

Parks Produce Local Economic Benefits in Amazonia

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Parks and reserves in the tropics have been portrayed as constraints on development for already poor communities. It is also argued that rich northern countries reap the benefits from these parks in the form of carbon storage, climate stability and biodiversity conservation, while the payoff to locals is inadequate to cover their opportunity costs (1,2). Recent evidence from the Brazilian state of Amazonas suggests that at least in some places the reality is quite the reverse; parks funnel money and jobs to places with few other options, and outsiders pay the tab.

Economic analyses of protected areas usually adopt a broad so-called “social” perspective, putting the establishment, operational and opportunity costs in the debit column, and counting as benefits any incremental values that can be attributed to formal protection. These include things like recreation, biodiversity, climate stabilization, watershed protection and sustainable extraction that would be lost in the park’s absence (3). This perspective is valid from a national or global point of view, but gives us little insight into the costs and benefits as they are experienced by locals, whose attitudes can contribute to a park’s success or failure.

We gathered 1992-2003 financial data from 10 protected areas (Figure 1) within 200 km of Manaus, state capital of Amazonas, sorting it according to the purpose and source of cash flows. The source categories were both institutional and geographic: private, non-governmental and governmental; and municipal, state, national and international. Expenditures on local goods and services made with funds originating outside state or local government were considered net additions to local economies. These figures were compared with the local opportunity cost of land. Further, we compared median incomes of people whose employment derived from protected areas with the regional median.

The 10 protected areas ranged in size from the 33 ha of the municipal Mindu Park to the 2.3-million-ha Jaú National Park. Annual local expenditures ranged from \$3,280 to \$428,010, with a median of \$142,105 per park, and \$3.72/ha. These values are consistent with independent estimates of the cost of protected area management in wilderness areas (4, 5). The total for the 10 areas was \$1.76 million per year. We conservatively estimated the present value of local expenditures over time at between \$7.23 and \$11.17 million, applying punishing discount rates of 10-20% that obtain in Brazil’s financial markets.

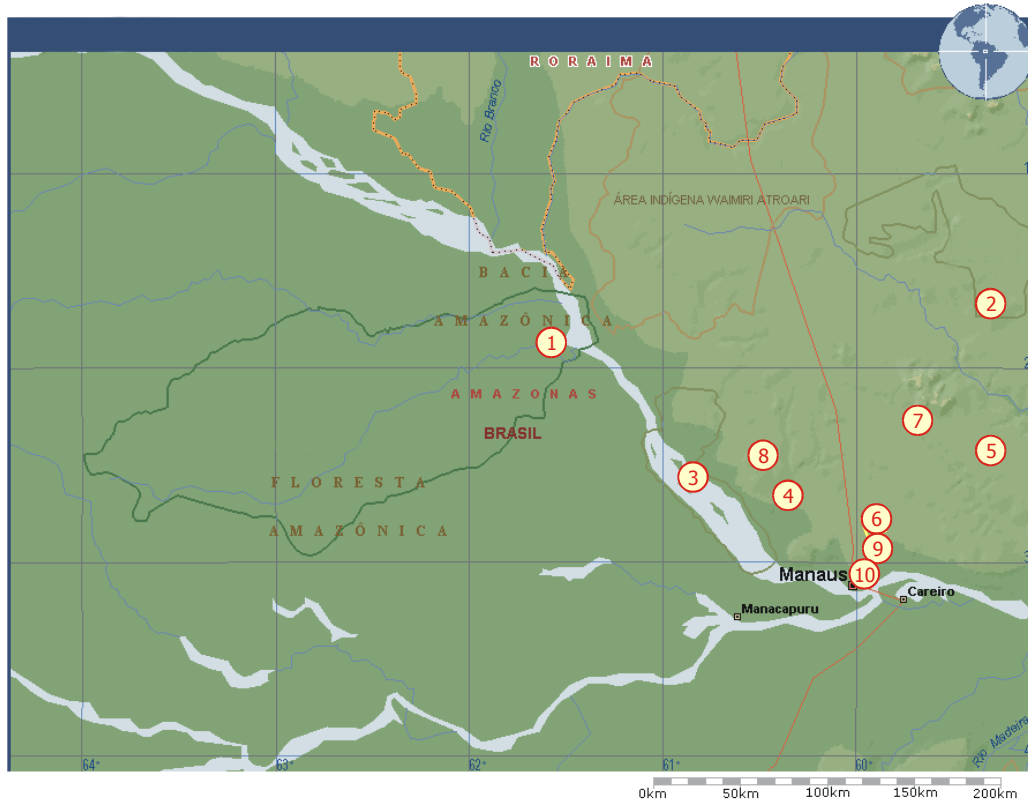
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Figure 1 - Studied protected areas



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| 1. Jaú National Park (2,272,000 ha) | 7. Projeto de Dinâmica Biológica de Fragmentos Florestais Reserve (2,488 ha) |
| 2. Uatumã Biological Reserve (943,000 ha) | 8. Cuieras Experimental Reserve (18,900 ha) |
| 3. Anavilhanas Ecological Station (350,018 ha) | 9. INPA Botanical Garden (500 ha) |
| 4. Rio Negro State Park (157,807 ha) | 10. Mindu Municipal Park (33 ha) |
| 5. Walter Egler Experimental Reserve (760 ha) | |
| 6. Adolfo Ducke Experimental Reserve (9,572 ha) | |

Financial flow analysis (Table 1) shows that only 1.49% could be identified as deriving from state and local government sources. An additional 5.98% came from non-governmental and private sources within the state of Amazonas (but may have originated elsewhere). A further 13.13% was from undefined government sources. At a minimum, therefore 79.4% of park-related funds comes from outside the state and can be viewed as “income” for the State’s economy. The proportion that originates outside local economies is probably much higher. If we apply the minimum percentage of outside funding to the median financial flows in the 10 parks, \$3.72/ha/year, parks draw at least \$2.95/ha/year into the local economy.

Table 1 - Source of incomes

Origin	Undefined	Government	ONG	Private	Total
Undefined	0.01%	13.10%	-	0.02%	13.13%
Municipal	-	1.49%	-	-	1.49%
State	-	-	0.80%	5.18%	5.98%
National	-	22.21%	3.84%	0.13%	26.18%
International	-	30.94%	14.34%	7.94%	53.21%
Total	0.01%	67.74%	18.98%	13.27%	100.00%

Pastures cover 77% of deforested areas in the Brazilian Amazon (6), making them a useful indicator for the opportunity cost of protection. Profits have been estimated at between \$2 and \$4/ha/year for extensive cattle ranching (7). Where Brazilian federal law is enforced, only 20% of private properties in the Amazon may be legally deforested, meaning that 80% has no opportunity cost for ranching, which drops the unit opportunity cost to \$0.40-\$0.80/ha. Whether the higher or lower figures are considered more relevant, parks are on average a competitive land use from a local perspective. Further, the five protected areas reporting employment figures showed 218 workers at an average annual salary of \$4,329.12 (min = \$2,556.67; max = \$9,786.08), well above the Amazon average of \$1,620 (8) and the national yearly minimum wage of around \$1000.

The per-unit-area median masks huge variation. While smaller areas readily compete with cattle ranching, larger areas such as Jaú, Anavilhanas, Rio Negro and Uatumã have local expenditures in the range of \$0.02-\$0.18/ha/year. These big areas, however, are remote and have little opportunity cost associated with foregone ranching. Among the most significant economic activities was research, which was concentrated in one area managed by the National Institute for Amazon Research (INPA). Our study is limited to a rough estimate of net benefits of this portfolio of protected areas, rather than the net benefits of each individual area.

This analysis is conservative in that it excludes many of Amazonas' most recently created parks and reserves, which are now receiving substantial investments. The study also omits much of INPA's administrative and research activity, which is surely related to the protected areas but difficult to tie to them directly. Further no multipliers were applied to the direct economic activity generated by parks. Finally, we assumed constant investment in the 10 protected areas over time, rather than a growth path driven by increasing global interest in ecosystem services.

Far from being a local sacrifice for the global good, protected areas can be a strategy for local economic development. The strategy will be more economically competitive where opportunity costs are low and can be managed by allowing some small-scale economic activities. Local benefits are particularly large where the research activities are encouraged and where resources can be drawn in from government, private and non-governmental sources simultaneously.

References and Notes

1. The authors wish to acknowledge the managers of the protected areas studied for providing data, INPA for logistical support, Conservation International for financial support and Keith Alger, Nicholas Connor, Anthony Rhylands and John Dixon for comments.
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