



Evolving frontier land markets and the opportunity cost of sparing forests in western Amazonia



Tim G. Holland^{b,*}, Oliver T. Coomes^a, Brian E. Robinson^a

^a Department of Geography, Burnside Hall Rm 705, McGill University, 805 Sherbrooke Street West, Montreal, QC H3A 0B9, Canada

^b Department of Environmental Science, Policy, and Management, University of California, Berkeley, 130 Mulford Hall #3114, Berkeley, CA 94720-3114, United States

ARTICLE INFO

Article history:

Received 11 June 2015

Received in revised form 20 June 2016

Accepted 11 August 2016

Keywords:

Land use and land cover change

Colonization

Deforestation

Conservation

Payment for ecosystem services

Peru

ABSTRACT

Efforts aimed at sparing forests on tropical forest frontiers through REDD+, PES or conservation initiatives currently rely on a limited understanding of the operation of land markets and their effects on the opportunity cost of forests as frontiers develop. In this paper, we draw on a unique dataset of landholder-reported land transactions that includes post-1991 land sales in three sub-montane frontier forest areas on the eastern slopes of the Peruvian Andes. We analyze reported land sales that took place between 1979 and 2013 among Amazonian frontier farmers and find highly active land markets in all three areas, often in the absence of formal land tenure. As frontiers developed, parcel size fell, as did the portion of remaining forest cover, and land prices rose, reflecting both forest clearing and general land price inflation as the areas became more populated and developed. Across three study districts in 2013, each additional hectare of forest cleared raised the expected price of a parcel of land by US \$1371–\$2587. Importantly, we estimate the opportunity cost per hectare of frontier forest rose markedly over time: by \$124–\$226 per year between 2003 and 2013, a rate of increase over that period of 9–27% per year. Forest conservation programs that rely on estimates of landholders' willingness to accept compensation for sparing forest need to take into account that these values change rapidly as frontiers develop.

© 2016 Published by Elsevier Ltd.

1. Introduction

Conserving tropical forests requires an understanding of the economic incentives that operate on the agricultural frontier. Land markets play an important role in shaping the incentives faced by frontier actors: prices for land are a deciding factor in whether a frontier area is profitable to settle and they determine incentives for forest clearing (Bowman et al., 2012; Chomitz et al., 2005; Poffenberger, 2009). As land prices increase, the pressure to deforest intensifies as farmers bring more of their land into agricultural production in order to recoup the initial investment; forest left standing therefore represents a forgone opportunity to farmers. The opportunity cost of standing forest is important in the planning of forest conservation efforts, particularly for initiatives aimed at reducing emissions from deforestation and degradation (REDD) and for payments for ecosystem services (PES) schemes (Fisher et al., 2011b; Naidoo and Adamowicz, 2006; Plumb et al., 2012). A higher opportunity cost of standing forest increases the minimum

payments that landholders would be willing to accept to conserve forests (Börner et al., 2010; Wunder, 2007).

Few studies to date have investigated land prices in tropical frontier areas. In newly-settled frontier areas, record-keeping on land transactions can be non-existent or spotty at best (Gould et al., 2006; Sills and Caviglia-Harris, 2008). In Latin America, studies on rural land markets have either focused on more developed non-frontier areas (Chomitz et al., 2005; Zegarra, 1999a) or used national surveys that lack information on individual land transactions (Deininger et al., 2003, 2004). To overcome the limitations imposed by scant data on land transactions, researchers have used landholders' stated perception of land value (Merry et al., 2008; Sills and Caviglia-Harris, 2008; Zegarra, 1999a). Alternately, land values have been estimated without reference to land markets by using net present value (NPV) estimates of future agricultural production (Börner and Wunder, 2008; Fisher et al., 2011b; Naidoo and Adamowicz, 2006).

In frontier Amazonia, several consistent predictors of land price have been found among previous studies. First, distance to market depresses prices because of the increased cost of transporting farm inputs and outputs. Second, farmer investment in land parcels in the form of forest clearing or pasture or crop establishment

* Corresponding author.

E-mail address: tim.holland@berkeley.edu (T.G. Holland).

increases land value; forest coverage on land parcels is generally associated with lower prices per hectare (Chomitz et al., 2005; Merry et al., 2008; Sills and Caviglia-Harris, 2008). In one report from Pará, Brazil, pasture was reported to be five to ten times more valuable than the same area of forestland (Mertens et al., 2002). Total area of land parcels and slope have been shown to negatively affect the price per hectare (Chomitz et al., 2005; Sills and Caviglia-Harris, 2008). Merry et al. (2008) found that length of the landholder's residence time is positively associated with land price, but—perhaps surprisingly—holding definite title to the land did not affect landholder perceptions of value.

Land prices increase as frontiers advance, and this affects incentives for future land use and forest clearing (Sills and Caviglia-Harris, 2008). Expectations of rising land price encourage land speculation, leading individuals to acquire larger areas of land and clear more forest than they would considering only the productive potential of the land (Naidoo and Adamowicz, 2006; Poffenberger, 2009). Speculation thus plays a key role in accelerating the rate

of frontier advancement and associated deforestation (Carrero and Fearnside, 2011; Fearnside, 2002; Kirby et al., 2006). The relative importance of speculative versus productive motivations may change through time as frontiers develop (Carrero and Fearnside, 2011; Fearnside, 2005). It is also important to note—particularly where land speculation is common—that land markets do not depend on the presence of formal land title. Indeed, land markets in Latin America have been described in areas where the proportion of individuals who hold formal title to their land ranges from 18% (Carrero and Fearnside, 2011) and 27% (Merry et al., 2008) to 71% (Alvarado, 1994) and 76% (Zegarra, 1999b).

Forest frontiers are advancing rapidly in many parts of the Amazon Basin. The 'arc of deforestation' in the southeast of the Basin is the locus of most deforestation; however, rates of deforestation in parts of the western Amazon, on the eastern slopes of the Andes, are just as high as rates in the southeast (Fig. 1). Twenty percent of the deforestation in Amazonian countries between 2000 and 2012 took place in the five countries that span both the Amazon and

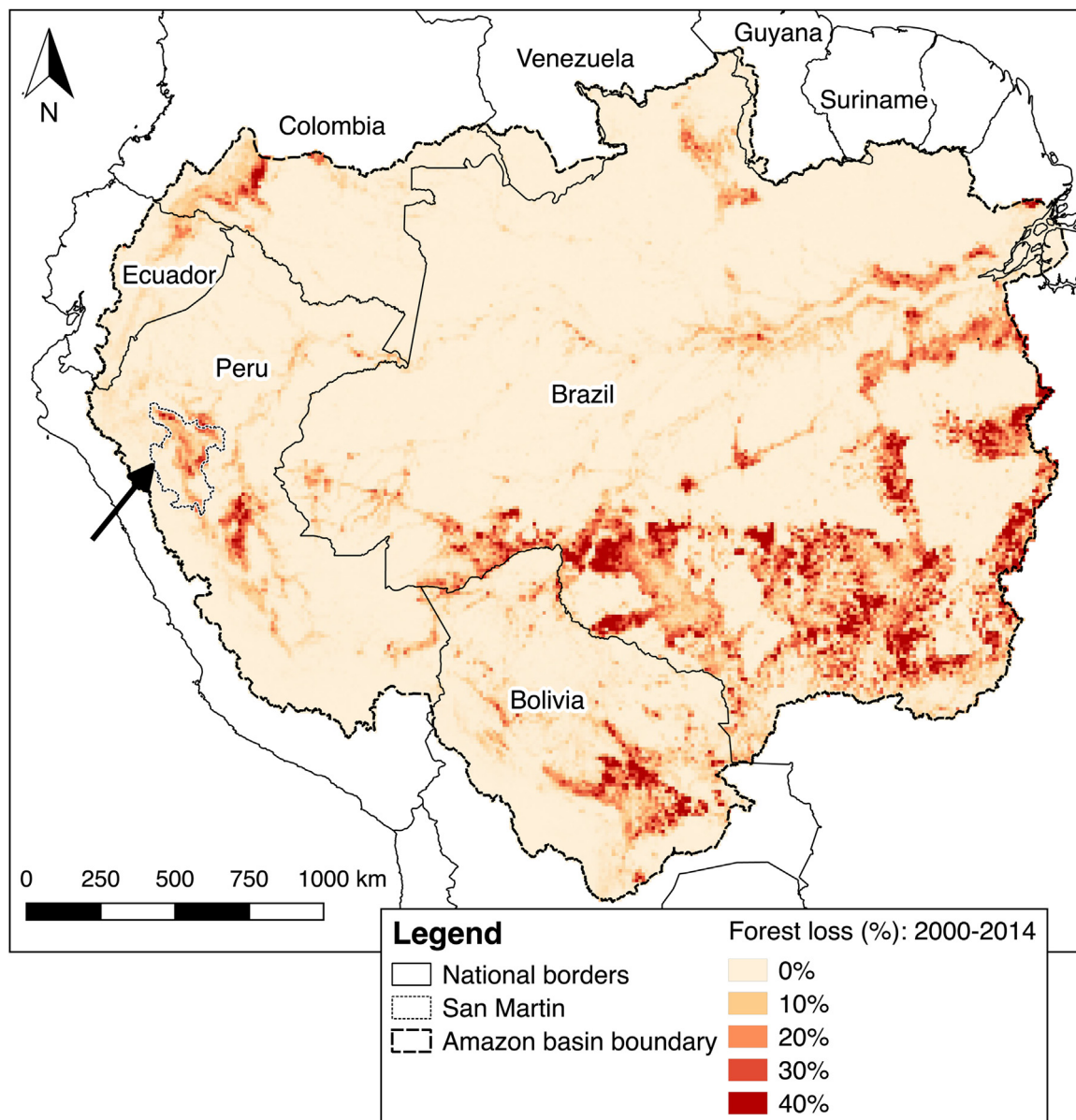


Fig. 1. Deforestation in the Amazon Basin between 2000 and 2014 mapped at six minutes resolution (1/10th of a degree; about 10 km) using data from Hansen et al. (2013). Greyscale in legend indicates total forest loss as a percentage of land area over the 2000–2014 period (i.e., percent of pixels in the original 30 m by 30 m resolution dataset that recorded a transition from forest to non-forest). Region of San Martín indicated by dotted border and by arrow.

Download English Version:

<https://daneshyari.com/en/article/6546925>

Download Persian Version:

<https://daneshyari.com/article/6546925>

[Daneshyari.com](https://daneshyari.com)