

Policy Brief

Mapping success in protecting forests

For Costa Rica's parks and reserves, a threatened location is the key to effectively avoiding deforestation

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Billions of dollars are spent every year on over 100,000 protected areas around the world. Yet it is unclear how effective this protection is in actually reducing deforestation. With global carbon payments on the horizon, sites known to permit effectively avoided deforestation should be more attractive when allocating scarce conservation resources. Now, findings from Costa Rica suggest key criteria. In this Central American country's national parks, deforestation is avoided most in protected areas closer to the capital and to national roads, and on flatter land—generally, land that faces more threat of deforestation. This is information that could map the way to better informed investment.

Protected areas such as national parks and forest reserves and refuges have long been the most common approach to forest conservation. Every year, about US\$6.5 billion is spent on more than 100,000 protected areas around the world (Emerton, Bishop and Thomas, 2006). And with the recognition of the role of deforestation of greenhouse gas emissions, shifts in international climate change policies may actually reinforce expansion of protected areas.

Protected areas and the carbon market

Proposals to allow the sale of avoided deforestation credits on global carbon markets will mean that countries will choose whether to reduce their deforestation relative to an agreed baseline and will decide on the means to that end. As protected areas are already widely used as a way of regulating changes in land use, the potential to receive such carbon payments is likely to increase incentives to establish new protected areas.

In recent years, however, concern has grown over how effective legal protection is in promoting conservation in the sense of actually avoiding deforestation that would have occurred. Protected areas are not immune from illegal deforestation, of course. But even if governance of these areas is effective and no illegal deforestation takes place, protection of a particular area still might not be having an effect. For instance, if farmers have no incentive to clear the forest in that area in the first place, then a legal restriction on land use will not have any impact on conservation.

In Costa Rica, for instance, most of the forested protected areas remain uncleared (Sanchez-Azofeifa et al. 2003). This might seem to suggest

Key Points

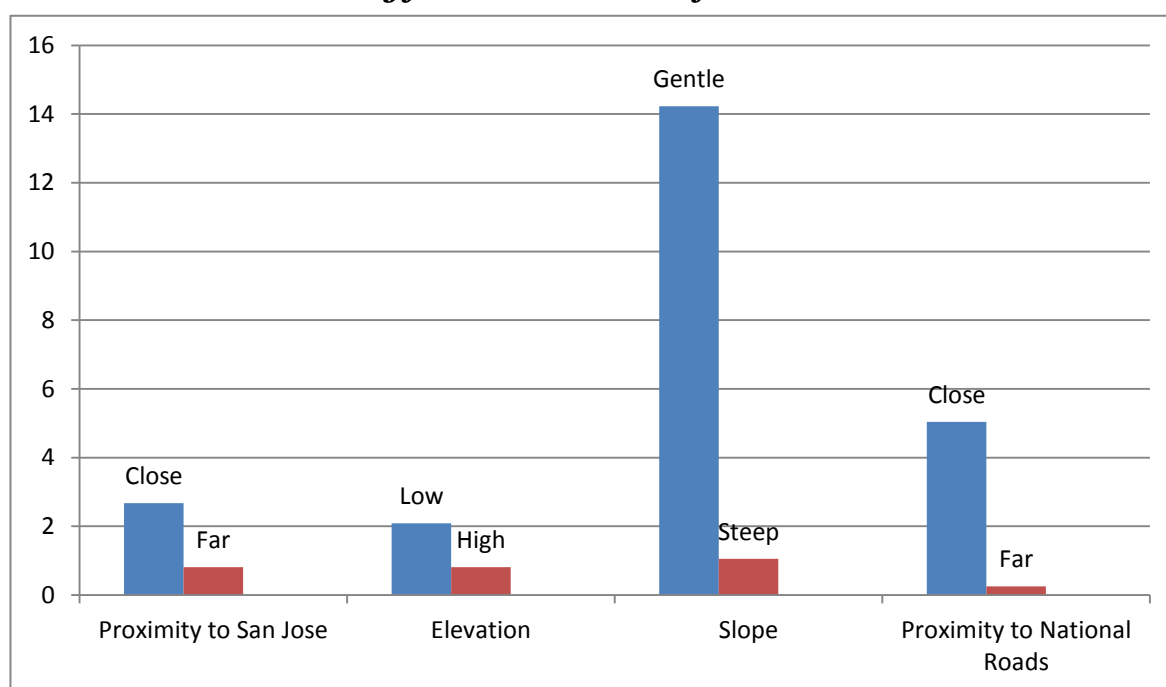
- Parks tend to be located in areas where little deforestation would take place.
- It is the deforestation rate that would have occurred without protection that determines the impact on forest of a protected area that remains completely forested.
- Simply adding to protection planners' core questions, like "how is threat evolving across space?", helps greatly by stimulating collection of relevant information.
- Land not currently under high threat could be highly pressured later on.

A park's impact on deforestation varies with observable characteristics

legal protection is reducing deforestation. But deforestation has not in fact been avoided over the entire protected area, which covers more than a quarter of the country, as it was not all going to be cleared. Since not much of the forest was cleared outside the protected areas, it would be an overestimation to think that protected areas saved the whole of that 25 per cent of Costa Rican territory from deforestation.

To discover the real impact protection has on deforestation it is necessary to know what would have happened to the forest in the protected areas if that protection had not been in place.

Key factors in avoided deforestation



Fraction of protected areas where deforestation was actually avoided during 1986-1997

Estimating the impact of protection

Looking at deforestation in places where protection is not in place is the way to estimate what would have happened in protected areas. However, the details of how to choose the unprotected places for comparisons matter. Existing impact analyses of protected areas have, for the most part, used the average deforestation patterns within unprotected nearby forested areas or spatial buffer areas (see, for example, Oliveira et al. 2007 and Stern et al. 2001). While clearly an improvement over assuming that all of the protected land would have been deforested or that all lands are comparable, this approach can be inaccurate when protected sites have significantly different characteristics than unprotected areas nearby. These differences can be considerable.

It has been shown for Costa Rica that comparing to unprotected sites with the most similar land characteristics to the protected areas generates estimates of parks' impact on deforestation from 1963 to 1997 that are less than a third of the estimates using spatial buffers (Andam et al. 2008). Clearly, then, it is critical to control for differences in land characteristics in estimating impact.

To support conservation planning, the new research from Costa Rica offers an analysis of the variation in correctly measured impact that protected areas would have across potential reserve sites. Thus, every estimate is generated with controls for land characteristics but also different groups of parks are evaluated separately to see whether, using the best possible measures, some parks have more impact. The subsets criteria examined in this recent research are the proximity

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to the capital and to national roads, and relatively gentle slopes at low elevations. In general, though, site characteristics associated with higher clearing pressure indicate greater impact.

From 1986 to 1997, for instance, protected areas within 85 kilometers of the Costa Rican capital, San José, prevented an average 2.5 per cent of their forest area from being cleared. Areas further away prevented, on average, less than 1 per cent. Protection within 7.5 kilometers of national roads prevented about 5 per cent of the forest from being cleared, while in areas further away protection prevented less than 1 per cent. Protection on land with a slope of less than 7.12 degrees prevented an impressive 14 per cent of the forest from being cleared during this period, while in high-sloped terrain protection prevented only around 1 per cent. Clearly policy makers could target greater additional impact using such easily observed characteristics of new sites.

Policy implications and recommendations

Along with information on the environmental services, species and land costs at any given site, these new findings about parks' impacts can and should guide future investments. For example, if all forest land generated the same environmental benefits and cost the same, it will be best to locate new parks in flatter areas closer to roads and cities, where they will block more clearing.

Revisiting the intuition for why that is the case, deforestation rates in the absence of protection will of course vary across the landscape due to a variety of factors. Further, it is the deforestation rate that would have occurred without a park that determines the impact on forest of a protected area. Thus, a parks' impact varies across the landscape, depending on pressure that it blocked.

Obviously, the cost of acquiring the land is important. Yet land cost is likely to be higher when profitability and thus deforestation pressure are higher, i.e. when a park's impact on clearing would be higher. This means that, ecoservices held constant, a higher-cost location may be the better choice if the gain in actual impact on deforestation outweighs the higher acquisition cost. At the least, it means that always choosing the cheapest land will not necessarily be optimal.

The specific causal drivers of deforestation that are a focus of this particular research will surely continue to be important for future deforestation pressure and thus protected-area planning. However, land-use dynamics shift over time. Given global marketplaces for many agricultural products, for instance, external forces will shift relevant prices. Put another way, a particular parcel of land may not be highly threatened today but yet could be highly pressured later. All the same, it remains important that planners looking at potential park sites factor in the variability in deforestation threat across space to obtain as much conservation as possible for the buck.

ABOUT THIS BRIEF

This brief is based on results from: Pfaff, A., Robalino, J., Sanchez-Azofeifa, G.A., Andam, K. and Ferraro, P., 2009 "Park Location Affects Forest Protection: Land Characteristics Cause Differences in Park Impacts across Costa Rica," *The B.E. Journal of Economic Analysis & Policy*: 9 (2) (Contributions), Article 5.

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