
Multi-scale tradeoff analysis of future amazon deforestation

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Abstract

The Amazon is the world's largest remaining tropical forest and it is under immense pressure from land use conversion. We combine empirical data with future predictions to estimate the gains and losses in four 'commodities' within the Brazilian Amazon under a predicted deforestation scenario; (1) timber, (2) agricultural crops, (3) carbon and (4) bird species richness. We then investigate how these would be influenced by managing differently the same predicted deforestation intensity. We consider three approaches to optimisation, 'net profits', 'commodity equivalence', and 'Constraint based optimisation'. The effect of management scale is also considered and where possible estimated dollar (US\$) values are used. Our final optimisation approach seeks to provide a way to include ecosystem elements (without a \$ value) in the decision making process without having to undertake the difficult (if not impossible and perhaps inappropriate) process of assigning a dollar value. We also considered the effects of applying these scenarios at different scales. Different scenarios gave markedly different geographical distributions of deforestation, and significantly different commodity values. For example under an expected deforestation scenario the expected revenue from timber would be ~\$2,000,000 by 2020, but if we manage to maximise timber revenue this increases to nearly ~\$5,000,000. Simply by changing the scale of management 33% of potential timber revenue can be lost. Given the importance of the Amazon it is imperative that we understand and can quantify the effects of different management scenarios.

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