

COMMENTARY

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Grassy biomes: An inconvenient reality for large-scale forest restoration? A comment on the essay by Chazdon and Laestadius¹

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In their essay, *Forest and landscape restoration: Toward a shared vision and vocabulary*, Chazdon and Laestadius (2016) made an impassioned case for the restoration of deforested land at the global scale. Unfortunately, they did not address the risks posed to the world's ancient grassy biomes (i.e., grasslands, savannas, and open-canopy woodlands) by forest-biased conservation agendas that promote tree planting and fire exclusion, and indirectly incentivize agricultural conversion of ecosystems with naturally low tree cover (Parr et al., 2014; Overbeck et al., 2015; Searchinger et al., 2015; Veldman et al., 2015a, b). The risk of misapplying forest restoration, resulting in the establishment of forests where they did not historically occur (i.e., afforestation and forest expansion; Fig. 1), is particularly high in the tropics where, for at least a century, European and North American ecologists have confused old-growth savannas (shaped over millions of years by fire and megafaunal herbivores; Veldman et al., 2015a; Bond, 2016) with deforested land, recently cleared by humans (Fairhead and Leach, 1996; Veldman, 2016). We agree with Chazdon and Laestadius that forest restoration can provide benefits when implemented on deforested and degraded forest land, but misapplication of tree-promoting land management strategies in historically grassy biomes has many clear, long-lasting, negative consequences for people and nature. Such negative consequences include the loss of pastoral livelihoods,

perpetuation of poverty, reduced groundwater recharge, and declines in plant and animal diversity (Cao et al., 2011; Fleischman, 2014; Parr et al., 2014; Overbeck et al., 2015).

It is not our intent to fully reiterate these previously published concerns, but rather to address their relevance with respect to two assertions advanced by Chazdon and Laestadius (2016). These assertions were (1) to achieve the level of political support necessary for the success of large-scale forest restoration, scientists need to be more pragmatic in their selection of evidence and attention to detail; and (2) such pragmatism is essential to the development of a “shared vision and vocabulary”, understandable to both scientists and policymakers. While we fully agree with Chazdon and Laestadius about the need to bridge science and policymaking in a process that “integrates the best available technical, traditional, and practical knowledge” (p. 1870), these two assertions warrant critical evaluation by scientists.

With regard to pragmatism and evidence, we are concerned that Chazdon and Laestadius, along with their colleagues at the World Resources Institute (WRI) and the International Union for Conservation of Nature (IUCN; i.e., Laestadius et al., 2015; DeWitt et al., 2016), continue to overestimate the amount of deforested and degraded forest land that is suitable for reforestation. Chazdon and Laestadius (2016, p. 1869) write “Over 2 billion hectares (7,722,043 square miles) of dysfunctional land (former forest and mixed woodland) provide opportunities for forest landscape restoration (Laestadius et al., 2011).” This estimate—based on remote sensing of tree cover and the overly simplistic assumption that low tree cover is evidence of deforestation (Laestadius et al., 2011)—mistakenly includes nearly 1 billion hectares of the world's grassy biomes (i.e., 40% of the total “opportunities for forest landscape restoration”; Veldman et al., 2015b). Much of these classification errors occurred in tropical regions where tree cover is an unsuitable metric to diagnose ecosystem degradation (Veldman, 2016), let alone prioritize landscapes for restoration efforts (Bond, 2016). This same flawed analysis (i.e., Laestadius et al., 2011) is the basis for the interactive online *Atlas of Forest Restoration Opportunities* (WRI, 2014). Promoted by WRI (2014) as an information management tool for

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FIGURE 1 Ancient grassy biomes (left, an old-growth savanna in Bolivia) are important to human livelihoods (e.g., livestock production) and support a tremendous diversity of long-lived herbaceous plants and endemic animals (Parr et al., 2014; Veldman et al., 2015a). Misapplication of forest restoration to grassy biomes results in afforestation (center, a *Eucalyptus* plantation in Brazil), forest expansion (right, due to fire exclusion in Brazil), and declines in biodiversity and ecosystem services (Veldman et al., 2015b).

stakeholders and decision makers, the *Atlas* allows users to peruse the globe and zoom in on identified “deforested” and “degraded” land, categories that erroneously include many old-growth savannas and grasslands (Veldman et al., 2015b). Given the ecological and human risks posed by misapplied reforestation efforts, a politically pragmatic approach requires that scientists provide policymakers with the best possible information (Pielke, 2007). In this case, the best information should be used to substantially narrow the area deemed suitable for restoration and thereby help governments and funding organizations allocate limited resources to truly degraded land.

The reliance of Chazdon and Laestadius (2016) on analyses that overestimate forest degradation and misrepresent grassy biomes as deforested (Veldman et al., 2015b) is also worrisome given their goal to establish a “shared vision and vocabulary” for forest restoration globally. We are particularly concerned about language that seems to equate “grazing land” with “cleared land” (p. 1869), given that herbivores (native and domestic) are important to the maintenance of old-growth grassland biodiversity and are critical to human livelihoods (e.g., Trauernicht et al., 2013). Similarly, we are concerned by calls to “return forest cover to barren lands” while broadly referring to low tree cover ecosystems as “dysfunctional” (p. 1869). We urge scientists and politicians to take great care to avoid vocabulary that is reminiscent of the degradation discourse of western European colonialism, which portrayed indigenous land management practices—such as savanna burning and livestock grazing—as causes of degradation and served as a pretext for the subjugation of native peoples and the appropriation of natural resources (Fairhead and Leach, 1996). Moving forward, thoughtful vocabulary will be important to avoid the pitfalls of other well-intentioned conservation initiatives that inadvertently play a negative role in processes of dispossession and environmental degradation in many parts of the world (Larson and Ribot, 2007; Kashwan, 2017).

Indeed, there is a long history of oversights in the communication of ecological knowledge that translated into long-lasting policy prescriptions with negative environmental and social consequences (Fleischman, 2014). Although the best defense against such mistranslations is to clearly communicate both knowledge and uncertainty at

the outset, Chazdon and Laestadius omit reference to cautionary literature on the implementation of Forest and Landscape Restoration (FLR) in grassy biomes. Such omission may reflect a general viewpoint among FLR proponents that concerns over threats to grassy biomes are unwarranted (but see Mansourian et al., 2017). For example, in response to Veldman et al. (2015b) and Bond (2016), Laestadius et al. (2015, p. 1210) and DeWitt et al. (2016, p. 1036) wrote: “FLR does not call for increasing tree cover beyond what would be ecologically appropriate for a particular location, and should not cause any loss or conversion of natural forests, grasslands, or other ecosystems.” Unfortunately, such assurances provide no safeguard against the entrenched interests of forestry bureaucrats and timber companies who plant trees, often under the guise of restoration, without regard to ecological histories or cultural values (Fleischman, 2014; Andersson et al., 2016). We thus urge Chazdon and Laestadius to seriously consider the risks of misapplied forest restoration efforts (e.g., water shortages; Cao et al., 2011) and ask that their WRI and IUCN colleagues (Laestadius et al., 2015; DeWitt et al., 2016) either revise, or take off-line, their flawed map of forest restoration opportunities (WRI, 2014). More generally, we encourage scientists and environmental policymakers to better acknowledge the conservation values of tropical savannas (e.g., Searchinger et al., 2015) and to work with us to incorporate grasslands and fire, alongside forests, in conservation and restoration efforts (Overbeck et al., 2015; Veldman, 2016).

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