Testing the effects of legislation on deforestation rates in conservation units within the Legal Amazon

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Deforestation and destruction of natural ecosystems represent a serious threat to biodiversity and environmentally provided services. The Legal Amazon territory in Brazil is such a case, containing the largest continuous tropical forest on earth, which accounts for a large fraction of the global carbon budget, water cycle and biodiversity. The Amazon deforestation is a multi layered, complex issue involving multiple actors. Establishment of conservation units, implementation of focused legislation and adoption of deforestation programmes are considered important tools in conserving forests and biodiversity. Specifically, Federal Laws 9.985/00; 11.284/06 and 12.651/12 are designed to prevent further deforestation and harmonize economic development. Here we evaluate whether Federal Law 11.284/06 and 12.651/12, and the 2008 deforestation programmes decreased deforestation rates within conservation units in the Legal Amazon. We analyzed legislation on annual basis and found no significant change; however, we did find a significant change in deforestation rates after the compilation of operations and programs of 2008. Further, when we analyzed deforestation over a reasonable period for the effect of legislation, we found significant changes for Federal Law 11.284/06 resulting in a decrease in mean deforestation rates of 0.73 and 0.02 in absolute (km^2) and relative terms (%) respectively. Federal Law 12.651/12 showed no significant change, despite increase in mean absolute deforestation (+0.11 km^2) and decrease in mean relative deforestation (-0.04%). These results imply that both focused legislation and deforestation programmes contribute to reduce deforestation, conserve forest and biodiversity. However, the effects of the implementation of new legislation are not immediately clear.

The complexity of managing native forests through participation by local actors / *La complejidad de la gestión del bosque natural por la participial de actores locales*

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La evolución y desarrollo de la humanidad históricamente ha estado signada por su relacionamiento con el bosque, inicialmente como proveedor de frutos y leña, que se convirtió en un determinante para intervenir el medio, hasta sostener relaciones complejas como soporte y regulación de la vida misma de la humanidad a través de los servicios ecosistémicos que provee. Esta investigación permite identificar la evolución conceptual que el hombre ha tenido del bosque, desde consideraciones netamente extractivistas por explotación hasta su tratamiento holístico por múltiples servicios ecosistémicos propios de su dinámica, bases para la consecución del desarrollo sostenible tanto de las comunidades que tiene un contacto directo con él, como de la sociedad que requiere de muchos de sus servicios para satisfacer necesidades básicas. La percepción conceptual ha evolucionado de objeto de explotación, considerado como recurso, a requerimientos de gestión multinivel para alcanzar un manejo hacia la provisión de medios para la consecución del bienestar, para su perpetuación como recurso natural renovable; así se hace necesario evolucionar de una consideración de simple factor de producción, cerniéndose entre el libre acceso y derechos de propiedad, hacia la definición de un conjunto de condicionantes o principios de arreglo institucional de relacionamiento, que se definen resultado de la presente investigación, en pro de prospectar la gestión del bosque como recurso de uso común en el siglo XXI, para hacer una efectiva gobernanza forestal.

A9r: FOREST OWNERSHIP AND FOREST VALUES

Estimation of the asset value of lands reserved for environmental preservation in Brazil

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The territorial and economic dimension of the areas devoted by farms to preserve native vegetation was not known in Brazil until the Forestry Code was promulgated (Law 12,651/2012). By law, rural properties should maintain areas with native vegetation cover in various categories (Legal Reserve, Permanent Preservation Areas, Surplus Vegetation, etc.). Created by the Forestry Code, the Rural Environmental Registry (CAR) is a mandatory electronic registry for all rural producers that became a relevant tool for agricultural and socio-environmental planning. The aim of this study was to quantify the property asset value of each hectare of legal reserve and permanent preservation areas in Brazil should they be sold for current market prices. Based on the price of land published by FNP Consultoria & Negócio for the year 2017, it is possible to assess by activity group (grain, rice, semi-arid shrubland, coffee, sugar cane, savannah, Amazon rainforest, transition forest, planted forests, fruit farming, Atlantic rainforest, horticulture, pasture, miscellaneous production) the average and full values of municipal land. With data from the CAR regarding the territorial area of the 218 million hectares of areas devoted to preserving native vegetation in Brazilian rural properties, produced by Embrapa Territorial, reserved areas were calculated by municipality, micro-region, and state. The results were then multiplied by the respective full land values (FNP, 2017). The national total shows that Brazilian farmers and cattle ranchers own land assets reserved for the benefit of the environment in excess of 3.1 trillion reais.

Costs of opportunity and potential for the generation of jobs, taxes, and food in mandatory environmental reserves of Brazilian rural properties

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The assessment of costs of opportunity is one way to estimate the wealth that was renounced with the legal obligation to keep areas with productive potential as environmental reserves in Brazil. Knowing the costs of opportunity is relevant in order to estimate the economic value of ecosystem services, providing environmental information to agents, aiming to underline the role of farmers in the preservation of nature and its impact in society, in socioeconomic terms as well as in terms of food production. The goal was to calculate the costs of opportunity, generation of jobs, taxes, and food in mandatory environmental reserve areas in Brazil. To calculate the cost of opportunity, we considered the main crop in the municipality under assessment, as well as corn, which has a more widespread territorial distribution. For the number of jobs to be generated, we used the average direct jobs in the corn sector. Tax generation was calculated

based on Funrural (Law 13,606/2018). Information about environmental reserves was extracted from the Rural Environmental Registry (2018) and organized by staff from Embrapa Territorial. Taking into consideration the main crop in each municipality, the 97.9 million hectares of mandatory environmental reserves in Brazil have a cost of opportunity of 309.8 billion reais. Taking into consideration corn for all municipalities, the value is 246.5 billion reais. Annually, more than 419.8 million tons of corn could be produced, an amount that could feed approximately 1.68 billion people, generate 4.9 million direct jobs, and collect 4.6 billion reais in taxes (Funrural).

Forgotten forests in the Brazilian Amazon: policy and territorial planning

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The Brazilian Amazon had ca; 65.4 million hectares of undesignated public forestlands in 017. This massive block of forests is not under some category of use or effective supervision by a designated public agency, increasing the risk of continued land grabbing and predatory use. We estimated that ca; 25% of Amazon annual deforestation occurred in these forestlands between 2015-2018, responding for 200 million tons of CO_2 emissions. Under the current scenario of deforestation growth in the region, the immediate allocation of undesignated forestlands to production, conservation or social use by the government would reduce the availability of unsupervised public land, increase forest protection and, therefore, decrease deforestation and carbon emissions. The careful designation planning and landscape design may contribute to form a mosaic of different categories of forest protection that may optimize the maintaining of ecosystem services in large extensions of forests, mitigating the effect of climate changing and its consequences. Doing so, Brazil will also increase governance of its large share of the Amazon forest.

Assessing indigenous people's perception and preference for ecosystem services: case study of Omo Biosphere Reserve, Nigeria

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Biosphere reserves are designated to harmonize the relationships between humans and their environment in order to mitigate biodiversity loss which underpins ecosystem services and environmental sustainability. However, previous studies have shown an increasing decline in the availability of ecosystem services over the past few decades due to unsustainable use and management of forest resources. Though an urgent intervention program is needed for sustainable ecosystem services provision for the local communities, the translation of indigenous people's perception of ecosystem services into actionable strategies is still lacking. This study aims to understand local people's perception of ecosystem services that are of priority for their basic needs. Such understanding will help in focusing intervention programs to conserve the ecosystem services while conserving forest resources. To achieve this, empirical data will be collected using a face-to-face questionnaire survey. The questionnaire will be designed to collect information relating to socioeconomic, demographic, identification of ecosystem services, perception about ecosystem services in terms of importance and preferences, accessibility to ecosystem services, and willingness to conserve ecosystem services. Frequencies and multinomial logistic regression will be used to determine which ecosystem services are perceived as important and likely to be utilized in Omo Biosphere Reserve and other similar landscape. This study will help to understand direct users' preferences which will facilitate policy-makers to respond to stakeholders' priorities and better orient management of forest resources. Such orientation can help to improve indigenous peoples' livelihood while contributing to the Global Sustainable Development Goals

How to choose a suitable family forest cooperative organization for local small-scale private forestry in China: a successful experience from Yongan county

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Since the Chinese Collective Forest Tenure Reform (CCFTR), three typical Family Forest Cooperative Organizations (FFCOs)in the form of Forestry Professional Cooperatives (FPC), Family Stock-Cooperative Forest Farm (FSCFF) and Forestry Association(FA) have been successfully established and operated at most of local villages. Based on the sample data of 143 FFCOs and thevillages where they locate in in Yongan, a successful demonstration county of CCFTR, we make a model by Multiple Logistic Regression and Stepwise Regression through using R software. Results show thatthe model with the smallestAkaike Inf. Crit.(AIC) of 67.06 is selected, and influencing factors such as local race category, forest resource category, law condition, land scale served by FFCOs, number of the Party member, distance to town or market, proportion of migrant worker and forest land scale managed by family are significant at 1% probability level. It is concluded that, compared with FA, FPC and FSCFF, especially FPC with good policy conditions, are chose with big probability by local, and more suitable for local SHE race villages, or local with timber or bamboo forest, or smaller land scale served by FFCOs, or smaller forest land scale managed by family, or more Party members, or long distance to town, or more proportion of migrant workers. Finally, we suggest that the successful experience of demonstration county should be actively summarize , and appropriate FFCOs should beselected and popularized for other small-scale family forestry according to local actual conditions such as forest resource conditions, village social conditions, and policy environment.

Economic optimization of landscape restoration in Latin America

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Landscape Restoration in Latin America is becoming an increasable feasible strategy to mitigate and adapt to climate change effects. Restoration includes interventions such as reforestation, agroforestry, and silvopastures. Many governments in the region have committed to restoring about 50 million hectares to the Bonn Challenge, Initiative 20x20 and the New York Declaration on Forest. However, challenges remain about where, when, and how to implement restoration activities in the landscape. In this study, we developed a multi-objective multi-criteria spatial optimization model to identify, rank and prioritize different restoration opportunities based on their contribution to multiple objectives. The model optimizes spatial resource allocation to priority areas to restore forest connectivity, improve carbon stocks and protect water resources. We have applied the model in two countries, Guatemala and Colombia to estimate the