Biodivers Conserv (2017) 26:3505–3507
DOI 10.1007/s10531-017-1415-8

LETTER TO THE EDITOR

Colombian ecosystems at the crossroad after the new peace deal

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Received: 2 June 2017 / Revised: 11 July 2017 / Accepted: 7 August 2017 /
Published online: 18 August 2017
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After more than 50 years of struggle, Colombia's armed conflict apparently is close to an end. The agreement between the Colombian Government and the Revolutionary Armed Forces of Colombia (FARC) was stopped by the negative result of the referendum, but a new agreement has been already supported by the Colombian Parliament. If the process leading to peace in these territories is respected by all parties, the ceasefire will open many areas currently under conflict to more intensive human use and resource extraction (Fig. 1). Returning these areas to the Colombian Government may allow renewed scientific explorations to better understand the biodiversity and ecological complexity of these ecosystems (Regalado 2013). However, the new situation may also be opportunity for highly impacting activities. Large areas formerly closed because of the civil unrest may now be open to mining, logging, farming, or commercial fishing and hunting, thus threatening highly fragile ecosystems as well as the local communities.

Colombia is a biodiversity hot-spot (Myers et al. 2000). With only 0.7% of Earth's surface area, the country harbors almost 10% of the planet's known biological diversity. Its complex orography and the location around the equatorial zone result in a large variety of

Communicated by David Hawksworth.

Electronic supplementary material The online version of this article (doi:10.1007/s10531-017-1415-8) contains supplementary material, which is available to authorized users.

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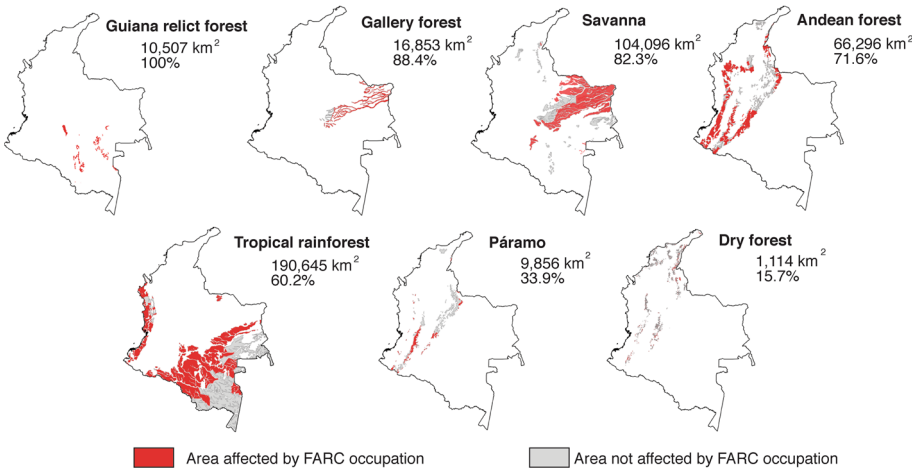

Fig. 1 Distribution of seven key ecosystems in Colombia, their total and the percent area under FARC occupation. (Color figure online)

landscapes, ranging from some of the rainiest areas on Earth to dry semi-deserts and from high mountains in the Andean ranges to coastal ecosystems in the Caribbean and Pacific oceans. These ecosystems host around 22,840 species of angiosperm plants, 1921 species of birds, 1435 species of freshwater fish, and 803 amphibian species, as well as other biological groups. Most of the areas under concern also are ethnically diverse, with up to 84 indigenous groups, more than 60 native languages (Campbell 2012), as well as a rich culture developed by Afro-Descendants. In these areas biodiversity has long been threatened, first by commercial hunting (Antunes et al. 2016), and more recently by land transformation to agriculture and farming (Foley et al. 2007).

Each ecosystem shows specific sensitivity to anthropic stressors. Páramos, which are high montane habitats above timberline in the tropics, hold a 90% of endemic flora, and provide high-quality drinking water to many cities. These are especially sensitive ecosystems to human activities, for soil structure is particulary prone to be impaired by intensive agriculture, cattle raising or mining (Buytaert et al. 2006). Colombian tropical rainforests are susceptible to extensive logging as well as to mining, both small- and large-scale (Asner et al. 2013; Lessmann et al. 2016), which can impair water and habitat quality of rivers and wetlands (Neill et al. 2001). Other activities such as palm oil (*Elaeis guineensis* Jacq.) plantations and oil extraction can occur everywhere, but their impacts could be especially adverse in the Guiana shield, which contains relictual ecosystems with unique biodiversity, and in the lowland savannas and gallery forests (Lasso et al. 2016).

Facing these threats requires promoting local political power and resource control as much as possible. Ideally, the most environmentally detrimental activities need to be limited or carefully managed. Policies should be addressed to recover a harmonious relationship between people and the landscape in pursuit of collective well-being. Interesting initiatives for self-regulation by local communities already exist in non-occupied areas. For instance, in the Amazonian lakes of Yahuarcaca and Tarapoto, fisheries have been regulated by an official decree following the initiative of local communities, supported by academic and governmental agencies. Supporting sustainable farming by the local communities may limit other activities such as illegal cropping or small-scale mining, which are associated with deforestation (Asner et al. 2013). Prevention of such damaging

activities is best achieved by investing in social development, education and health (Davalos 2016), strategies that may facilitate decision making by local and regional entities.

Acknowledgements Stan V. Gregory (Oregon State University) and Nick Bond (La Trobe University) made useful comments to the manuscript.

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