

Scientific evidence on the outcomes of Tropical Forest Certification --

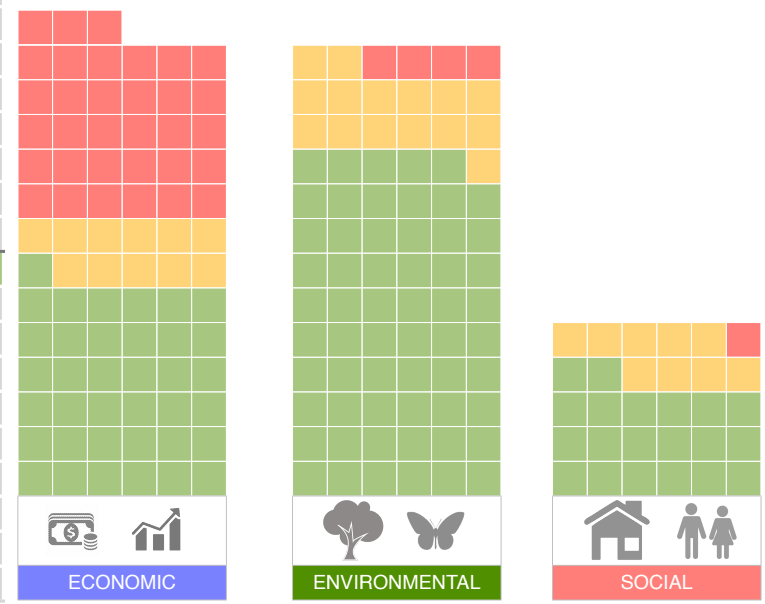
Each square represents one data point extracted from scientific, peer-reviewed literature. The colour of each square shows whether certified forestry, or careful logging practices called Reduced Impact Logging, performed better, about the same, or worse than conventional tropical forestry. Darker shades represent stronger evidence. Below, evidence is divided into 3 broad themes, on the left, evidence is assigned into finer categories. The map shows the geographic distribution of the evidence. See next page and Mongabay.com/ConservationEffectiveness for details on methods and references corresponding to numbers in squares. Based on an updated version of Burivalova et al. 2017 Conservation Letters 10, pages 4-14.

VARIABLES		TROPICAL FOREST CERTIFICATION																					
ENVIRONMENTAL	Deforestation, fragmentation and degradation	11	8	26	14	26																	
	Carbon stock, emissions			22	20	25	32	34	34	34	34	38											
	Road and skid trail density				3	6	25	37	39														
	Animal diversity			12	7	10	12	12	12	15	15	20	38	38									
	Tree diversity			25	22	12																	
	Canopy loss, gap size	19	19	40	18	25	3	5	5	5	5	18	31	36	37	40							
	Collateral damage	40	18	29	37	37	22	5	5	6	25	32	33	33	37	39	19						
	Set asides and buffer zones						20	39															
	Illegal hunting, logging, mining						11																
	Water regulation, erosion prevention						43																
	Ground disturbance						5	5	17	18	25	27	31	33	19	40							
	SOCIAL	Access to land						4	11														
Infrastructure and institutions						26	26	4	11	11													
Living & working conditions of employees					11	11	11	4	11	11													
Jobs						36	36	36															
Conflict								1															
Direct economic benefits to community							4	26															
Compliance with harvest regulations							4	39															
Community wellbeing and livelihoods							26	26	26	26	11												
Awareness, empowerment, participation							4																
Equality, equity, less marginalization							11																
ECONOMIC	Price premium on products						28	1	28	28	28	36	21	28	28	28	28	28	28	28	28	36	
	Profit	13	16	30	35	36	36	36	39	39	19	1	23	24	5	5	9	18	36				
	Timber stock (sustainability of income)												25	39									
	Total lower cost of logging operations						13	24	27	33	39	19	16	35	2	5	5	23	19				
	Harvest efficiency												25										
	Management and administration												1	1	36								
	Market access												1	36									
	Pre-logging costs							5	5	18	27	39	19	40	2								
	Skidding cost														27	40	2	5	5	18	19	36	
	Worker productivity							5	18	27	33	39	19	5	40								

LEGEND

causal or meta-analysis case study

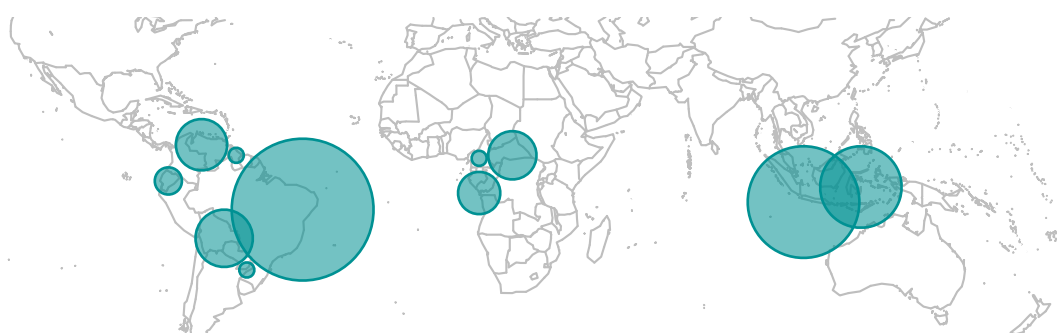
■ better
■ same
■ worse



Produced by Zuzana Burivalova &



CONSERVATION EFFECTIVENESS SERIES:
I - Tropical Forest Certification (Sep 2017)



Studies

1. Araujo, M., Kant, S. & Couto, L. (2009). Why Brazilian companies are certifying their forests? *For. Policy Econ.*, 11, 579–585
2. Armstrong, S. (2000). *Report by Edinburgh Center for Tropical Forests (ECTF) On Reduced Impact Logging Research: Activities and Outputs for the Barama Company Limited*. ECTF, Edinburgh
3. Asner, G.P., Keller, M., Pereira, J.R., Zweede, J.C. & Silva, J.N.M. (2004). Canopy Damage and Recovery After Selective Logging in Amazonia : Field and Satellite Studies. *Ecol. Appl.*, 14, 280–298
4. Bacha, C.J.C. & Rodriguez, L.C.E. (2007). Profitability and social impacts of reduced impact logging in the Tapajós National Forest, Brazil - A case study. *Ecol. Econ.*, 63, 70–77
5. Barreto, P., Amaral, P., Vidal, E. & Uhl, C. (1998). Costs and benefits of forest management for timber production in eastern Amazonia. *Forestry*, 9–26
6. Bertault, J.-G. & Sist, P. (1997). An experimental comparison of different harvesting intensities with reduced-impact and conventional logging in East Kalimantan, Indonesia. *For. Ecol. Manage.*, 94, 209–218
7. Bicknell, J.E., Struebig, M.J., Edwards, D.P. & Davies, Z.G. (2014). Improved timber harvest techniques maintain biodiversity in tropical forests. *Curr. Biol.*, 24, 1119–1120
8. Blackman, A., Goff, L. & Rivera Planter, M. (2015). Does Eco-certification Stem Tropical Deforestation? *Resour. Futur.*, 15–36
9. Boltz, F., Carter, D.R., Holmes, T.P. & Pereira R., J. (2001). Financial returns under uncertainty for conventional and reduced-impact logging in permanent production forests of the Brazilian Amazon. *Ecol. Econ.*, 39, 387–398
10. Burivalova, Z., Lee, T.M., Giam, X., Wilcove, D.S. & Koh, L.P. (2015). Avian responses to selective logging shaped by species traits and logging practices. *Proc. R. Soc. B Biol. Sci.*, 282
11. Cerutti, P.O., Lescuyer, G., Tacconi, L., Eba’atyi, R., Essiane, R., Nasi, R., *et al.* (2017). Social impacts of the Forest Stewardship Council certification in the Congo basin. *Int. For. Rev.*, 19, 1–14
12. Chaudhary, A., Burivalova, Z., Koh, L.P. & Hellweg, S. (2016). Impact of Forest Management on Species Richness: Global Meta-Analysis and Economic Trade-Offs. *Sci. Rep.*, 6, 23954
13. Dagang, A.A., Richter, F., Hanh, S. & Manggil, P. (2002). *Financial and economic analyses of conventional and reduced impact harvesting systems in Sarawak*. FAO RAP Publication 2002/14
14. Damette, O. & Delacote, P. (2011). Unsustainable timber harvesting, deforestation and the role of certification. *Ecol. Econ.*, 70, 1211–1219
15. Davis, A.J. (2000). Does Reduced-Impact Logging Help Preserve Biodiversity in Tropical Rainforests? *Environ. Entomol.*, 29, 467–475
16. Dwiprabowo, H., Grulois, S., Sist, P. & Kartawinata, K. (2002). *Cost-benefit analysis of reduced-impact logging in a lowland Dipterocarp forest of Malinau, East Kalimantan*. ITTO Technical Report, Yokohama
17. Feldpausch, T.R., Jirka, S., Passos, C.A.M., Jasper, F. & Riha, S.J. (2005). When big trees fall: Damage and carbon export by reduced impact logging in southern Amazonia. *For. Ecol. Manage.*, 219, 199–215
18. Holmes, T., Blate, G.M., Zweede, J.C., Pereira, R., Barreto, P., Boltz, F. (2002). Financial and ecological indicators of reduced impact logging performance in the eastern Amazon. *For. Ecol. Manage.*, 163, 93–110
19. van der Hout, P. (1999). Reduced Impact Logging in the Tropical Rain Forest of Guyana: Ecological, Economic, and Silvicultural Consequences. *Tropenbos-Guyana Ser.*, 6
20. Imai, N., Samejima, H., Langner, A., Ong, R.C., Kita, S., Titin, J., *et al.* (2009). Co-benefits of sustainable forest management in biodiversity conservation and carbon sequestration. *PLoS One*, 4
21. Kollert, W. & Lagan, P. (2007). Do certified tropical logs fetch a market premium?. A comparative price analysis from Sabah, Malaysia. *For. Policy Econ.*, 9, 862–868
22. Martin, P.A., Newton, A.C., Pfeifer, M., Khoo, M. & Bullock, J.M. (2015). Impacts of tropical selective logging on carbon storage and tree species richness: A meta-analysis. *For. Ecol. Manage.*, in press
23. Mattsson-Marn, H., Vel, E., de Jongh, O. & Hui, D.C.K. (1981). *Planning and cost studies in harvesting in the mixed dipterocarp forest of Sarawak*. (No. FO: MAL/76/008). FAO, Rome, Italy
24. Medjibe, V.P. & Putz, F.E. (2012). Cost comparisons of reduced-impact and conventional logging in the tropics. *J. For. Econ.*, 18, 242–256
25. Medjibe, V.P., Putz, F.E. & Romero, C. (2013). Certified and uncertified logging concessions compared in Gabon: Changes in stand structure, tree species, and biomass. *Environ. Manage.*, 51, 524–540
26. Miteva, D.A., Loucks, C.J. & Pattanayak, S.K. (2015). Social and Environmental Impacts of Forest Management Certification in Indonesia. *PLoS One*, 1–18
27. Montenegro, F. (1996). *Extraccion Forestal de Bajo Impacto en La Mayronga*. Fundacion Forestal Juan Manuel Durini/ITTO, Quito, Ecuador
28. Nebel, G., Quevedo, L., Bredahl Jacobsen, J. & Helles, F. (2005). Development and economic significance of forest certification: The case of FSC in Bolivia. *For. Policy Econ.*, 7, 175–186
29. Parren, M. & Bongers, F. (2001). Does climber cutting reduce felling damage in southern Cameroon? *For. Ecol. Manage.*, 141, 175–188
30. Pearce, D., Putz, F.E. & Vanclay, J.K. (2003). Sustainable forestry in the tropics: panacea or folly? *For. Ecol. Manage.*, 172, 229–247
31. Pereira, R., Zweede, J., Asner, G.P. & Keller, M. (2002). Forest canopy damage and recovery in reduced-impact and conventional selective logging in eastern Para, Brazil. *For. Ecol. Manage.*, 168, 77–89
32. Pinard, M. a & Putz, F.E. (1996). Retaining forest biomass by reducing logging damage. *Biotropica*, 28, 278–295
33. Pinard, M. a, Putz, F.E. & Tay, J. (2000). Lessons learned from the implementation of reduced-impact logging in hilly terrain in Sabah, Malaysia. *Int. For. Rev.*
34. Putz, F.E. & Pinard, M.A. (1993). Reduced-Impact Logging as a Carbon-Offset Method. *Conserv. Biol.*, 7, 755–757
35. Saharudin, A.S., Brodie, J.D. & Sessions, J. (1999). Analysis of two alternative harvesting systems in Peninsular Malaysia: sensitivity analysis of costs, logging damage and buffers. *J. Trop. For. Sci.*, 11, 809–821
36. Simula, M., Astana, S., Ishmael, R., Santana, E.J. & Schmidt, M.L. (2004). *Financial Cost-Benefit Analysis of Forest Certification and Implementation of Phased Approaches*. Yokohama, Japan
37. Sist, P., Sheil, D., Kartawinata, K. & Priyadi, H. (2003). Reduced-impact logging in Indonesian Borneo: Some results confirming the need for new silvicultural prescriptions. *For. Ecol. Manage.*, 179, 415–427
38. Sollmann, R., Mohamed, A., Niedballa, J., Bender, J., Ambu, L., Lagan, P., *et al.* (2017). Quantifying mammal biodiversity co-benefits in certified tropical forests. *Divers. Distrib.*, 23, 317–328
39. Tay, J., Healey, J.R. & Price, C. (2002). Financial assessment of reduced-impact logging techniques in Sabah, Malaysia. In: *FAO 2002 International Conference Proceedings*. FAO, Bangkok, Thailand
40. Winkler, N. (1997). *Environmentally Sound Forest Harvesting: Testing the Applicability of the FAO Model Code in the Amazon in Brazil*. Forest Harvesting Case Study 8, FAO, Rome, Italy

Notes

To carry out this literature review, we followed the search protocol recommended for systematic reviews. The goal was to compare variables under certified or Reduced Impact Logging with conventional logging, or before and after certification. We went through the first 1000 Google Scholar search results for the keywords: forest certification OR Reduced Impact Logging OR sustainable forestry AND tropical forest OR Africa OR Asia OR South America AND impact OR effect* AND social OR economic OR environment. The search was carried out in 2015, then updated in July 2017. Please see full methods on Mongabay.com/ConservationEffectiveness or refer to the published results of the initial search in Burivalova et al. 2017 *Conservation Letters* 10:4–14. The majority of extracted data points do not imply causation, only correlation. Studies vary in the rigor of design, sample size, methodology, and scope. Therefore, data points (individual squares) cannot be summed or used to calculate overall effect! One red square does NOT cancel out one green square. Please use as a map of existing scientific evidence rather than as a final verdict on whether tropical forest certification is effective. Please contact Zuzana Burivalova for full database: z.burivalova@gmail.com