Discussion Draft: September 25, 2007

Forests and Biodiversity in Latin America: An Alternative View

Randall Kramer

Nicholas School of the Environment and Earth Sciences
Duke University
Durham, NC. 27708 USA

Introduction

Latin America faces a number of major environmental challenges including climate change, loss of biodiversity, provision of clean drinking water, deteriorating air quality in urban areas, and over-fishing of economically important fisheries. The Sedjo report focuses on one of these issues -- biodiversity in the regions' forests. Fueled by population growth in the developing world and increased resource demands in both developed and developing parts of the world, the loss of forests and forest biodiversity has accelerated in many parts of the world. These issues are particularly acute in tropical forests, which also contain many of the world's biodiversity "hotspots. Forest fragmentation, deforestation, and over-utilization of remaining forests have impacted the diversity of remaining species. This has prompted international efforts to protect the remaining tropical forest, but conservation remains significantly under-funded. In the developing world, current expenditures have been estimated to be only a small fraction of what is needed to ensure the survival of representative species, habitats and ecosystems (Kramer 2007)

This paper provides an overview of some of the main points raised in Roger Sedjo's assessment of biodiversity issues and opportunities in Latin America. Some additional economic

information is introduced, and an alternative, more modest solution for addressing the region's biodiversity concerns is provided, based on an expansion of protected areas.

The Context

Roger Sedjo has provided a thorough and balanced review of the definition, measurement and status of biodiversity. He notes that wile the rate of species extinction is at least an order of magnitude greater than background rates, IUCN has only documented 27 extinctions during the past 20 years. Thus, at the individual species level, there is reason for concern but the predictions of two decades ago that we would see thousands of extinctions by now have fortunately not been realized. Some experts fear that climate change may significantly increase rate of extinction since fast moving climatic shifts may leave behind some species who are unable to adapt their range.

Sedjo also reviews rates of forest and biodiversity loss in Latin America, noting that Latin America accounts for a very large percentage of the globe's total threatened species. Hence, Latin America is a location where targeting of biodiversity conservation could generate significant economic and social values.

Sedjo rightfully acknowledges the dearth of information about the benefits and costs of biodiversity conservation. He notes that the most widely cited study of global ecosystem benefits by Robert Costanza and colleagues has been widely criticized by economists, but he then goes on to use Costanza's seemingly inflated benefits estimates in some of his analysis. Sedjo searches for other benefit estimates and finds several credible estimates of bioprospecting benefits. For example, Simpson estimated the value to be as high as $9,431 for some species or $21 per hectare for some lands. However, once one factors in the low probability of getting a

commercial “hit” from a particular species or track of land, the bioprospecting benefits are too low to justify much, if any ,conservation.

Sedjo is most sanquine about the prospects of a global market for carbon as a source of future revenue that could support biodiversity conservation. He relies on a study by Pearce that estimated a potential of 100 tons per carbon per hectare and per ton price of $20 for carbon sequestered in forests. These numbers drive several of Sedjo’s benefit cost calculations and proposed solutions.

One element that is missing from Sedjo’s analysis is the institutional changes that would be necessary to convince public and private forest owners to move from their current orientation to timber production to one that emphasizes carbon storage and provision of other ecosystem services from all of the region’s forests. Even if global carbon markets scaled up to the point of providing consistent demand for carbon at a level of $20 per ton, would it be politically feasible to lock up all 1 billion hectares of Latin America’s forests for carbon sequestration? Would governments allow such a major structural change that would largely dry up local timber markets and cause large scale job losses in wood manufacturing and sectors? While I agree that there are reasonably good prospects that substantial amounts of forests could be set aside for sequestration and the resulting biodiversity benefits would be important, but I would expect it to occur at smaller scale than Sedjo implies.

Measuring the Non-Use Benefits of Biodiversity Conservation

It is inherently challenging to monetize the economic benefits of biodiversity conservation because of the array of services provided by biodiversity conservation (Pearce and Moran, 1994). Sedjo provided several different estimates of the benefits of biodiversity

conservation, primarily based on ecosystem services. While such services are an important part of the total economic value generated by forests placed into conservation status, it is necessary to also consider non-use values of biodiversity conservation. In some cases, the non-use values may well exceed the use values. In this section, I discuss two studies that have developed empirical estimates of the largely non-use, public good provision of biodiversity conservation. Both employ the contingent-valuation method (CVM), a stated preference approach that applies survey research methods to directly query respondents about their willing to pay for a change in the provision of a public good like biodiversity protection. The CVM approach allows the measurement of both use and nonuse values. As Sedjo observes, there are controversies surrounding stated preference approaches but it is the only accepted empirical strategy for capturing non-use values (Carson, et al., 2001).

Kramer and Mercer (1997) conducted a national contingent-valuation survey of U.S. residents to determine their preferences for protecting tropical rain forests. After focus groups, pretesting, and expert review, a survey instrument was developed and sent to a random sample of 1,200 U.S. residents. Respondents were asked several attitudinal questions about environmental and other social issues, awareness of tropical forest issues, the respondents' socioeconomic characteristics, and their willingness to provide financial support to expand the protection of rain forests. When asked, "Should industrialized countries help developing countries pay for preserving their rain forests?" two thirds said "yes." This response has important implications for international financing of biodiversity conservation.

Respondents were presented with a contingent valuation scenario – would they be willing to contribute to a United Nations-managed fund to protect an additional 5 percent of the world's tropical forests. The mean response for a one-time payment was $24 per household (see Table 1).

If we aggregate across all US households, this results in a total willingness-to-pay of nearly $2.2 billion in1992 dollars. This shows a significant demand for biodiversity protection for its own sake – few of these respondents expected to enjoy use benefits from the protected forests.

Table 1. US Residents' Willingness to Pay for Global Rainforest Biodiversity Conservation

Measure	**Estimated Value ($1992)**
Mean WTP/household	$24
Total WTP all households	$2.18 billion

Kramer and Mercer, 1997

Horton, Colarulio, Bateman and Peres (2003) conducted a similar study in Europe to see if these results could be replicated in a different cultural context. Their survey took a more narrow focus on forest conservation – the Brazilian Amazon. Iinterviews with 407 randomly selected individuals were conducted in Italy and the UK in1999. Horton et al (2003) found that 98% of their respondents were familiar with tropical rainforest issues and some 93% believed that industrial nations should share in the cost of rainforest conservation. The mean willingness to pay for protecting 5% more of the Brazilian Amazonia was $44 per household per year. Summing up over all households in the UK and Italy, this represents a willingness to pay of $1.62 billion (1999 dollars). The authors' analysis of the survey data showed that the values held for the Amazonia rainforests are largely non-use.

Table 2. European Residents' Willingness to Pay for Forest Biodiversity Conservation in Amazonia

Measure	**Estimated Value ($1999)**
Mean WTP/household	$43

Total WTP all households in UK and Italy	$1.68 billion

Taken together, the results of these two studies show strong support in OECD countries for biodiversity conservation in the south. There is a large and measurable willingness to pay (WTP) for such conservation efforts. While these measured values are likely approximations and not precise estimates, scaling up the household estimates suggest global non-use benefits in the billions of dollars from forest conservation (Kramer, 2007)

Alternative Solution: Expanding Protected Areas

Protected areas are a tried and true approach to conserving biodiversity. By restricting harvesting and most land disturbance, protected areas are one of the best ways to ensure that adequate amounts of representative ecosystems are in place to ensure stable biodiversity. Currently about 11 percent of Latin American land is under some form of protection status (WRI, 2005). However, much of the protection is on paper only, and many parks are woefully under-funded (Marquez, 2003). An alternative solution is to add 5% more land to the protected area system. Or, one can think of providing adequate funding for 5% of land under legal protection now but without effective conservation

The Horton et al study estimated a non-use benefit from biodiversity conservation in the Amazon at $1.68 billion per year for protecting 5% of the remaining forest. This works out to a per hectare benefit of $44 annually. The net present value of this non-use benefit is $1111 at a 4% discount rate. If we couple that with the Pearce cost estimate used by Sedjo of a one time payment of $500 to take land out of production, the benefit-cost ratio is 2.2 (see Table 3)

Table 3. Benefit-Cost Analysis of Expanded Protected Areas

Non-use benefits from Horton	$1.68 billion per year for 36,000 hectares	$1111 Net Present Value per hectare
Cost estimates from Pearce	$500 one time payment	$500 per hectare
Benefit-Cost Ratio		2.2

The findings of this analysis buttress the findings of Sedjo. There is a clear economic case for increased protection of biodiversity whether one focuses on use or non-use benefits. In this case, only non-use benefits are employed on the benefit side, and only the amount of benefits that would accrue to residents of the UK and Italy are included. Hence, if one expanded the range of beneficiaries to include national citizens in the countries where the conservation is practiced and one included benefits to citizens in other wealthy nations outside the region, the benefit-cost ratio would increase considerably. While this analysis was done for a 5% increase in protected area in the Brazilian Amazon, it is likely that a favorable benefit-cost ratio would be found for other biodiversity hotspots in Latin America as well.

Conclusions

The loss of biodiversity is one of the most pressing environmental issues in Latin America. Sedjo has mounted considerable evidence to show that increased protection of the biodiversity in the region's forest will generate significant net social benefits. His analysis hinges largely on the emergence of carbon markets that will provide sufficient use benefits to finance conservation. Alternatively, when one focuses on non-use benefits, one can make the case that it is economically feasible to increase the current level of biodiversity conservation even without the emergence of carbon markets. To implement an expanded biodiversity protection effort requires mobilizing the financial support from beneficiaries who are often

geographically separated from those who bear the costs of biodiversity conservation (Kramer, 2007). Example international cost-sharing mechanisms for capturing non-use benefits include the Global Environment Facility, Conservation International's Global Conservation Fund, and Debt-for Nature Swaps. Of course, the emergence of ecosystem service markets will only enhance these existing conservation finance tools and make it more politically feasible and economically attractive to reverse the decline in Latin America's biodiversity.

References

Carson, Richard T., Nicholas E. Flores, Norman F. Meade, "Contingent Valuation: Controversies and Evidence," Environmental and Resource Economics 19 (2001):173-210.

Costanza, Robert, et al. 1997. The Value of the World's Ecosystem Services and Natural Capital. Nature 253-260.

Horton, B., G. Colarullo, I. Bateman, C. Peres. 2003. "Evaluating Non-Users Willingness to Pay for a Large-Scale Conservation Programme in Amazonia." Environmental Conservation 30: 139-146.

Kramer, Randall A., "International Financial Transfers for Biodiversity Conservation," Unpublished paper prepared for OECD, Paris, France, March 2007.

Kramer, Randall A. and Evan. Mercer, "Valuing a Global Environmental Good: U.S. Residents' Willingness to Pay to Protect Tropical Rain Forests," Land Economics, 73 (1997): 196-210.

Marques, Huberto, "Environment-Latin America: Protected Nature - But On Paper Only," Global Information Network. New York: Sep 17, 2003. pg. 1

Pearce, D. and D.Moran. 1994. *The Economic Value of Biodiversity*. London: Earthscan.

Sedjo, Roger. "Forests and Biodiversity in Latin America: San Jose Solution Paper," July 2007.

Simpson, R.D. 2000. "Economic Perspectives on Preservation of Biodiversity." In *Conserving Nature's Diversity. Insights from Biology, Ethics, and Economics*. G.C. van Kooten et al eds. Aldershot, UK: Ashgate, 88-105.