

## **A Letter to the California Air Resources Board Regarding the Tropical Forest Standard**

November 13, 2018

California Air Resources Board  
1001 I Street  
Sacramento, CA 95814

Dear CARB members and staff,

We are scientists—ecologists, economists, anthropologists, geographers, and climatologists. We are all directly involved with research to better understand climate change and to identify the best ways to avoid its most dangerous impacts. Many of us have spent decades working in the Tropics.

We are writing to strongly urge the California Air Resources Board to endorse the California Tropical Forest Standard (CTFS). We believe that California has a unique opportunity to leverage its global leadership on climate policy to advance a broad and inclusive agenda to address climate change by protecting tropical forests at scale.

The message we convey is this: slowing the loss and speeding the recovery of tropical forests is a critical part of any successful global strategy for minimizing the negative impacts of climate change. The CTFS is an important step towards unlocking this potential.

1. The best science shows us that tropical forests could help avoid the most dangerous impacts of climate change.<sup>1-3</sup>

These carbon- and species-rich ecosystems could deliver 25 to 30% of the carbon emissions reductions needed by 2030 to avoid dangerous climate change.<sup>3</sup> Slowing the deforestation and degradation of tropical forests, the source of as much as one fifth of global emissions,<sup>4-14</sup> while allowing damaged forests to recover<sup>15-20</sup> is one of the most cost-effective, near-term steps towards a zero net carbon budget globally.<sup>21-25</sup>

2. The CTFS could help unlock this potential.

The CTFS would establish a very high bar of methodological rigor, transparency and accountability for tropical forest jurisdictions—states, provinces, counties and even nations—that are taking steps towards low-emission development. Given California’s global leadership on climate change solutions and the depth of the analyses and public consultation that went into developing the Standard, we believe that the CTFS would be adopted by other programs under development by governments and industries to support the transition of tropical forest jurisdictions to equitable low-emission development. The Standard is also likely to be used by tropical forest jurisdictions themselves.

3. The importance of the CTFS goes beyond offsets and REDD+

The CTFS was deliberately developed as an alternative to project-based REDD+ and it reflects a recognition that one of the most promising pathways to achieve emissions reductions at scale in tropical forest regions is to encourage the governments of jurisdictions to partner with civil society, the private sector, and indigenous peoples and local communities to develop durable programs for low emissions development. While the standard could eventually inform efforts to recognize the emissions reductions achieved by tropical forest jurisdictions in existing and emerging “pay-for-performance” programs, including implementation of California’s international offset provision, its value goes beyond this purpose.

The Standard is focused on *jurisdictional*<sup>26-28</sup>, or “sector-wide”, strategies for slowing the loss of tropical forests while improving the livelihoods and participation of forest communities within a broader transition to low-emission development. Jurisdictional strategies seek systemic solutions to deforestation, inadequate recognition of land rights, and other issues across entire political geographies—states and provinces—and are much less susceptible to leakage and dubious carbon accounting than some of the project-based examples that have been cited by others.

4. The CTFS already reflects important progress made in fostering stronger partnerships between tropical forest governments and indigenous peoples

One of the highlights of the Global Climate Action Summit in San Francisco last September was the announcement of “[Guiding Principles for Collaboration and Partnership between Subnational Governments, Indigenous Peoples and Local Communities](#).” State and provincial governments that are members of the Governors’ Climate and Forests Task Force endorsed these principles and shook hands with the democratically-elected leaders of key Indigenous Peoples organizations in Indonesia (AMAN), Central America and Mexico (AMPB) and the Amazon (COICA). In all, 35 governments, 18 Indigenous Peoples organizations, and 17 environmental NGOs endorsed these principles, which have now been incorporated into the CTFS.

These partnerships are already happening, as has been [documented](#) for the State of Acre, in the Brazilian Amazon, which has a 20-year partnership between the state government and the Indigenous Peoples who reside in the state.<sup>28</sup>

Conclusion: To unlock the potential of tropical forests as a climate change solution, it is urgent that the California Tropical Forest Standard be endorsed. New governments in many tropical forest regions have just been elected and will define their major priorities in the next few months. If endorsement is postponed, an important opportunity will be lost to send the signal that California, in its role as a global leader of climate change

solutions, recognizes and supports bold efforts to address climate change by slowing the loss and speeding the recovery of tropical forests.

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#### References Cited in the Letter

1. Houghton, R.A., Byers, B., Nassikas, A.A., 2015. A role for tropical forests in stabilizing atmospheric CO<sub>2</sub>. *Nature Climate Change* 5, 1022–1023. <https://doi.org/10.1038/nclimate2869>

2. Seymour, F., Busch, J., 2016. Why forests? Why now? The science, economics, and politics of tropical forests and climate change. Center for Global Development, Washington DC.
3. Griscom, B.W., Adams, J., Ellis, P.W., Houghton, R.A., Lomax, G., Miteva, D.A., Schlesinger, W.H., Shoch, D., Siikamäki, J.V., Smith, P., Woodbury, P., Zganjar, C., Blackman, A., Campari, J., Conant, R.T., Delgado, C., Elias, P., Gopalakrishna, T., Hamsik, M.R., Herrero, M., Kiesecker, J., Landis, E., Laestadius, L., Leavitt, S.M., Minnemeyer, S., Polasky, S., Potapov, P., Putz, F.E., Sanderman, J., Silvius, M., Wollenberg, E., Fargione, J., 2017. Natural climate solutions. *Proceedings of the National Academy of Sciences* 114, 11645–11650. <https://doi.org/10.1073/pnas.1710465114>
4. Pan, Y., Birdsey, R.A., Fang, J., Houghton, R., Kauppi, P.E., Kurz, W.A., Phillips, O.L., Shvidenko, A., Lewis, S.L., Canadell, J.G., Ciais, P., Jackson, R.B., Pacala, S.W., McGuire, A.D., Piao, S., Rautiainen, A., Sitch, S., Hayes, D., 2011. A Large and Persistent Carbon Sink in the World's Forests. *Science* 333, 988–993. <https://doi.org/10.1126/science.1201609>
5. Baccini, A., Goetz, S.J., Walker, W.S., Laporte, N.T., Sun, M., Sulla-Menashe, D., Hackler, J., Beck, P.S.A., Dubayah, R., Friedl, M.A., Samanta, S., Houghton, R.A., 2012. Estimated carbon dioxide emissions from tropical deforestation improved by carbon-density maps. *Nature Climate Change* 2, 182–185. <https://doi.org/10.1038/nclimate1354>
6. Harris, N.L., Brown, S., Hagen, S.C., Saatchi, S.S., Petrova, S., Salas, W., Hansen, M.C., Potapov, P.V., Lotsch, A., 2012. Baseline Map of Carbon Emissions from Deforestation in Tropical Regions. *Science* 336, 1573–1576. <https://doi.org/10.1126/science.1217962>
7. Achard, F., Beuchle, R., Mayaux, P., Stibig, H.-J., Bodart, C., Brink, A., Carboni, S., Desclée, B., Donnay, F., Eva, H.D., Lupi, A., Raši, R., Seliger, R., Simonetti, D., 2014. Determination of tropical deforestation rates and related carbon losses from 1990 to 2010. *Global Change Biology* 20, 2540–2554. <https://doi.org/10.1111/gcb.12605>
8. Grace, J., Mitchard, E., Gloor, E., 2014. Perturbations in the carbon budget of the tropics. *Global Change Biology* 20, 3238–3255. <https://doi.org/10.1111/gcb.12600>
9. Tubiello, F.N., Salvatore, M., Ferrara, A.F., House, J., Federici, S., Rossi, S., Biancalani, R., Condor Golec, R.D., Jacobs, H., Flammini, A., Prosperi, P., Cardenas-Galindo, P., Schmidhuber, J., Sanz Sanchez, M.J., Srivastava, N., Smith, P., 2015. The Contribution of Agriculture, Forestry and other Land Use activities to Global Warming, 1990-2012. *Global Change Biology* 21, 2655–2660. <https://doi.org/10.1111/gcb.12865>
10. Liu, Y.Y., van Dijk, A.I.J.M., de Jeu, R.A.M., Canadell, J.G., McCabe, M.F., Evans, J.P., Wang, G., 2015. Recent reversal in loss of global terrestrial biomass. *Nature Climate Change* 5, 470–474. <https://doi.org/10.1038/nclimate2581>
11. Zarin, D.J., Harris, N.L., Baccini, A., Aksenov, D., Hansen, M.C., Azevedo-Ramos, C., Azevedo, T., Margono, B.A., Alencar, A.C., Gabris, C., Allegretti, A., Potapov, P., Farina, M., Walker, W.S., Shevade, V.S., Loboda, T.V., Turubanova, S., Tyukavina, A., 2016. Can carbon emissions from tropical deforestation drop by 50% in 5 years? *Global Change Biology* 22, 1336–1347. <https://doi.org/10.1111/gcb.13153>

12. Smith, P., Bustamante, M., Ahammad, H., Clark, H., Dong, H., Elsiddig, E.A., Haberl, H., Harper, R., House, J., Jafari, M., Masera, O., Mbow, C., Ravindranath, N.H., Rice, C.W., Robledo Abad, C., Romanovskaya, A., Sperling, F., Tubiello, F., 2014. Agriculture, Forestry and Other Land Use (AFOLU), in: Edenhofer, O., Pichs-Madruga, R., Sokona, Y., Farahani, E., Kadner, S., Seyboth, K., Adler, A., Baum, I., Brunner, S., Eickemeier, P., Kriemann, B., Savolainen, J., Schlömer, S., von Stechow, C., Zwickel, T., Minx, J.C. (Eds.), *Climate Change 2014: Mitigation of Climate Change. Contribution of Working Group III to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change*. Cambridge University Press, Cambridge, United Kingdom and New York, NY, USA.
13. Silver, W.L., Ostertag, R., Lugo, A.E., 2000. The Potential for Carbon Sequestration Through Reforestation of Abandoned Tropical Agricultural and Pasture Lands. *Restoration Ecology* 8, 394–407. <https://doi.org/10.1046/j.1526-100x.2000.80054.x>
14. Gilroy, J.J., Woodcock, P., Edwards, F.A., Wheeler, C., Baptiste, B.L.G., Medina Uribe, C.A., Haugaasen, T., Edwards, D.P., 2014. Cheap carbon and biodiversity co-benefits from forest regeneration in a hotspot of endemism. *Nature Climate Change* 4, 503–507. <https://doi.org/10.1038/nclimate2200>
15. Chazdon, R.L., Guariguata, M.R., 2016. Natural regeneration as a tool for large-scale forest restoration in the tropics: prospects and challenges. *Biotropica* 48, 716–730. <https://doi.org/10.1111/btp.12381>
16. Hawes, M., 2018. Planting carbon storage. *Nature Climate Change* 8, 556–558. <https://doi.org/10.1038/s41558-018-0214-x>
17. Kindermann, G., Obersteiner, M., Sohngen, B., Sathaye, J., Andrasko, K., Rametsteiner, E., Schlamadinger, B., Wunder, S., Beach, R., 2008. Global cost estimates of reducing carbon emissions through avoided deforestation. *Proceedings of the National Academy of Sciences* 105, 10302–10307. <https://doi.org/10.1073/pnas.0710616105>
18. Strassburg, B., Turner, R.K., Fisher, B., Schaeffer, R., Lovett, A., 2009. Reducing emissions from deforestation—The “combined incentives” mechanism and empirical simulations. *Global Environmental Change* 19, 265–278. <https://doi.org/10.1016/j.gloenvcha.2008.11.004>
19. Coren, M.J., Streck, C., Madeira, E.M., 2011. Estimated supply of RED credits 2011–2035. *Climate Policy* 11, 1272–1288. <https://doi.org/10.1080/14693062.2011.579318>
20. Busch, J., Engelmann, J., 2017. Cost-effectiveness of reducing emissions from tropical deforestation, 2016–2050. *Environmental Research Letters* 13, 015001. <https://doi.org/10.1088/1748-9326/aa907c>
21. Busch J et al (2012) Structuring economic incentives to reduce emissions from deforestation within Indonesia. *Proc Nat Acad Sci USA* 109(4):1062-1067.
22. Fuss, S., Lamb, W.F., Callaghan, M.W., Hilaire, J., Creutzig, F., Amann, T., Beringer, T., de Oliveira Garcia, W., Hartmann, J., Khanna, T., Luderer, G., Nemet, G.F., Rogelj, J., Smith, P., Vicente, J.L.V., Wilcox, J., del Mar Zamora Dominguez, M., Minx, J.C., 2018. Negative emissions—Part 2: Costs, potentials and side effects. *Environmental Research Letters* 13, 063002. <https://doi.org/10.1088/1748-9326/aabf9f>
23. Edwards, D.P., Fisher, B., Boyd, E., 2010. Protecting degraded rainforests: enhancement of forest carbon stocks under REDD+: Enhancing forest carbon with

- REDD+. *Conservation Letters* 3, 313–316. <https://doi.org/10.1111/j.1755-263X.2010.00143.x>
24. Nepstad, D., Irawan, S., Bezerra, T., Boyd, W., Stickler, C., Shimada, J., Carvalho, O., MacIntyre, K., Dohong, A., Alencar, A., Azevedo, A., Tepper, D., Lowery, S., 2013. More food, more forests, fewer emissions, better livelihoods: linking REDD+, sustainable supply chains and domestic policy in Brazil, Indonesia and Colombia. *Carbon Management* 4, 639–658. <https://doi.org/10.4155/cmt.13.65>
  25. Nepstad, D., McGrath, D., Stickler, C., Alencar, A., Azevedo, A., Swette, B., Bezerra, T., DiGiano, M., Shimada, J., Seroa da Motta, R., Armijo, E., Castello, L., Brando, P., Hansen, M.C., McGrath-Horn, M., Carvalho, O., Hess, L., 2014. Slowing Amazon deforestation through public policy and interventions in beef and soy supply chains. *Science* 344, 1118–1123. <https://doi.org/10.1126/science.1248525>
  26. Boyd, W., Stickler, C., Duchelle, A.E., Seymour, F., Nepstad, D., Bahar, N.H.A., Rodriguez Ward, D., 2018. Jurisdictional Approaches to REDD+ and Low Emissions Development: Progress and Prospects. Working Paper. Presented at the Oslo Tropical Forest Forum, Oslo, World Resources Institute, Washington, DC.
  27. Stickler, CM et al. 2018. The State of Jurisdictional Sustainability. San Francisco, USA: Earth Innovation Institute/Bogor, Indonesia: Center for International Forestry Research/Boulder, USA: Governors’ Climate and Forests Task Force Secretariat.
  28. DiGiano, M., Mendoza, E., Ochoa, M.L., Ardila, J., Oliviera de Lima, F., Nepstad, D. 2018. The twenty –year-old partnership between indigenous peoples and the Government of Acre, Brazil. Earth Innovation Institute, Collaboration for Climate series, San Francisco USA.

#### Sample of Other Relevant Publications by Signatory Scientists

- Agrawal, A., Chhatre, A., Hardin, R., 2008. Changing Governance of the World’s Forests. *Science* 320, 1460–1462. <https://doi.org/10.1126/science.1155369>
- Agrawal, A., Nepstad, D., Chhatre, A., 2011. Reducing Emissions from Deforestation and Forest Degradation. *Annual Review of Environment and Resources* 36, 373–396. <https://doi.org/10.1146/annurev-environ-042009-094508>
- Angelsen, A. (Ed.), 2008. Moving ahead with REDD: Issues, options and implications. Center for International Forestry Research, Bogor, Indonesia.
- Angelsen, A., Brockhaus, M., Kanninen, M., Sills, E., Sunderlin, W.D., Wertz-Kanounnikoff, S. (Eds.), 2009. Realising REDD+: National strategy and policy options. Center for International Forestry Research, Bogor, Indonesia.
- Angelsen, A., Brockhaus, M., Sunderlin, W.D., Verchot, L.V. (Eds.), 2012. Analysing REDD+: Challenges and choices. Center for International Forestry Research, Bogor, Indonesia.

- Angelsen, A., Kaimowitz, D., 1999. Rethinking the Causes of Deforestation: Lessons from Economic Models. *The World Bank Research Observer* 14, 73–98.  
<https://doi.org/10.1093/wbro/14.1.73>
- Angelsen, A., Kaimowitz, D. (Eds.), 2001. *Agricultural technologies and tropical deforestation*. CABI Pub. in association with Center for International Forestry Research, Wallingford, Oxon, UK ; New York, NY, USA.
- Arriagada, R.A., Ferraro, P.J., Sills, E.O., Pattanayak, S.K., Cordero-Sancho, S., 2012. Do Payments for Environmental Services Affect Forest Cover? A Farm-Level Evaluation from Costa Rica. *Land Economics* 88, 382–399.
- Asner, G.P., 2005. Selective Logging in the Brazilian Amazon. *Science* 310, 480–482.  
<https://doi.org/10.1126/science.1118051>
- Asner, G.P., Rudel, T.K., Aide, T.M., Defries, R., Emerson, R., 2009. A Contemporary Assessment of Change in Humid Tropical Forests. *Conservation Biology* 23, 1386–1395. <https://doi.org/10.1111/j.1523-1739.2009.01333.x>
- Baccini, A., Goetz, S.J., Walker, W.S., Laporte, N.T., Sun, M., Sulla-Menashe, D., Hackler, J., Beck, P.S.A., Dubayah, R., Friedl, M.A., Samanta, S., Houghton, R.A., 2012. Estimated carbon dioxide emissions from tropical deforestation improved by carbon-density maps. *Nature Climate Change* 2, 182–185.  
<https://doi.org/10.1038/nclimate1354>
- Baccini, A., Walker, W., Carvalho, L., Farina, M., Sulla-Menashe, D., Houghton, R.A., 2017. Tropical forests are a net carbon source based on aboveground measurements of gain and loss. *Science* 358, 230–234. <https://doi.org/10.1126/science.aam5962>
- Balch, J.K., Brando, P.M., Nepstad, D.C., Coe, M.T., Silvério, D., Massad, T.J., Davidson, E.A., Lefebvre, P., Oliveira-Santos, C., Rocha, W., Cury, R.T.S., Parsons, A., Carvalho, K.S., 2015. The Susceptibility of Southeastern Amazon Forests to Fire: Insights from a Large-Scale Burn Experiment. *BioScience* 65, 893–905.  
<https://doi.org/10.1093/biosci/biv106>
- Bierregaard, R.O., Lovejoy, T.E., Kapos, V., Hutchings, R.W., 1992. The Biological Dynamics of Tropical Rainforest Fragments. *BioScience* 42, 859–866.  
<https://doi.org/10.2307/1312085>
- Brando, P.M., Nepstad, D.C., Balch, J.K., Bolker, B., Christman, M.C., Coe, M., Putz, F.E., 2012. Fire-induced tree mortality in a neotropical forest: the roles of bark traits, tree size, wood density and fire behavior. *Global Change Biology* 18, 630–641.  
<https://doi.org/10.1111/j.1365-2486.2011.02533.x>
- Caplow, S., Jagger, P., Lawlor, K., Sills, E., 2011. Evaluating land use and livelihood impacts of early forest carbon projects: Lessons for learning about REDD+. *Environmental Science & Policy* 14, 152–167.  
<https://doi.org/10.1016/j.envsci.2010.10.003>

- Carlson, K.M., Curran, L.M., Asner, G.P., Pittman, A.M., Trigg, S.N., Marion Adeney, J., 2013. Carbon emissions from forest conversion by Kalimantan oil palm plantations. *Nature Climate Change* 3, 283–287. <https://doi.org/10.1038/nclimate1702>
- Carlson, K.M., Curran, L.M., Ratnasari, D., Pittman, A.M., Soares-Filho, B.S., Asner, G.P., Trigg, S.N., Gaveau, D.A., Lawrence, D., Rodrigues, H.O., 2012. Committed carbon emissions, deforestation, and community land conversion from oil palm plantation expansion in West Kalimantan, Indonesia. *Proceedings of the National Academy of Sciences* 109, 7559–7564. <https://doi.org/10.1073/pnas.1200452109>
- Carrasco, L.R., Larrosa, C., Milner-Gulland, E.J., Edwards, D.P., 2014. A double-edged sword for tropical forests. *Science* 346, 38–40. <https://doi.org/10.1126/science.1256685>
- Caviglia-Harris, J.L., Sills, E.O., 2005. Land use and income diversification: comparing traditional and colonist populations in the Brazilian Amazon. *Agricultural Economics* 32, 221–237. <https://doi.org/10.1111/j.1574-0862.2005.00238.x>
- Chave, J., Andalo, C., Brown, S., Cairns, M.A., Chambers, J.Q., Eamus, D., Fölster, H., Fromard, F., Higuchi, N., Kira, T., Lescure, J.-P., Nelson, B.W., Ogawa, H., Puig, H., Riéra, B., Yamakura, T., 2005. Tree allometry and improved estimation of carbon stocks and balance in tropical forests. *Oecologia* 145, 87–99. <https://doi.org/10.1007/s00442-005-0100-x>
- Chazdon, R.L., 2008. Beyond Deforestation: Restoring Forests and Ecosystem Services on Degraded Lands. *Science* 320, 1458–1460. <https://doi.org/10.1126/science.1155365>
- Chazdon, R.L., 2003. Tropical forest recovery: legacies of human impact and natural disturbances. *Perspectives in Plant Ecology, Evolution and Systematics* 6, 51–71. <https://doi.org/10.1078/1433-8319-00042>
- DeFries, R.S., Houghton, R.A., Hansen, M.C., Field, C.B., Skole, D., Townshend, J., 2002. Carbon emissions from tropical deforestation and regrowth based on satellite observations for the 1980s and 1990s. *Proceedings of the National Academy of Sciences* 99, 14256–14261. <https://doi.org/10.1073/pnas.182560099>
- DeFries, R.S., Rudel, T., Uriarte, M., Hansen, M., 2010. Deforestation driven by urban population growth and agricultural trade in the twenty-first century. *Nature Geoscience* 3, 178–181. <https://doi.org/10.1038/ngeo756>
- Duchelle, A.E., Cromberg, M., Gebara, M.F., Guerra, R., Melo, T., Larson, A., Cronkleton, P., Börner, J., Sills, E., Wunder, S., Bauch, S., May, P., Selaya, G., Sunderlin, W.D., 2014. Linking Forest Tenure Reform, Environmental Compliance, and Incentives: Lessons from REDD+ Initiatives in the Brazilian Amazon. *World Development* 55, 53–67. <https://doi.org/10.1016/j.worlddev.2013.01.014>

- Engel, S., Palmer, C. (Eds.), 2009. *Avoided deforestation: prospects for mitigating climate change*, Routledge explorations in environmental economics. Routledge, London ; New York.
- Etter, A., McAlpine, C., Wilson, K., Phinn, S., Possingham, H., 2006. Regional patterns of agricultural land use and deforestation in Colombia. *Agriculture, Ecosystems & Environment* 114, 369–386. <https://doi.org/10.1016/j.agee.2005.11.013>
- Fahey, T.J., Woodbury, P.B., Battles, J.J., Goodale, C.L., Hamburg, S.P., Ollinger, S.V., Woodall, C.W., 2010. Forest carbon storage: ecology, management, and policy. *Frontiers in Ecology and the Environment* 8, 245–252. <https://doi.org/10.1890/080169>
- Field, C.B., Barros, V., Stocker, T., Dahe, Q., Dokken, D.J., Ebi, K., Mastrandrea, M., Mach, K., Plattner, G.K., Allen, S., Tignor, M. (Eds.), 2012. *Managing the risks of extreme events and disasters to advance climate change adaptation: special report of the Intergovernmental Panel on Climate Change*. Cambridge University Press, New York, NY.
- Field, C.B., Barros, V.R., Dokken, D.J., Mach, K.J., Mastrandrea, M.D., Bilir, T.E., Chatterjee, M., Ebi, K.L., Estrada, Y.O., Genova, R.C., Girma, B. (Eds.), 2014. *Climate change 2014: impacts, adaptation, and vulnerability: Working Group II contribution to the fifth assessment report of the Intergovernmental Panel on Climate Change*. Cambridge University Press, New York, NY.
- Foley, J.A., DeFries, R., Asner, G.P., Barford, C., Bonan, G., Carpenter, S.R., Chapin, F.S., Coe, M.T., Daily, G.C., Gibbs, H.K., Helkowski, J.H., Holloway, T., Howard, E.A., Kucharik, C.J., Monfreda, C., Patz, J.A., Prentice, C., Ramankutty, N., Snyder, P.K., 2005. Global Consequences of Land Use. *Science* 309, 570–574. <https://doi.org/10.1126/science.1111772>
- Foley, J.A., Asner, G.P., Costa, M.H., Coe, M.T., DeFries, R., Gibbs, H.K., Howard, E.A., Olson, S., Patz, J., Ramankutty, N., Snyder, P., 2007. Amazonia revealed: forest degradation and loss of ecosystem goods and services in the Amazon Basin. *Frontiers in Ecology and the Environment* 5, 25–32. [https://doi.org/10.1890/1540-9295\(2007\)5\[25:ARFDAL\]2.0.CO;2](https://doi.org/10.1890/1540-9295(2007)5[25:ARFDAL]2.0.CO;2)
- Gaveau, D.L.A., Epting, J., Lyne, O., Linkie, M., Kumara, I., Kanninen, M., Leader-Williams, N., 2009. Evaluating whether protected areas reduce tropical deforestation in Sumatra. *Journal of Biogeography* 36, 2165–2175. <https://doi.org/10.1111/j.1365-2699.2009.02147.x>
- Gaveau, D.L.A., Wandono, H., Setiabudi, F., 2007. Three decades of deforestation in southwest Sumatra: Have protected areas halted forest loss and logging, and promoted re-growth? *Biological Conservation* 134, 495–504. <https://doi.org/10.1016/j.biocon.2006.08.035>

- Gibbs, H.K., Brown, S., Niles, J.O., Foley, J.A., 2007. Monitoring and estimating tropical forest carbon stocks: making REDD a reality. *Environmental Research Letters* 2, 045023. <https://doi.org/10.1088/1748-9326/2/4/045023>
- Gibbs, H.K., Ruesch, A.S., Achard, F., Clayton, M.K., Holmgren, P., Ramankutty, N., Foley, J.A., 2010. Tropical forests were the primary sources of new agricultural land in the 1980s and 1990s. *Proceedings of the National Academy of Sciences* 107, 16732–16737. <https://doi.org/10.1073/pnas.0910275107>
- Gibson, L., Lee, T.M., Koh, L.P., Brook, B.W., Gardner, T.A., Barlow, J., Peres, C.A., Bradshaw, C.J.A., Laurance, W.F., Lovejoy, T.E., Sodhi, N.S., 2011. Primary forests are irreplaceable for sustaining tropical biodiversity. *Nature* 478, 378–381. <https://doi.org/10.1038/nature10425>
- Gonçalves, F., Treuhaft, R., Law, B., Almeida, A., Walker, W., Baccini, A., dos Santos, J.R. and Graça, P., 2017. Estimating aboveground biomass in tropical forests: field methods and error analysis for the calibration of remote sensing observations. *Remote Sensing*, 9(1), p.47.
- Groom, B., Palmer, C., 2012. REDD+ and rural livelihoods. *Biological Conservation* 154, 42–52. <https://doi.org/10.1016/j.biocon.2012.03.002>
- Gullison, R.E., Frumhoff, P.C., Canadell, J.G., Field, C.B., Nepstad, D.C., Hayhoe, K., Avissar, R., Curran, L.M., Friedlingstein, P., Jones, C.D., Nobre, C., 2007. ENVIRONMENT: Tropical Forests and Climate Policy. *Science* 316, 985–986. <https://doi.org/10.1126/science.1136163>
- Hansen, M.C., Potapov, P.V., Moore, R., Hancher, M., Turubanova, S.A., Tyukavina, A., Thau, D., Stehman, S.V., Goetz, S.J., Loveland, T.R., Kommareddy, A., Egorov, A., Chini, L., Justice, C.O., Townshend, J.R.G., 2013. High-Resolution Global Maps of 21st-Century Forest Cover Change. *Science* 342, 850–853. <https://doi.org/10.1126/science.1244693>
- Harris, N.L., Brown, S., Hagen, S.C., Saatchi, S.S., Petrova, S., Salas, W., Hansen, M.C., Potapov, P.V., Lotsch, A., 2012. Baseline Map of Carbon Emissions from Deforestation in Tropical Regions. *Science* 336, 1573–1576. <https://doi.org/10.1126/science.1217962>
- Hecht, S.B., Cockburn, A., 2010. *The fate of the forest: developers, destroyers, and defenders of the Amazon*, Updated ed. ed. University of Chicago Press, Chicago ; London.
- Houghton, R.A., 1991. Tropical Deforestation and Atmospheric Carbon Dioxide, in: Myers, N. (Ed.), *Tropical Forests and Climate*. Springer Netherlands, Dordrecht, pp. 99–118. [https://doi.org/10.1007/978-94-017-3608-4\\_10](https://doi.org/10.1007/978-94-017-3608-4_10)

- Jagger, P., Sills, E., Lawlor, K., Sunderlin, W.D., 2010. A guide to learning about livelihood impacts of REDD+ projects. Occasional paper 56, CIFOR, Bogor, Indonesia.
- Kaimowitz, D., Angelsen, A., 1998. Economic models of tropical deforestation: a review. CIFOR, Center for International Forestry Research, Bogor, Indonesia.
- Kanninen, M., Murdiyarso, D., Seymour, F., Angelsen, A., Wunder, S., German, L. (Eds.), 2007. Do trees grow on money? The implications of deforestation research for policies to promote REDD, Forest perspectives. CIFOR, Center for International Forestry Research, Bogor, Indonesia.
- Larson, A.M., Brockhaus, M., Sunderlin, W.D., Duchelle, A., Babon, A., Dokken, T., Pham, T.T., Resosudarmo, I.A.P., Selaya, G., Awono, A., Huynh, T.-B., 2013. Land tenure and REDD+: The good, the bad and the ugly. *Global Environmental Change* 23, 678–689. <https://doi.org/10.1016/j.gloenvcha.2013.02.014>
- Law, B.E., Hudiburg, T.W., Berner, L.T., Kent, J.J., Buotte, P.C. and Harmon, M.E., 2018. Land use strategies to mitigate climate change in carbon dense temperate forests. *Proceedings of the National Academy of Sciences*, p.201720064.
- Lawlor, K., Madeira, E., Blockhus, J., Ganz, D., 2013. Community Participation and Benefits in REDD+: A Review of Initial Outcomes and Lessons. *Forests* 4, 296–318. <https://doi.org/10.3390/f4020296>
- Loarie, S.R., Duffy, P.B., Hamilton, H., Asner, G.P., Field, C.B., Ackerly, D.D., 2009. The velocity of climate change. *Nature* 462, 1052–1055. <https://doi.org/10.1038/nature08649>
- Lubowski, R.N., Plantinga, A.J., Stavins, R.N., 2006. Land-use change and carbon sinks: Econometric estimation of the carbon sequestration supply function. *Journal of Environmental Economics and Management* 51, 135–152. <https://doi.org/10.1016/j.jeem.2005.08.001>
- Marvin, D.C., Koh, L.P., Lynam, A.J., Wich, S., Davies, A.B., Krishnamurthy, R., Stokes, E., Starkey, R., Asner, G.P., 2016. Integrating technologies for scalable ecology and conservation. *Global Ecology and Conservation* 7, 262–275. <https://doi.org/10.1016/j.gecco.2016.07.002>
- Merry, F., Soares-Filho, B., Nepstad, D., Amacher, G., Rodrigues, H., 2009. Balancing Conservation and Economic Sustainability: The Future of the Amazon Timber Industry. *Environmental Management* 44, 395–407. <https://doi.org/10.1007/s00267-009-9337-1>
- Meyfroidt, P., Carlson, K.M., Fagan, M.E., Gutiérrez-Vélez, V.H., Macedo, M.N., Curran, L.M., DeFries, R.S., Dyer, G.A., Gibbs, H.K., Lambin, E.F., Morton, D.C., Robiglio, V., 2014. Multiple pathways of commodity crop expansion in tropical

- forest landscapes. *Environmental Research Letters* 9, 074012.  
<https://doi.org/10.1088/1748-9326/9/7/074012>
- Moutinho, P., Schwartzman, S. (Eds.), 2005. Tropical deforestation and climate change. Instituto de Pesquisa Ambiental da Amazônia ; Environmental Defense, Brasília, DF, Brasil : Washington, DC.
- Murdiyarso, D., Purbopuspito, J., Kauffman, J.B., Warren, M.W., Sasmito, S.D., Donato, D.C., Manuri, S., Krisnawati, H., Taberima, S., Kurnianto, S., 2015. The potential of Indonesian mangrove forests for global climate change mitigation. *Nature Climate Change* 5, 1089–1092. <https://doi.org/10.1038/nclimate2734>
- Nepstad, D., Carvalho, G., Cristina Barros, A., Alencar, A., Paulo Capobianco, J., Bishop, J., Moutinho, P., Lefebvre, P., Lopes Silva, U., Prins, E., 2001. Road paving, fire regime feedbacks, and the future of Amazon forests. *Forest Ecology and Management* 154, 395–407. [https://doi.org/10.1016/S0378-1127\(01\)00511-4](https://doi.org/10.1016/S0378-1127(01)00511-4)
- Nepstad, D., Irawan, S., Bezerra, T., Boyd, W., Stickler, C., Shimada, J., Carvalho, O., MacIntyre, K., Dohong, A., Alencar, A., Azevedo, A., Tepper, D., Lowery, S., 2013. More food, more forests, fewer emissions, better livelihoods: linking REDD+, sustainable supply chains and domestic policy in Brazil, Indonesia and Colombia. *Carbon Management* 4, 639–658. <https://doi.org/10.4155/cmt.13.65>
- Nepstad, D., McGrath, D., Alencar, A., Barros, A.C., Carvalho, G., Santili, M., Vera Diaz, M. del C., 2002. Frontier Governance in Amazonia. *Science* 295, 629–631. <https://doi.org/10.1126/science.1067053>
- Nepstad, D., McGrath, D., Stickler, C., Alencar, A., Azevedo, A., Swette, B., Bezerra, T., DiGiano, M., Shimada, J., Seroa da Motta, R., Armijo, E., Castello, L., Brando, P., Hansen, M.C., McGrath-Horn, M., Carvalho, O., Hess, L., 2014. Slowing Amazon deforestation through public policy and interventions in beef and soy supply chains. *Science* 344, 1118–1123. <https://doi.org/10.1126/science.1248525>
- Nepstad, D., Schwartzman, S., Bamberger, B., Santilli, M., Ray, D., Schlesinger, P., Lefebvre, P., Alencar, A., Prinz, E., Fiske, G., Rolla, A., 2006. Inhibition of Amazon Deforestation and Fire by Parks and Indigenous Lands: Inhibition of Amazon Deforestation and Fire. *Conservation Biology* 20, 65–73. <https://doi.org/10.1111/j.1523-1739.2006.00351.x>
- Nepstad, D., Soares-Filho, B.S., Merry, F., Lima, A., Moutinho, P., Carter, J., Bowman, M., Cattaneo, A., Rodrigues, H., Schwartzman, S., McGrath, D.G., Stickler, C.M., Lubowski, R., Piris-Cabezas, P., Rivero, S., Alencar, A., Almeida, O., Stella, O., 2009. The End of Deforestation in the Brazilian Amazon. *Science* 326, 1350–1351. <https://doi.org/10.1126/science.1182108>
- Nepstad, D.C., Boyd, W., Stickler, C.M., Bezerra, T., Azevedo, A.A., 2013. Responding to climate change and the global land crisis: REDD+, market transformation and low-emissions rural development. *Philosophical Transactions of the Royal Society B*:

- Biological Sciences 368, 20120167–20120167.  
<https://doi.org/10.1098/rstb.2012.0167>
- Nepstad, D.C., de Carvalho, C.R., Davidson, E.A., Jipp, P.H., Lefebvre, P.A., Negreiros, G.H., da Silva, E.D., Stone, T.A., Trumbore, S.E., Vieira, S., 1994. The role of deep roots in the hydrological and carbon cycles of Amazonian forests and pastures. *Nature* 372, 666–669.
- Nepstad, D.C., Nobre, C., Lima, E., Lefebvre, P., Schlesinger, P., Potter, C., Mendoza, E., Cochrane, M., Brooks, V., 1999. Large-scale impoverishment of Amazonian forests by logging and fire 398, 4.
- Nepstad, D.C., Stickler, C.M., Filho, B.S., Merry, F., 2008. Interactions among Amazon land use, forests and climate: prospects for a near-term forest tipping point. *Philosophical Transactions of the Royal Society B: Biological Sciences* 363, 1737–1746. <https://doi.org/10.1098/rstb.2007.0036>
- Nepstad, D.C., Tohver, I.M., Ray, D., Moutinho, P., Cardinot, G., 2007. Mortality of Large Trees and Lianas Following Experimental Drought in an Amazon Forest. *Ecology* 88, 2259–2269. <https://doi.org/10.1890/06-1046.1>
- Newton, P., Agrawal, A., Wollenberg, L., 2013. Enhancing the sustainability of commodity supply chains in tropical forest and agricultural landscapes. *Global Environmental Change* 23, 1761–1772.  
<https://doi.org/10.1016/j.gloenvcha.2013.08.004>
- Palmer, C., 2011. Property rights and liability for deforestation under REDD+: Implications for ‘permanence’ in policy design. *Ecological Economics* 70, 571–576.  
<https://doi.org/10.1016/j.ecolecon.2010.10.011>
- Pattanayak, S.K., Sills, E., 2001. Do tropical forests provide natural insurance? The microeconomics of non-timber forest product collection in the Brazilian Amazon. *Land Economics* 77, 595–612.
- Persson, U.M., Azar, C., 2010. Preserving the World’s Tropical Forests—A Price on Carbon May Not Do. *Environmental Science & Technology* 44, 210–215.  
<https://doi.org/10.1021/es902629x>
- Phelps, J., Carrasco, L.R., Webb, E.L., Koh, L.P., Pascual, U., 2013. Agricultural intensification escalates future conservation costs. *Proceedings of the National Academy of Sciences* 110, 7601–7606. <https://doi.org/10.1073/pnas.1220070110>
- Phelps, J., Friess, D.A., Webb, E.L., 2012. Win–win REDD+ approaches belie carbon–biodiversity trade-offs. *Biological Conservation* 154, 53–60.  
<https://doi.org/10.1016/j.biocon.2011.12.031>

- Phelps, J., Guerrero, M.C., Dalabajan, D.A., Young, B., Webb, E.L., 2010a. What makes a 'REDD' country? *Global Environmental Change* 20, 322–332. <https://doi.org/10.1016/j.gloenvcha.2010.01.002>
- Phelps, J., Webb, E. L., Adams, W. M., 2012. Biodiversity co-benefits of policies to reduce forest-carbon emissions. *Nature Climate Change* 2, 497–503. <https://doi.org/10.1038/nclimate1462>
- Phelps, J., Webb, E.L., Agrawal, A., 2010b. Does REDD+ Threaten to Recentralize Forest Governance? *Science* 328, 312–313. <https://doi.org/10.1126/science.1187774>
- Putz, F.E., Zuidema, P.A., Synnott, T., Peña-Claros, M., Pinard, M.A., Sheil, D., Vanclay, J.K., Sist, P., Gourlet-Fleury, S., Griscom, B., Palmer, J., Zagt, R., 2012. Sustaining conservation values in selectively logged tropical forests: the attained and the attainable: Sustaining tropical forests with forestry. *Conservation Letters* 5, 296–303. <https://doi.org/10.1111/j.1755-263X.2012.00242.x>
- Ramankutty, N., Gibbs, H.K., Achard, F., Defries, R., Foley, J.A., Houghton, R.A., 2007. Challenges to estimating carbon emissions from tropical deforestation. *Global Change Biology* 13, 51–66. <https://doi.org/10.1111/j.1365-2486.2006.01272.x>
- Robinson, B.E., Holland, M.B., Naughton-Treves, L., 2014. Does secure land tenure save forests? A meta-analysis of the relationship between land tenure and tropical deforestation. *Global Environmental Change* 29, 281–293. <https://doi.org/10.1016/j.gloenvcha.2013.05.012>
- Rode, J., Gómez-Baggethun, E., Krause, T., 2015. Motivation crowding by economic incentives in conservation policy: A review of the empirical evidence. *Ecological Economics* 117, 270–282. <https://doi.org/10.1016/j.ecolecon.2014.11.019>
- Rudel, T., Roper, J., 1997. The paths to rain forest destruction: Crossnational patterns of tropical deforestation, 1975–1990. *World Development* 25, 53–65. [https://doi.org/10.1016/S0305-750X\(96\)00086-1](https://doi.org/10.1016/S0305-750X(96)00086-1)
- Rudel, T.K., 2007. Changing agents of deforestation: From state-initiated to enterprise driven processes, 1970–2000. *Land Use Policy* 24, 35–41. <https://doi.org/10.1016/j.landusepol.2005.11.004>
- Rudel, T.K., 1998. Is There a Forest Transition? Deforestation, Reforestation, and Development. *Rural Sociology* 63, 533–552. <https://doi.org/10.1111/j.1549-0831.1998.tb00691.x>
- Rudel, T.K., 1989. Population, Development, and Tropical Deforestation: A Cross-national Study. *Rural Sociology* 54, 327–338.
- Rudel, T.K., Coomes, O.T., Moran, E., Achard, F., Angelsen, A., Xu, J., Lambin, E., 2005. Forest transitions: towards a global understanding of land use change. *Global Environmental Change* 15, 23–31. <https://doi.org/10.1016/j.gloenvcha.2004.11.001>

- Rudel, T.K., Defries, R., Asner, G.P., Laurance, W.F., 2009. Changing Drivers of Deforestation and New Opportunities for Conservation. *Conservation Biology* 23, 1396–1405. <https://doi.org/10.1111/j.1523-1739.2009.01332.x>
- Saatchi, S.S., Harris, N.L., Brown, S., Lefsky, M., Mitchard, E.T.A., Salas, W., Zutta, B.R., Buermann, W., Lewis, S.L., Hagen, S., Petrova, S., White, L., Silman, M., Morel, A., 2011. Benchmark map of forest carbon stocks in tropical regions across three continents. *Proceedings of the National Academy of Sciences* 108, 9899–9904. <https://doi.org/10.1073/pnas.1019576108>
- Santilli, M., Moutinho, P., Schwartzman, S., Nepstad, D., Curran, L., Nobre, C., 2005. Tropical Deforestation and the Kyoto Protocol. *Climatic Change* 71, 267–276. <https://doi.org/10.1007/s10584-005-8074-6>
- Scherr, S.J., White, A., Kaimowitz, D., 2004. A new agenda for forest conservation and poverty reduction: making forest markets work for low-income producers. *Forest Trends*, Washington, D.C.
- Schneider, C.J., Smith, T.B., Larison, B., Moritz, C., 1999. A test of alternative models of diversification in tropical rainforests: Ecological gradients vs. rainforest refugia. *Proceedings of the National Academy of Sciences* 96, 13869–13873. <https://doi.org/10.1073/pnas.96.24.13869>
- Shyamsundar, P., Kramer, R.A., 1996. Tropical Forest Protection: An Empirical Analysis of the Costs Borne by Local People. *Journal of Environmental Economics and Management* 31, 129–144.
- Sills, E.O., Atmadja, S.S., de Sassi, C., Duchelle, A.E., Kweka, D.L., Resosudarmo, I.A.P., Sunderlin, W.D. (Eds.), 2014. REDD+ on the ground: A case book of subnational initiatives across the globe. Centre for International Forest Research (CIFOR), Bogor Barat.
- Smith, P., Martino, D., Cai, Z., Gwary, D., Janzen, H., Kumar, P., McCarl, B., Ogle, S., O'Mara, F., Rice, C., Scholes, B., Sirotenko, O., Howden, M., McAllister, T., Pan, G., Romanenkov, V., Schneider, U., Towprayoon, S., Wattenbach, M., Smith, J., 2008. Greenhouse gas mitigation in agriculture. *Philosophical Transactions of the Royal Society B: Biological Sciences* 363, 789–813. <https://doi.org/10.1098/rstb.2007.2184>
- Soares-Filho, B., Moutinho, P., Nepstad, D., Anderson, A., Rodrigues, H., Garcia, R., Dietzsch, L., Merry, F., Bowman, M., Hissa, L., Silvestrini, R., Maretti, C., 2010. Role of Brazilian Amazon protected areas in climate change mitigation. *Proceedings of the National Academy of Sciences* 107, 10821–10826. <https://doi.org/10.1073/pnas.0913048107>
- Soares-Filho, B.S., Nepstad, D.C., Curran, L.M., Cerqueira, G.C., Garcia, R.A., Ramos, C.A., Voll, E., McDonald, A., Lefebvre, P., Schlesinger, P., 2006. Modelling

- conservation in the Amazon basin. *Nature* 440, 520–523.  
<https://doi.org/10.1038/nature04389>
- Stickler, C. M., Coe, M. T., Costa, M. H., Nepstad, D. C., McGrath, D.G., Dias, L. C. P., Rodrigues, H. O., Soares-Filho, B. S., 2013. Dependence of hydropower energy generation on forests in the Amazon Basin at local and regional scales. *Proceedings of the National Academy of Sciences* 110, 9601–9606.  
<https://doi.org/10.1073/pnas.1215331110>
- Stickler, C. M., Nepstad, D.C., Azevedo, A.A., McGrath, D.G., 2013. Defending public interests in private lands: compliance, costs and potential environmental consequences of the Brazilian Forest Code in Mato Grosso. *Philosophical Transactions of the Royal Society B: Biological Sciences* 368, 20120160–20120160.  
<https://doi.org/10.1098/rstb.2012.0160>
- Stickler, C.M., Nepstad, D.C., Coe, M.T., McGRATH, D.G., Rodrigues, H.O., Walker, W.S., Soares-Filho, B.S., Davidson, E.A., 2009. The potential ecological costs and cobenefits of REDD: a critical review and case study from the Amazon region. *Global Change Biology* 15, 2803–2824. <https://doi.org/10.1111/j.1365-2486.2009.02109.x>
- Sunderlin, W.D., Larson, A.M., Duchelle, A.E., Resosudarmo, I.A.P., Huynh, T.B., Awono, A., Dokken, T., 2014. How are REDD+ Proponents Addressing Tenure Problems? Evidence from Brazil, Cameroon, Tanzania, Indonesia, and Vietnam. *World Development* 55, 37–52. <https://doi.org/10.1016/j.worlddev.2013.01.013>
- Tacconi, L., 2012. Redefining payments for environmental services. *Ecological Economics* 73, 29–36. <https://doi.org/10.1016/j.ecolecon.2011.09.028>
- Vera-Diaz, M. del C., Kaufmann, R.K., Nepstad, D.C., Schlesinger, P., 2008. An interdisciplinary model of soybean yield in the Amazon Basin: The climatic, edaphic, and economic determinants. *Ecological Economics* 65, 420–431.  
<https://doi.org/10.1016/j.ecolecon.2007.07.015>
- Walker, W., Baccini, A., Schwartzman, S., Ríos, S., Oliveira-Miranda, M.A., Augusto, C., Ruiz, M.R., Arrasco, C.S., Ricardo, B., Smith, R., Meyer, C., Jintiach, J.C., Campos, E.V., 2014. Forest carbon in Amazonia: the unrecognized contribution of indigenous territories and protected natural areas. *Carbon Management* 5, 479–485.  
<https://doi.org/10.1080/17583004.2014.990680>
- Walker, W.S., Stickler, C.M., Kellndorfer, J.M., Kirsch, K.M., Nepstad, D.C., 2010. Large-Area Classification and Mapping of Forest and Land Cover in the Brazilian Amazon: A Comparative Analysis of ALOS/PALSAR and Landsat Data Sources. *IEEE Journal of Selected Topics in Applied Earth Observations and Remote Sensing* 3, 594–604. <https://doi.org/10.1109/JSTARS.2010.2076398>
- Warren, M., Frohling, S., Dai, Z., Kurnianto, S., 2017. Impacts of land use, restoration, and climate change on tropical peat carbon stocks in the twenty-first century:

implications for climate mitigation. *Mitigation and Adaptation Strategies for Global Change* 22, 1041–1061. <https://doi.org/10.1007/s11027-016-9712-1>

Zarin, D.J., Harris, N.L., Baccini, A., Aksenov, D., Hansen, M.C., Azevedo-Ramos, C., Azevedo, T., Margono, B.A., Alencar, A.C., Gabris, C., Allegretti, A., Potapov, P., Farina, M., Walker, W.S., Shevade, V.S., Loboda, T.V., Turubanova, S., Tyukavina, A., 2016. Can carbon emissions from tropical deforestation drop by 50% in 5 years? *Global Change Biology* 22, 1336–1347. <https://doi.org/10.1111/gcb.13153>

Ziegler, A.D., Phelps, J., Yuen, J.Q., Webb, E.L., Lawrence, D., Fox, J.M., Bruun, T.B., Leisz, S.J., Ryan, C.M., Dressler, W., Mertz, O., Pascual, U., Padoch, C., Koh, L.P., 2012. Carbon outcomes of major land-cover transitions in SE Asia: great uncertainties and REDD+ policy implications. *Global Change Biology* 18, 3087–3099. <https://doi.org/10.1111/j.1365-2486.2012.02747.x>