

Registry (CAR). Final identification of forest restoration areas also takes into account the opportunity costs, estimated by GLOBIOM-Brazil. Restoration costs take into account the previous use of the land, i.e., if it was cropland, pasture, abandoned land or degraded land. Our results emphasize the use of MapBiomas and GLOBIOM-Brazil as a support in the development of forest restoration policies.

Agricultural losses from biogeophysical climate change in Brazil: A business case for ecosystem protection?

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In the Amazon and Cerrado biomes of Brazil, slowing ecosystem conversion could help to protect valuable ecosystem services, but comes at the cost of foregone revenue from the expansion of agricultural activities. As part of a wider effort to estimate the likelihood that reducing ecosystem conversion will be net beneficial to key agricultural and government actors, we produced spatially explicit, near-term, probabilistic estimates of economic damage to the agricultural economy stemming from ecosystem services lost under ecosystem conversion. Underlying these estimates was an ecological forecasting framework. We assembled the framework using two sets of statistical models, selected for their predictive skill and drawing on remotely sensed and in situ evidence. Agricultural land use and native ecosystem area were extracted from MapBiomas 3.0. The first model set predicted the response of agriculturally relevant rainfall and temperature parameters to regional land use and land cover change. The second set predicted the response of agricultural productivity to changes in the regional climate. Together with idealized land use and land cover scenarios, we linked these models and used them to forecast economic damage to the agricultural sector stemming from ecosystem conversion. The results of the forecast exhibited a high degree of uncertainty, but nevertheless revealed the costs of damage from a considerable area of ecosystem conversion to robustly exceed the opportunity cost of conservation. Partitioning the uncertainty demonstrated several priority areas for improved modeling and data in the agricultural, ecological, and climatological domains.

Understanding the importance of the Cerrado for deforested-driven greenhouse gas (GHG) emissions in Brazil from 1990 to 2017

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The Cerrado, second largest biome in Brazil, is characterized by a savanna-dominated matrix enfolding forest and grassland patches. Native vegetation was already suppressed in 45% of its 2M km² territory in 2017. Cerrado remnants reserves 9 GtC, but this stock is prone to rapid conversion due to lack of protection and agricultural suitability. Governmental monitoring of GHG emissions associated with Cerrado deforestation covers the period of 1990-2010, leaving an information gap about the role Cerrado plays in the national emission profile in recent years. Here we present trends in land-use change emissions estimates for Cerrado from 1990 to 2017, produced by the SEEG (System for Estimating Greenhouse Gas Emissions) initiative. To estimate deforestation-driven emissions we used country specific emission factors and annual deforestation rates derived from the MapBiomas time-series. Deforestation was defined as pixels that remained in a vegetation class for at least three years and then transitioned to a land-use class, remaining in the later for two years or longer. Emissions from 1990 to 2017 were summed 18% of Brazil land-use change sector (7 GtCO₂e). Cerrado average contribution to the land-use change sector was 22% from 1990-1999, 15% from 2000-2009 and 20% from 2010-2017. The increase in Cerrado contribution in recent years indicates accelerated conversion in Cerrado in relation to other biomes. The Brazilian Forest Code allows for legal suppression of 325.000 km² and an associated emission of 3.2 GtCO₂e. Reducing national land-use change emissions requires urgent efforts by both public and private sectors to halt deforestation in Cerrado.

D4b: TECHNOLOGICAL INNOVATIONS FOR NATIVE FOREST MANAGEMENT IN DIFFERENT BRAZILIAN BIOMES

Forest management 4.0: planning with drones / Manejo Florestal 4.0 - planejamento com aeronaves remotamente pilotadas (RPAs)

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A cada dia se fazem mais presente no campo, os processos que envolvem as geotecnologias de precisão, com inclusão de máquinas robotizadas e guiadas por computadores, sensores de presença e GNSS. Importantes aliadas nessa nova era do planejamento florestal de grande teor digital, são as aeronaves remotamente pilotadas (RPAs) ou mais conhecidas como *drones*. O manejo de precisão de florestais tropicais na Amazônia também acompanha a nova geração tecnológica, contemplando para isso: os inventários florestais semiautônomos a partir de RPAs, GNSS pós-processado e uso de algoritmos para segmentação e geolocalização automática de árvores. O objetivo do trabalho foi propor um calendário preliminar de inventário florestal com uso de RPAs (classe III), contemplando as árvores codominantes e dominantes, acima de 50 cm de DAP1,3m. O mapeamento da cobertura florestal a partir de ortofotos de alta resolução (< 7 cm) será uma etapa que deverá preceder a entrada da equipe de inventário em campo. Dessa maneira, a equipe de inventário florestal iniciará seus trabalhos com a geolocalização precisa de todas as árvores dominantes, facilitando significativamente a busca por espécies de interesse. O trabalho foi na reserva florestal da Embrapa Acre, na Amazônia Brasileira, com a RPA DJI P4Pro, por meio de voos semiautônomos. Para segmentação foram testados diversos parâmetros utilizando o algoritmo GEOBIA. O acompanhamento mensal da floresta a partir de ortofotos de alta resolução, possibilita traçar um perfil modal preliminar das fenofases de cada uma das 14 espécies estudadas, demonstrando assim a viabilidade do inventário automatizado com as RPAs. ■

Alternative systems for primary transport of wood planks in low-intensity sustainable forest management / Sistemas alternativos para o transporte primário de pranchas de madeira no manejo florestal sustentável de baixa intensidade

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Na Amazônia existem diversas experiências de transporte primário de madeira na modalidade de Plano de Manejo Florestal Sustentável (PMFS) Pleno, com inúmeros arranjos de equipamentos e planejamentos já definidos em função do terreno, equipamentos disponíveis e graus de investimentos. Mas na modalidade