha is natural forests, providing annually more than 300,000 m³_{rw}
(VNFOREST, 2010)



Problem outline

- Two main methods of logging natural forests:
 - Extracting **board wood** by **animals**
 - Extracting **round wood** by **tractors**
- The different methods of logging leads to different methods of supplying wood from forests to wood industry (FWSC).
- Assessment of these impacts as the basic for improving chains of natural forest in Vietnam.

Method



Sustainability indicators



Indicators		Unit	Data collection	Data calculation	
Economy	Wood utilization rate	% (of m^3_{st})	Investigation in field	Excel & Umberto ⁽³⁾	
	Productivity	m^3_{bw}/PUH	Time study	Excel	
	Production cost	€/m ³ _{bw}	Investigation in field	Excel & Umberto	
Society	Employment	shift/m ³ _{bw}	Investigation in field	Excel & Umberto	
	Wage	€/shift	Investigation in field	Excel	
	Accident	FA NFA	cases/10 ⁶ m ³ _{rw} (2008 – 2010)	Investigation in field	Excel
Environment	GHG emission	kg CO ₂ eq/m ³ _{bw}	Method of DEFRA ⁽¹⁾	Excel & Umberto	
	Waste	HW	kg/m ³ _{bw}	Method of AFOCEL ⁽²⁾	Excel & Umberto
		NHW			
	Disturbed area	low	m ² /ha	Investigation in field	Excel
		moderate			
heavy					

(1) DEFRA , a government department in the UK.

(2) AFOCEL, a private research organization in forest-wood-paper area.

(3) Umberto, a tool for modeling, evaluating and optimizing the processes and the flow of materials, energy.

Study sites



Chain 1



Chain 2



Features	Unit	Chain 1	Chain 2
Area	ha	10	08
Average slope	%	52	23
Harvest method		selective	selective
Average harvested dbh	cm	71	65
Extracted wood dimension	m ³	0.25-0.35 (board wood)	1.2 - 6.8 (round wood)
Average skidding distance	m	1600	700

Economic indicators



Indicators	Chains	Calculating results	Unit	Note
Board wood proportion	Chain 1	36	%	% of 1 m ³ standing tree
	Chain 2	45		
Productivity (to landing I)	Chain 1	0.3	m ³ _{bw} /PUH	01 chainsaw + 04 buffaloes
	Chain 2	4.5		01 chainsaw + 01 tractor
Production cost	Chain 1	51	€/m ³ _{bw}	Total cost of of whole chains
	Chain 2	37		

Conclusion: Chain 2 had more positive impacts on economic aspect

Social indicators



Indicators	Chains	Calculating results	Unit	Note
Employment	Chain 1	4.3	shift/m ³ _{bw}	8 hours per one shift
	Chain 2	2.7		
Average wage	Chain 1	12.1	€/day	Average wage of one man per day (shift)
	Chain 2	19.3		
Fatal accident (2008-2010)	Chain 1	182	Cases/10 ⁶ m ³ _{rw}	In Austria 1.2 cases/10 ⁶ m ³ _{rw} (2000-2004)
	Chain 2	170		

Conclusion: Chain 2 had more positive impacts on social aspect

Environmental indicators



Indicators	Chains	Calculating results	Unit	Note
GHG emission	Chain 1	8.1	kgCO _{2eq} /m ³ _{bw}	Of total chain
	Chain 2	22.3		
Hazardous waste generation	Chain 1	1.6	kg/m ³ _{bw}	Of total chain
	Chain 2	0.6		
Heavily disturbed area	Chain 1	3.5	%	Of total harvesting area
	Chain 2	6.2		

Conclusion: Chain 2 had more negative impacts on environmental aspect

Conclusion



- ↳ Chain 2 had more positive impacts on economic and social aspects but had more negative impacts on environmental aspects as compared with Chain 1.
- ↳ Based on the results, suggestions to improve FWSCs towards more sustainability will be given in next steps.
- ↳ A holistic judgment about the overall sustainability of the chains can be based on an MCA (multi criteria analysis) approach.



Thank you for your attention!

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