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ANALYSIS

Carbon offsets as an economic alternative to large-scale logging: a case study in Guyana

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Abstract

The objective of this study is to analyze the economic viability of carbon-offset projects that avoid logging in Guyana's forests. The results of this case study illustrate the cost effectiveness of alternative land-use options that reduce deforestation and associated greenhouse gas (GHG) emissions. This analysis demonstrates that using Guyana's rainforests for climate change mitigation can generate equivalent revenue to that of conventional large-scale logging without detrimental environmental impacts. At a 12% discount rate, the break-even price for carbon is estimated to be about US$ 0.20/tC. This estimate falls toward the low range of carbon prices for existing carbon offset projects that avoid deforestation.

Keywords: Carbon offsets; Deforestation; Climate change mitigation; Land use change and forestry; Guyana

1. Introduction

Since the early international attention to global warming beginning with the World Climate Conference in 1979 to the more concerted efforts and ongoing negotiations of the Kyoto Protocol, the accumulation of carbon dioxide (CO_2) in the atmosphere continues to be an important concern for international institutions and national governments. Deforestation and other land-use changes are recognized as a major source of rising atmospheric CO_2, responsible for 20–25% of global anthropogenic greenhouse gas (GHG) emissions (Schimel et al., 1996). Therefore, avoiding deforestation holds significant promise as a potential means for diminishing this source of CO_2 emissions. The issue is especially relevant for Guyana, a nation whose forests cover over 75% of its total land area and represent one of the most intact tracts of old-growth tropical rainforests in the world. The country's financial distress has left few alternatives to large-scale logging to supplement national income. The timber industry, dominated by foreign-owned companies, ranks among the leading

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threats to Guyana's forests and is largely responsible for the destruction of approximately 49,000 ha annually (FAO, 2001). The nation has been forced to sacrifice its forests to generate much-needed foreign exchange, service a sizable external debt, and alleviate poverty. While logging does provide income for the country as a whole (about US$ 36 million annually[1]), it also destroys large areas of old-growth forest, threatens the survival of endangered species, and impacts the traditional livelihood of indigenous and forest communities. Guyana's National Forest Policy articulates forest management goals that include protecting rainforests, providing income to stakeholders, and ensuring ecosystem services. However, the country's decision to pursue large-scale logging demonstrates the priority the government places on achieving its financial objectives, even at the expense of other goals identified in the Forest Policy. Due to binding financial constraints, the government of Guyana is unlikely to consider alternative forest activities unless they generate revenue comparable to the amount gained from logging. Forest-based climate change mitigation or carbon-offset projects could offer such an option. The objective of this paper is to determine the economic feasibility of 'avoided deforestation'[2], a designated 'land use, land-use change, and forestry' (LULUCF) activity under the Kyoto Protocol. Carbon offsets that avoid logging or deforestation have the potential to not only generate revenue competitive with large-scale commercial logging but also to meet other development and environmental goals articulated in Guyana's National Forest Policy.

Several studies have performed economic analyses of avoided deforestation in individual host countries (Kremen et al., 2000; Pereira et al., 1997; Makundi and Okitingati, 1995; Ismail, 1995; Wangwacharakul and Bowonwiwat, 1995). However, many of these analyses fail to consider the opportunity costs of land on a national basis (Brown et al., 2000b). When including opportunity costs, one study's results show that carbon offset projects that avoid logging in Madagascar are not economically viable at the national scale (Kremen et al., 2000). Avoided deforestation can yield a range of economic outcomes, and therefore, more specific country studies are needed to determine the economic viability of these projects within a particular resource outlay and within particular geographical, cultural, and socioeconomic contexts.

This paper analyzes the economic feasibility of avoided deforestation for Guyana by first determining the opportunity costs of the deferred land use, which are the revenues from large-scale logging. The break-even price for carbon is defined as the minimum price that will enable Guyana to generate revenue equivalent to that of large-scale logging. The price is determined by dividing the opportunity costs by the carbon benefit of avoided deforestation, which is equivalent to expected carbon emissions from logging.

2. Avoided deforestation in the climate change agreement

The Kyoto Protocol requires industrialized countries to reduce their GHG emissions to about 5% below 1990 levels by the end of the first commitment period (2008–2012). The clean development mechanism (CDM) is a 'flexibility mechanism' of the Kyoto Protocol, which allows industrialized countries to offset a portion of their emissions in developing countries through energy and LULUCF-based projects. Avoided deforestation is one type of LULUCF project that serves to reduce carbon emissions by conserving existing carbon stocks (Brown et al., 2000b). In July 2001, rules to implement the Kyoto Protocol in the first commitment period were accepted by 178 countries in Bonn, Germany. The parties agreed that only afforestation and reforestation LULUCF projects would be eligible under the CDM for the first commitment period. Although avoided deforestation will not initially be included in the CDM, it may be reconsidered for future periods. In this paper, we argue that avoided deforestation should be reconsidered as a necessary and viable strategy to mitigate climate change in the CDM. Indeed, as Smith and Scherr (2002) have demonstrated, primary

[1] Logging's contribution to GDP is 5%, and Guyana's GDP in 2000 was US$ 710 million (World Bank, 2002).

[2] Throughout this paper, we often use the term 'avoided deforestation' to refer to avoided logging in the case of Guyana due to the fact that 'avoided deforestation' is a specific term used in the Kyoto Protocol.