

## ADDENDUM TO THE WHRC REDD REPORTS FOR THE BRAZILIAN AMAZON AND THE DEMOCRATIC REPUBLIC OF THE CONGO

The Woods Hole Research Center and collaborating institutions present new reports with analyses of possible REDD programs for two key tropical forest countries that differ greatly: Brazil and the Democratic Republic of the Congo. These countries have, respectively, the world’s first and second largest moist tropical forest estate, histories of very high and very low deforestation, driven by primarily cattle ranching and smallholder farming, with high and low capacity to implement and monitor REDD programs. Our goal in these analyses is to present an approach to REDD that builds from the ground up, focusing on how much REDD will *cost* for these countries to implement, how REDD could maximize benefits to forest people, and exploring some of the basic premises of the REDD debate. The results of these reports provide some important lessons in the types of challenges that countries will face in developing REDD programs. Smallholder farmers, for example, with semi-subsistence incomes from very small parcels of recently cleared land, may require higher per-ton-carbon compensation than some other types of deforesters, such as Amazon cattle ranchers. In this Addendum, we respond to some of the questions that these reports have fostered in the spirit of helping to interpret the work represented in these studies. We remind readers that both of these reports are designed as *illustrative studies* of potential approaches to the design of REDD programs and should not be interpreted as definitive research conclusions. The goal of these reports is to stimulate discussion, offer simplifying conceptual approaches to difficult aspects of REDD program design, and to demystify REDD.

### Q1. Why do reductions in carbon emissions from deforestation cost so little in the Brazil Amazon (<\$3 per ton of carbon) where individual land owners appear to make so much money?

A: Most (70 to 80%) of Amazon deforestation is driven by cattle ranching with annual profits of only \$10 to 20 per hectare, but with vast landholdings (often thousands of hectares). Alternative deforestation-dependent land uses that provide higher profits than cattle ranching, such as soybean production, are limited in their expansion in the Amazon by constraints from soil and climate. Land uses with low profitability that are driving tropical deforestation are important “low hanging fruits” of the emerging REDD regime.

In the Democratic Republic of the Congo, the main source of carbon emissions is swidden (slash-and-burn) smallholder farming. It is difficult to know the subsistence and cash income, or in-kind subsistence values, for swidden agriculture families, but we assume in the report that it ranges from \$300 to \$1000 per family per year, and is therefore higher than the per-hectare profits that accrue to Amazon cattle ranchers. (Cattle ranchers, however, typically own 5,000 hectares of land or more, while African smallholders typically own only a few hectares). Each

farm family emits an average of 15 tons of carbon each year, although farmers clearing the densest forests emit far more carbon each year. In the DRC report, the per-ton carbon values to compensate the opportunity costs of slowing swidden clearing that we present are aggregated to a District level and begin at \$10. When we disaggregate this data (Figure 1), we obtain a price of carbon beginning at \$4 per ton for farmers clearing high carbon forests (assuming \$300 annual family income).

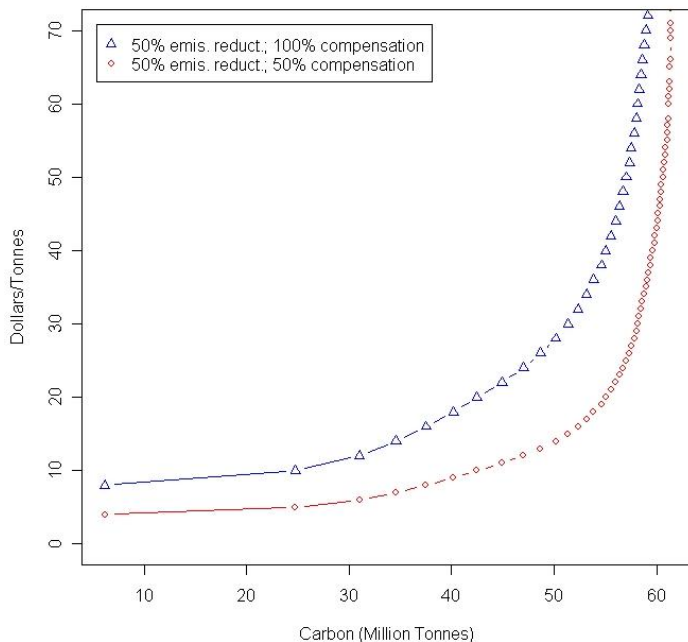


Figure 1. The marginal cost (per ton of carbon) of 50% and 100% compensation of the annual income of smallholder farmers in the DRC who reduce their forest clearing and associated carbon emissions by half. These data are estimated at a 10x10 km pixel level. The same method for estimating the carbon prices is used as in Table 1 of the report.

The cost of reducing carbon emissions from swidden farmers is similar in the Brazilian Amazon and the DRC. In the Brazilian report, smallholders are allocated \$1,200 per year to gradually shift to permanent agriculture that does not require new deforestation. Our research has shown that smallholders in the Amazon deforest just over 1 ha per year; if we assume that they are emitting 100 tons of carbon from that clearing a carbon price of \$12 would be needed to compensate these farm families for foregone revenues.

**Q2. Does WHRC support the logging of tropical forests?**

A: Sustainable forest management for timber production will be an important component of REDD strategies for many tropical countries because of its potential in reconciling economic development with the maintenance of forest carbon stocks. For both the Amazon and the Central African forests, the technology for good forest management – called Reduced Impact Logging – is well developed. The results can be income generation to both landowners and the government with minimal carbon emissions. While there is a stigma attached to logging, we believe that this stigma is largely the result of past mismanagement rather than inherent problems with logging technology or its impact on the environment. A well-managed forest sector will require proper oversight, adequate training and a level economic playing field. This would help reduce the environmental degradation currently associated with logging.

**Q3. If deforestation-dependent land uses slow down, will that not affect the overall economy?**

A: The joint returns from logging and carbon sales could generate as much income as is possible through activities that are dependent upon deforestation, such as cattle ranching, swidden agriculture, soybean cultivation, and palm oil production. The overall distribution of activities in the economy will change within the REDD regime, i.e., there may be fewer cattle producers, but the gross value product will be similar, or perhaps increase, and so will government revenues from taxes.

**Q4. How can a system of REDD payments reduce the deforestation activities of low-income, semi-subsistence farm families who live in remote forest regions?**

A. We estimate the cost of reducing carbon emissions from swidden farmers in both Brazil and the DRC using estimates of their annual income as a benchmark. We assume that carbon payments that increase the income of those farmers who reduce the area of forest they clear each year will be an attractive option. In practice, the reduction of carbon emissions from swidden agriculture in a way that does not threaten the food security of farm families and that leads to lasting shifts towards stable, sustainable, high-carbon farming systems, is a very complex undertaking, particularly in remote forest regions with poor market access. The success of large-scale interventions in swidden farmer land use will depend upon effective rural extension systems, assistance (at least for a transition period) with of fertilizer and seed, investments in marketing systems, and improvements in basic education. At its broadest scale, successful REDD programs will encourage farming in regions where stable, diversified production systems are feasible as it discourages migration of land-seeking farmers into regions of largely intact forests where the feasibility of productive farming is low.

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***Further Information:*** Interactive maps produced for the Democratic Republic of the Congo report are also available from the WHRC website: [http://atlas.whrc.org/drc\\_emissions](http://atlas.whrc.org/drc_emissions)