



## The Role of Physical and Political Factors on the Conservation of Native Vegetation in the Brazilian Forest-Savanna Ecotone

PDF (Size: 1255KB) PP. 49-56 DOI: 10.4236/ojf.2013.31008

### Author(s)

Henrique O. Sawakuchi, Maria Victoria R. Ballester, Manuel Eduardo Ferreira

### ABSTRACT

The Araguaia River Basin covers a considerable extent of Brazilian Savanna (locally called Cerrado) and part of Amazon Tropical Rainforest, embracing high biodiversity and a vast flooding area. This region has been converted to agricultural lands since 1970s, for the past four decades, leading to a fragmented landscape that holds one of the few large remaining blocks of Cerrado primary vegetation. Therefore, to assess the degree of preservation of this area a 2007 primary vegetation map was derived through Boolean operations using land use and land cover maps from 1975, 1985, 1996 and 2007, from digital classification of Landsat MSS and TM images. To evaluate the role of driving factors on the presence of pristine vegetation, a logistic regression analysis was performed. Tested factors were: distance from roads and cities, terrain slope, land tenure, soil fertility and flooding. We found statistically significant values ( $p < .05$ ) showing that distance from roads and cities, the increase in slope, the presence of protected areas, indigenous lands, wetlands and areas with low fertility have positive influence on the presence and maintenance of these pristine areas. The occurrence of original vegetation in many cases is associated with environmental constraints that difficult or do not allow agricultural use. Analysis of physical and political factors, which may have direct or indirect influence on the conservation and degradation of native vegetation are very important for the comprehension of the dynamics of regional land use, and provide supporting information for a more efficient and sustainable regional landscape planning.

### KEYWORDS

Amazon-Cerrado Transition; Pristine Vegetation; Driving Factors; Deforestation; Araguaia River Basin; Regional Planning

### Cite this paper

Sawakuchi, H. , Ballester, M. & Ferreira, M. (2013). The Role of Physical and Political Factors on the Conservation of Native Vegetation in the Brazilian Forest-Savanna Ecotone. *Open Journal of Forestry*, 3, 49-56. doi: 10.4236/ojf.2013.31008.

### References

- [1] Alencar, A., Nepstad, D., McGrath, D., Moutinho, P., Pacheco, P., Diaz, M. D. C. V. et al. (2004). Desmatamento na Amazônia: indo além da emergência crônica. Belém: Instituto de Pesquisa Ambiental da Amazonia (Ipam).
- [2] Alves, D. S., Morton, D. C., Batistella, M., Roberts, D. A., & Souza Jr., C. (2009). The changing rates and patterns of deforestation and land use in Brazilian Amazonia. In M. Keller, M. Bustamante, J. Gash, & P. S. Dias (Eds.), *Amazonia and global change* (pp. 11-24). Washington DC: American Geophysical Union. doi:10.1029/2008GM000722
- [3] Alves, D. S., Pereira, J. L. G., De Sousa, C. L., Soares, J. V., & Yamaguchi, F. (1999). Characterizing landscape changes in central Rondonia using Landsat TM imagery. *International Journal of Remote Sensing*, 20, 2877-2882. doi:10.1080/014311699211859
- [4] Asner, G. P., Keller, M., Lentini, M., Merry, F., & Souza Jr., C. (2009). Selective logging and its relation to deforestation. In M. Keller, M. Bustamante, J. Gash & P. S. Dias (Eds.), *Amazonia and global*

- [Open Special Issues](#)
- [Published Special Issues](#)
- [Special Issues Guideline](#)

[OJF Subscription](#)[Most popular papers in OJF](#)[About OJF News](#)[Frequently Asked Questions](#)[Recommend to Peers](#)[Recommend to Library](#)[Contact Us](#)

Downloads: 15,287

Visits: 72,934

[Sponsors, Associates, and Links >>](#)

- [5] Ballester, M. V. R., Victoria, D. D., Krusche, A. V., Coburn, R., Victoria, R. L., Richey, J. E. et al. (2003). A remote sensing/GIS-based physical template to understand the biogeochemistry of the Ji-Parana river basin (Western Amazonia). *Remote Sensing of Environment*, 87, 429-445. doi:10.1016/j.rse.2002.10.001
- [6] Batistella, M., & Moran, E. F. (2005). Dimensoes humanas do uso e cobertura das terras na Amazonia: uma contribuicao do LBA. *Acta Amazonica*, 35, 239-247. doi:10.1590/S0044-59672005000200014
- [7] Borma, L. S., da Rocha, H. R., Cabral, O. M., von Randow, C., Collicchio, E., Kurzatkowski, D. et al. (2009). Atmosphere and hydrological controls of the evapotranspiration over a floodplain forest in the Bananal Island region, Amazonia. *Journal of Geophysical Research*, 114, Article ID: G01003.
- [8] Bruner, A. G., Gullison, R. E., Rice, R. E., & da Fonseca, G. A. B. (2001). Effectiveness of parks in protecting tropical biodiversity. *Science*, 291, 125-128. doi:10.1126/science.291.5501.125
- [9] Cardille, J. A., & Foley, J. A. (2003). Agricultural land-use change in Brazilian Amazonia between 1980 and 1995: Evidence from integrated satellite and census data. *Remote Sensing of Environment*, 87, 551-562. doi:10.1016/j.rse.2002.09.001
- [10] Carvalho, F. M. V., De Marco Júnior, P., & Ferreira, L. G. (2009). The Cerrado into-pieces: Habitat fragmentation as a function of landscape use in the savannas of central Brazil. *Biological Conservation*, 142, 1392-1403. doi:10.1016/j.biocon.2009.01.031
- [11] Chomitz, K. M., & Gray, D. A. (1996). Roads, land use, and deforestation: A spatial model applied to belize. *World Bank Economic Review*, 10, 487-512. doi:10.1093/wber/10.3.487
- [12] Collicchio, E. (2006). Organizacao estadual de pesquisa agropecuária: Um instrumento de apoio ao desenvolvimento rural sustentável do Tocantins. Palmas: Provisao.
- [13] Collicchio, E. (2008). Zoneamento edafoclimático e ambiental para a cana-de-acúcar e as implicacoes das mudancas climáticas no estado do Tocantins. Ph.D. Thesis, Piracicaba: University Of Sao Paulo.
- [14] Coutinho, A. C. (2005). Dinamica das queimadas no estado do Mato Grosso e suas relacoes com as atividades antrópicas e a economia local. Ph.D. Thesis, Sao Paulo: University Of Sao Paulo.
- [15] Diegues, A. C. S. (2002). Povos e águas: Inventário de áreas úmidas (2 ed.). Sao Paulo: Núcleo de apoio à pesquisa sobre populacoes humanas e áreas úmidas, USP.
- [16] EMBRAPA (2008). Informacoes técnicas para a cultura do arroz irrigado no Estado do Tocantins: Safra 2008/2009. Santo Antonio de Goiás: EMBRAPA Arroz e Feijao.
- [17] Fearnside, P. M. (2006). Desmatamento na Amazonia: Dinamica, impactos e controle. *Acta Amazonica*, 36, 395-400. doi:10.1590/S0044-59672006000300018
- [18] Ferreira, L. V. (2001). Identificacao de áreas prioritárias para a conservacao da biodiversidade por meio da representatividade das unidades de conservacao e tipos de vegetacao nas ecorregioes da Amazonia brasileira. In J. P. R. Capobianco (Ed.), *Biodiversidade na Amazonia brasileira: Avaliacao e acoes prioritárias para a conservacao, uso sustentável e reparticao de beneficios* (pp. 268-286). Sao Paulo: Instituto Socioambiental.
- [19] Ferreira, L. V., Venticinqu, E., & Almeida, S. (2005). O desmatamento na Amazonia e a importancia das áreas protegidas. *Estudos Avancados*, 19, 157-166. doi:10.1590/S0103-40142005000100010
- [20] Ferreira, N. C., Ferreira, L. G., & Miziara, F. (2007). Deforestation hotspots in the Brazilian Amazon: Evidence and causes as assessed from remote sensing and census data. *Earth Interactions*, 11, 1-16. doi:10.1590/S0044-59672006000300018
- [21] Geist, H. J., & Lambin, E. F. (2001). What drives tropical deforestation? A meta-analysis of proximate and underlying causes of deforestation based on subnational case study evidence. Belgium: University of Louvain.
- [22] Gils, H. A. M. J. V., & Ugon, A. V. L. A. (2006). What drives conversion of tropical forest in Carrasco province, Bolivia? *Ambio*, 35, 8185. doi:10.1579/0044-7447(2006)35[81:WDCOTF]2.0.CO;2
- [23] Joppa, L. N., Loarie, S. R., & Pimm, S. L. (2008). On the protection of "protected areas" . *Proceedings of the National Academy of Sciences of the United States of America*, 105, 6673-6678. doi:10.1073/pnas.0802471105

- [24] Kirby, K. R., Laurance, W. F., Albernaz, A. K., Schroth, G., Fearnside, P. M., Bergen, S. et al. (2006). The future of deforestation in the Brazilian Amazon. *Futures*, 38, 432-453. doi:10.1016/j.futures.2005.07.011
- [25] Latrubesse, E. M., Amsler, M. L., de Moraes, R. P., & Aquino, S. (2009). The geomorphologic response of a large pristine alluvial river to tremendous deforestation in the South American tropics: The case of the Araguaia River. *Geomorphology*, 113, 239-252. doi:10.1016/j.geomorph.2009.03.014
- [26] Latrubesse, E. M., & Stevaux, J. C. (2006). Características físico-bióticas e problemas ambientais associados à planície aluvial do rio Araguaia, Brasil central. *Revista UnG—Geociências*, 5, 65-73.
- [27] Laurance, W. F., Albernaz, A. K. M., Fearnside, P. M., Vasconcelos, H. L., & Ferreira, L. V. (2004). Deforestation in Amazonia. *Science*, 304, 1109b-1111. doi:10.1126/science.304.5674.1109b
- [28] Laurance, W. F., Albernaz, A. K. M., Schroth, G., Fearnside, P. M., Bergen, S., Venticinque, E. M. et al. (2002). Predictors of deforestation in the Brazilian Amazon. *Journal of Biogeography*, 29, 737-748. doi:10.1046/j.1365-2699.2002.00721.x
- [29] Laurance, W. F., Cochrane, M. A., Bergen, S., Fearnside, P. M., Delamonica, P., Barber, C. et al. (2001). The future of the Brazilian Amazon. *Science*, 291, 438-439. doi:10.1126/science.291.5503.438
- [30] Ludeke, A. K., Maggio, R. C., & Reid, L. M. (1990). An analysis of anthropogenic deforestation using logistic regression and GIS. *Journal of Environmental Management*, 31, 247-259. doi:10.1016/S0301-4797(05)80038-6
- [31] Machado, R. B., Ramos Neto, M. B., Pereira, P. G. P., Caldas, E. F., Goncalves, D. A., Santos, N. S. et al. (2004). Estimativas de perda da área do Cerrado brasileiro. *Conservacao Internacional*.
- [32] Mahar, D. J. (1989). *Government policies and deforestation in Brazil's Amazon region*. Washington: World Bank Publications.
- [33] Margulis, S. (2004). *Causas do desmatamento da Amazonia Brasileira*. Brasilia: Banco Mundial.
- [34] Mertens, B., & Lambin, E. F. (2000). Land-cover-change trajectories in southern Cameroon. *Annals of the Association of American Geographers*, 90, 467-494. doi:10.1111/0004-5608.00205
- [35] Nepstad, D., Carvalho, G., Cristina Barros, A., Alencar, A., Paulo Capobianco, J., Bishop, J. et al. (2001). Road paving, fire regime feedbacks, and the future of Amazon forests. *Forest Ecology and Management*, 154, 395-407. doi:10.1016/S0378-1127(01)00511-4
- [36] Oliveira, P. J. C., Asner, G. P., Knapp, D. E., Almeyda, A., Galvan-Gildemeister, R., Keene, S. et al. (2007). Land-use allocation protects the Peruvian Amazon. *Science*, 317, 1233-1236. doi:10.1126/science.1146324
- [37] Pfaff, A., Robalino, J., Sanchez-Azofeifa, G. A., Andam, K. S., & Ferraro, P. J. (2009). Park location affects forest protection: Land characteristics cause differences in park impacts across Costa Rica. *B.E. Journal of Economic Analysis & Policy*, 9, 26. doi:10.2202/1935-1682.1990
- [38] Primack, R. B. (2002). *Essentials of conservation biology* (3.ed.). Sunderland: Sinauer Associates.
- [39] SEPLAN (2008). *Atlas do Tocantins: Subsídios à gestão e planejamento territorial*. Palmas: SEPLAN.