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What Can We Do to Promote Sustainable Development in the Brazilian amazon?

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Abstract

Considered the most expansive biome in the world, Amazonia has the largest ecosystem biodiversity and could be developed sustainably through limited use of its products and their derivatives. However, the occupation and current type of development has resulted in alarming rates of deforestation, almost always associated with fire. In Brazil, the advancement of the agricultural frontier has been highlighted as the principal cause of degradation of the Amazon Forest, which makes ever more important the development of production systems with reduced environmental impact. Sustainable management and the cultivation of native species with untapped potential, via products such as foods, medicines, resins, or wood, or services such as ecoturism, are all possibilities. But for this to happen, it is necessary to raise awareness within the population about environmental effects, to advance the study of products and product systems based on local species, and the development of public policies that conciliate regional development and environmental quality.

Introduction

Amazonia is a rich natural environment, from flora and fauna, through mineral deposits, to its immense rivers and lakes, that also provides the home for many peoples. Currently, the adoption of sustainable practices is small, in part due to a lack of appropriate technology that would allow for the full study of substances at the molecular level, allowing for the discovery of uses for macro and microorganisms and mineral resources present. The current land use is restricted to traditional agriculture. The pressue to expand these economic activities drives the current alarming rate of deforestation. These actions are perpetrated in the absence of instruments at the command and control of the government, and cause unmeasurable costs to the environment, that are left without reparation of this damage. Recently, the international community has expressed concern in regard to Amazonian degradation, particularly this year's devastating fires.

Impact of Use and Occupation on the Brazilian Amazon

With occupation increasing since the 1960's, native vegetation has been substituted for alternative uses that necessitate land clearing, usually pasture or small-scale agriculture. Beyond the impacts caused by agriculture and ranching , there are other growing threats in the form of logging, large scale transportation and energy infrastructure , and the small but significant exploration of mineral reserves [1]. The conversion of the original landscape in ways that modify the land surface, have immediate effects on the flows of energy and materials between the biosphere and atmosphere , due to changes in the surface albedo, roughness and water balance. From these initial changes, other alterations occur that may compromise nurient cycling, carbon cycling, the chemical composition of the water and air, the physical, chemical, and biological characteristics of the soil, and make the forest uninhabitable by its original inhabitants. And this impact is directly proportional to the scale of landscape conversion. Though They are underrated by most of civil society, and even some political leaders and scientists, these impacts not only affect the global climate, but may also cause disastrous local effects. Maintaining current trends in deforestation, it is possible that a large-scale reduction in the formation of clouds responsible for rain in the Central-southeast of the country due to a reduction in the formation of sources of organic condensation from trees that are felled [2]. But it is not possible to predict the limit of land conversion for which these phenomena will become significant.

The Amazon Forest is a system that has feedbacks with the climate, whose change represents a serious threat to its existence and to the environmental services it provides [3]. Within this context, increasing temperatures and decreasing humidity of

the local and regional climate may be driven by the changes in land use that remove forest cover. When forest cover is removed, surface runoff of rainwater increases and infiltration decreases, causing erosion, loss of minerals and silting rivers, resulting in the pollution of downstream basins and reducing hydrological security. Paradoxically, the same regions of Amazonia that have been deforested, are used to produce a large portion of grains and meat, that are highly dependent on the availability of water. Therefore, the understanding that forest fragmentation will alter the hydrological cycle, and may compromise productivity, is necessary. Were this to occur, it would further increase the cost of food, and harm local traditions of logging , fishing as well as indigenous groups. In this way, the perceptions and environmental awareness of the population as a whiole and of rural producers in particular must be improved so that they are conscious of problems that can be caused by the transformation of Amazon Forest vegetation. This will reconcile development with environmental quality, and consequently, the well-being of the society as a whole.

In all of the Brazilian Amazon, rural properties must preserve riparian areas, natural springs, the areas surrounding the reservoir of dammed waterways, and steep slopes. Beyond this was created the requirement of legal reserves of native vegetation, with required percentages variable by region, 80% for forests, 35% for cerrado and 20% for plains. These areas can be developed only with the express approval of environmental secretaries tasked with sustainable management. Despite these legal restrictions, some rural properties have converted protected areas into pasture or planted crops in an illegal manner. In these cases environmental repairs must be made to restore or rebuild these lands.

Sustainable Development Practices for the Brazilian Amazon

Environmental impacts caused by deforestation represent a lost opportunity to sustanably use the forest by exploring and researching both wood and non-wood products [3-5]. With the survey of tropical forests, a beneficial market could be formed in the case of detailed study [6], exploration and careful management of resources, resulting in an increase in nutrient rich foods, medicines, resins, starches, wood and other, yet to be discovered, products. Another factor that should be considered is that the replacement of forests by small statured plantations modifies the hydrological and climate systems, causing changes in the precipitation and increasing air temperature, which are important variables for the maintenance of existing farming and ranching activities. Since the 1990s, the problems caused by intensive and extensive agriculture resulted in efforts to produce foods using techniques with a lower environmental impact. The recuperation of environmental liabilities from degraded areas is an opportunity to develop models of integrated systems with diverse native species, in order to better understand the potential production and marketability of Amazonian products. To do this, it is necessary that alternative production models with diverse native species are studied, as well as the development of mechanization or partial mechanization techniques that would allow these systems to be implemented in medium or large properties. Therefore, studies that evaluate the production of native species and opportunities to add value to their products and derivatives, their production cycles, potential methods of cultivation, opportunities for mechanization, and genetic improvement to increase production and productivity are indispensable. The biodiversity and scenic beauty of Amazonia are also important attractions for ecotourism, whose economic potential could result in significant economic returns for the region.

Conclusion

The discovery of products and derivatives specific to Amazonia bring economic and ecological benefits, and can also result in societal benefits including jobs, salaries, reduction of rural exodus and improved land tenure by way of modern mechanized harvesting. However, this is hindered by a lack of necessary resources, such as rural labor, low technology, limited scientific knowledge, few economic incentives, reduced awareness of societal benefits, and the absence of public policies. This necessity comes at a time when remote sensing of vegetation is used by governmental institutions and researchers to detect and map deforestation in almost real-time, increasing the efficiency of combating illegal actions and monitoring recovering areas. But the effectiveness of recovering these areas, as well as a reduction of the pressure to clear primary forest, will be best encouraged by economically viable production systems, producing returns better than those of modern agriculture, together with public policies that develop technology and help train workers.

Conflict of Interest

There is no conflict of interest.

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