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# Research in biodiversity hotspots should be free

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Most species live in the tropics, but most field biologists study temperate ecosystems. For example, just 9.6% of recent papers in the journal *Ecology* are based on work in tropical countries [1]. Given this longstanding imbalance, it is no surprise that most 2010 targets set by the UN Convention on Biological Diversity will be missed [2,3]. Here I describe a one-time investment capable of permanently tripling research effort in biodiversity hotspots. At its heart is the concept of free field stations, whereby visiting researchers pay no user fees because all operating costs are covered by an endowment.

There are many reasons why science in the tropics lags behind that in the temperate zone. A lack of infrastructure for tropical field work is not, for the time being, one of them. A more immediate problem is that many well-established field stations in the tropics routinely operate at around 25% of capacity. During my tenure as director of a research station in Amazonian Peru, hundreds of scientists and students, both Peruvians and foreigners, told me that the primary obstacle to longer stays was the cost of field work.

In 2004–2007, a grant from the Gordon and Betty Moore Foundation allowed that site (the Los Amigos Biological Station) to waive station fees for a large proportion of research and training visits, and subsidize them for the remainder. The result was an increase of >500% in researcher-days compared to the preceding four years, resulting in the inventory of >5000 plant and animal species and the publication of 35 theses and peer-reviewed articles in 2008. When the grant ended, research traffic returned to pre-2004 levels despite modest station fees of US\$25 per night.

The Moore Foundation's experiment suggests that one effective way to stimulate field research on tropical ecosystems is to make it free. The foundations and government agencies that currently underwrite tropical field work typically do so as line items in grants to individual research teams. If instead they were to dedicate a portion of their annual budgets to endowing one field station in a biodiversity hotspot, their investments would have a greater and longer-term impact.

The experiment at Los Amigos suggests that permanently waiving station fees there would require a single endowment of around US\$4 million. Apart from standard operational costs, interest on the endowment would cover the salary of a resident director charged with ensuring an evenhanded mix of research topics, established and beginning researchers, and national and international visitors. The best way to guarantee a high level of science and

discourage freeloading would be to operate the station as a competitive grants program, soliciting proposals in a few high-priority fields (e.g. Latin American graduate students, biological inventories, and conservation biology) and awarding the winning projects a certain number of cost-free days at the station.

A US\$4 million endowment may seem a steep and experimental investment for a tropical field station. But Peru already manages a successful US\$93 million endowment for its protected areas (PROFONANPE). Likewise, Norway's recent pledge of US\$1 billion to a fund for sustainable development in the Brazilian Amazon suggests that establishing multiple free field-stations in the tropics is within the reach of the relevant funding agencies [4].

Data from the experiment at Los Amigos provide some quantitative estimates of the benefits expected from a free field station. For every 150 researcher-days logged at Los Amigos during a given year in the period 2000–2006, an average of one peer-reviewed article or thesis was published four years later. Were the 50-bed station to maintain this rate at capacity, it would produce >120 articles and theses per year, more than twice the region's current scientific output [5]. Twenty years after the initial investment, the cost of each individual article produced by the station would be approximately US\$1700.

In addition to giving an extra boost to the mounting productivity of tropical scientists [6], free field stations could also make a significant contribution to training young scientists, providing educational and other opportunities for local communities and protected areas, and collecting intensive inventory and monitoring data on the world's richest biological communities. In this, the UN's International Year of Biodiversity, what better way to galvanize research in biodiversity hotspots than by endowing it for perpetuity?

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