

# Sustainable agricultural value chains in the Colombian Amazon

## - An evaluation of the most frequently promoted models

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### Introduction



The **Colombian Amazon** is currently in the spotlight of post-conflict derived commitments, anti-deforestation and conservation projects, illicit crop substitution and private sector interests. Several organizations are promoting various productive models to achieve sustainable rural development and a few sectors have been prioritized, with agroforestry systems (AFS) for the cocoa and rubber value chains (VC), and silvopastoral systems (SPS) for meat and dairy production being among the most notorious (MADS, 2015).

In spite of the support, the adoption of these systems is highly dependent on development projects, and numerous producers remain skeptical or unaware of the benefits and requirements of changing their productive practices. Although the advantages of these systems have been widely documented; research, evaluation and information diffusion has usually been carried out independently, making it difficult for producers and decision makers to conduct direct comparisons and make more informed decisions.

### Objectives

In this study, we integrate the aforementioned productive models in a single analysis to compare their profitability, risks and competitiveness, by employing an ex-ante probabilistic cost-benefit analysis using Monte Carlo simulation, and by presenting the results of a participatory analysis of the VC's major threats and opportunities.

### Methodologies

As part of the project **Visión Amazonía**, we assessed the state of the art of the three VC in the departments of Caquetá and Guaviare by employing a framework based on the *LINK* (2014) and *ValueLinks* (2007) methodologies, which combined literature review, panel and plenary discussions, semi structured inter-views and multi-stakeholder workshops.



Secondly, we built cash-flow models of each production system and calculated different indicators to compare their performance on various dimensions. To include market risks, we identified key variables and obtained their empiric or expert based distributions and used the software @risk to conduct 5000 simulations for each system.

### References

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Ministerio de Ambiente y Desarrollo Sostenible MADS. (2015). Visión de Desarrollo Bajo en Deforestación para la Amazonía Colombiana. Gobierno de Colombia

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### Results




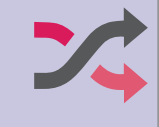
#### Cost benefit analysis

System	P(EAA) < 0	EAA (USD)		IRR		Repayment period (years)		Minimum area (hectares)	
		Mean	CI (95%)	Mean	CI (95%)	Mean	CI (95%)	Mean	CI (95%)
DPC Current State	94.8%	(55.61)	(107.82) 10.63	0.08%	(9.9%) 12.1%	11.3	8 N/D	27.8	23.42 32.27
DPC SPS	87.5%	(56.46)	(144.38) 35.06	8.27%	5% 11.5%	8.7	8 11	4.4	4.1 4.68
Cattle fattening Current state	100.0%	(35.37)	(53.9) (18.67)	(9.59%)	(16.8%) (0.04%)	N/D	N/D N/D	25.6	13.16 32.16
Cattle fattening SPS	17.8%	22.4	(26.54) 64.27	11.30%	9.1% 13.2%	8.0	8 8	5.7	5.49 6.06
Cocoa AFS GAP	1.1%	558.3	58.99 1451.52	20.47%	11.4% 33.8%	7.0	5 11	3.6	2.04 5.41
Rubber Monocrop GAP	80.3%	(159.9)	(457.88) 248.22	6.87%	(1.4%) 13.5%	19.1	13 N/D	4.3	2.48 7.04
Cocoa/Rubber AFS GAP	12.5%	212.9	(107.48) 620.97	12.70%	9.0% 17.4%	14.7	10 25	4.8	3.11 6.95

DPC: Double purpose cattle; GAP: Good Agricultural Practices; EAA: Equivalent annual annuity; IRR: Internal rate of return; Minimum area: Hectares required to provide 2 monthly minimum wages employing only household labor; N/D: No data available; Discount Rate: 10.3%; Labor day cost: US \$10.42; Full list of model parameters are available upon request.

- Cattle fattening under the current extensive system is not profitable even under optimistic conditions; transition to SPS reduces land requirements for sustaining a family from 30 to 5 hectares, reducing risks, pressure to expand the agricultural frontier and allowing reforestation.
- Cocoa provides the best results for all indicators, assuming yields expected from GAP and proper fertilization.
- Rubber as monocrop shows higher risks and payback periods than the alternative AFS.

#### Challenges and Opportunities (Participatory SWOT analysis)

Value chains	Challenges	Opportunities
Cocoa 	<ul style="list-style-type: none"><li>• Low yields and deficient quality from postharvest</li><li>• Uncertainty of cadmium (Cd) presence in beans, limiting the entrance to European markets</li></ul>	<ul style="list-style-type: none"><li>• Large international demand for conventional cocoa and increasing interest for niche products (organic, differentiated markets)</li></ul>
Rubber 	<ul style="list-style-type: none"><li>• Relatively low current and forecasted prices</li><li>• Large competition with international production and lack of integration of the national value chain</li></ul>	<ul style="list-style-type: none"><li>• Untapped local and regional demand</li><li>• Large planted area currently unexploited</li></ul>
Cattle (beef and milk) 	<ul style="list-style-type: none"><li>• Low pasture productivity and genetic performance of heard, affecting daily weight gain and milk production</li><li>• Informal, illegal and clandestine markets affect producers and formal processors.</li><li>• Low milk quality and lack of incentives to adopt and sustain good agricultural practices</li></ul>	<ul style="list-style-type: none"><li>• Growing beef exports from most productive regions may reduce supply for national markets</li><li>• Unexplored markets of differentiated beef and dairy products</li></ul>
Transversal 	<ul style="list-style-type: none"><li>• Illicit crops, and illegal markets</li><li>• Lack of coordination for provision of support services among private, public and NGO sectors</li><li>• Deficient infrastructure</li><li>• Lack of land rights</li></ul>	<ul style="list-style-type: none"><li>• Support from international organizations to protect Amazon forest and promote peace building</li><li>• Payment for ecosystem services</li></ul>

### Discussion and Recommendations

Cocoa AFS is the most attractive alternative for private and public investment, given its lower risks, land requirements, shorter repayment periods and greater returns, nevertheless, challenges such as potential Cd presence, low yields, lack of quality and traceability should be tackled before promoting large scale investments.

Current market trends, infrastructure and investment, presence of organizations, and productive culture make SPS a key alternative for fostering regional economic growth and reduce pressure on the forest, if supported with enabling policy.

Given our assumptions of yields and prices, rubber monoculture and extensive cattle ranching are, in most cases, generating net losses to smallholder producers; this should alert policy makers into redesigning and prioritizing their intervention strategies and productive bets.

Currently, the Ministries of Environment and Agriculture are promoting an integrated diversified farm model in the Amazon where agriculture, livestock and forest conservation co-exist. An analysis of the economic, social and environmental synergies, trade-offs and benefits as well as potential incentives necessary to promote this model and those analyzed in this document is required to create a solid knowledge base that guides further policy design.