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Abstract

Ongoing conflict resolution in Colombia brings an opportunity for economic development of impoverished communities and a conservation threat of deforestation in newly accessible rural areas. Ecotourism is often proposed as a “win–win” solution for developing countries to meet both economic and conservation needs. With the highest number of bird species of any country, including 443 rare species highly valued by bird-watchers, Colombia has a unique opportunity to develop a lucrative and conservation-friendly bird-watching tourism industry in postconflict areas. Through geospatial analysis of conflict zones, bird distributions, protected areas, forest cover, and bird-watching activity, we identify areas of Colombia with unrealized bird-watching potential that are ripe for the development of synergistic conservation-ecotourism projects. An investment in ecotourism infrastructure and training by the Colombian government may be a conservation-friendly alternative to natural resource extraction that could alleviate poverty without degrading natural capital in postconflict Colombia.

Keywords

Colombia, bird-watching, ecotourism, conservation, birds, postconflict, Andes

Introduction

Conflict between the Colombian government and illegal armed groups kept many sections of the country off-limits for decades, but tourism in Colombia is now flourishing. The popular travel guide, Lonely Planet, declared it the no. 2 best country to visit in 2017. This turnaround has stemmed directly from the success of the ongoing Colombian peace process, which reached an important milestone in late 2016, when the Colombian government signed an agreement with the prominent illegal armed group: FARC-EP (Fuerzas Armadas Revolucionarias de Colombia—Ejército del Pueblo). The agreement guarantees the dissolution of the FARC-EP and inclusion of its members into society, eradication of illicit crops, and investment in rural communities in postconflict areas (Colombian National Government & FARC-EP, 2016).

Barring any serious setbacks to the peace process, rural areas that were formerly controlled by FARC will become accessible to outsiders for the first time in decades. Most of these areas are covered by high conservation value forests with impressive concentrations of endemic and threatened fauna (Baptiste et al., 2017)

that will face a newly intensified threat of encroaching development. Large areas of forest will likely be cleared because a major point of the peace agreement is a rural land reform, which will encourage formerly displaced people to return to their homes and work in industrial agricultural production and resource extraction (Negret, Allan, Brackowski, Maron, & Watson, 2017).

Prevailing wisdom among conservation practitioners dictates that in order for development activities in post-conflict regions to be sustainable, they must provide benefits for both rural communities and biodiversity (Baptiste et al., 2017; Negret et al., 2017). Ecotourism is a popularly proposed economic alternative to more

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environmentally destructive industries (Sekercioglu, 2002). In this article, we consider a low-impact and sustainable form of ecotourism that Colombia is uniquely poised to develop: bird-watching tourism.

Nested between two oceans and criss-crossed by three cordilleras of the Andes, Colombia has the highest diversity of bird species in the world with 1,942 species (del Hoyo, Elliott, Sargatal, Christie, & de Juana, 2015). Bird-watchers are especially motivated by rare birds (Booth, Gaston, Evans, & Armsworth, 2011), and the opportunity to add them to a “life list,” a list of all the species that a bird-watcher has observed in his or her lifetime. Bird-watching tourism in Colombia has grown steadily over the past decade, especially in secure areas with high concentrations of endemics, such as the Sierra Nevada de Santa Marta and a few select sites in the Andes. Because rare birds are often endemic or threatened, the species bird-watchers are most interested in seeing also tend to have the most conservation importance. Might such “high value birds” (HVBs) present an opportunity to combat poverty and promote conservation in postconflict rural Colombia?

The Colombian government believes so, as is apparent from the Ministry of Commerce, Culture and Tourism’s, recently announced national bird-watching tourism strategy, which aims to promote this activity in postconflict regions. In addition, the peace agreement contains language advocating for conservation zones. What is lacking from the government’s plans and what conservationists identify as critical, is spatial planning (Negret et al., 2017). The practical question remains: Where should conservation and bird-watching tourism first be pursued?

The primary goal of this article is to identify the areas within postconflict zones of Colombia that have the greatest potential for development of a sustainable bird-watching tourism industry. We assess the spatial patterns of bird-watching activity in Colombia to date from the citizen scientist database eBird and highlight areas of high unrealized bird-watching potential (UBP) by overlaying spatial distributions of HVBs, maps of municipalities affected by conflict, protected areas, and forest cover. We discuss the infrastructure investments that are required for bird-watching tourism to succeed, the potential economic benefits based on recent bird-watcher survey data, as well as the synergistic opportunities and pitfalls for conservation.

Methods

Bird Distribution Mapping

We use range maps provided by BirdLife International and Handbook of the Birds of the World (2016). To obtain the concentrations of species per area, we overlap these ranges and calculate the number of species which

overlap in 10 km² cell using ArcMap 10.4.1 (ESRI, 2016). These maps are constructed from imperfect, incomplete data and thus in some cases do not reflect the entire distribution of the species, as has been shown for some regions in Colombia (Ocampo-Peñuela & Pimm, 2014). Yet, as the only open source maps of Colombian bird distributions, they represent the best available data for analysis at the national scale.

We map concentrations of the 1,915 (out of 1,942) Colombian bird species for which range maps exist and those of HVBs (Supplemental Figure 1). In our definition of HVBs, we include near-threatened species because often these species can have a much smaller range than previously thought due to deforestation (Ocampo-Peñuela & Pimm, 2014).

Postconflict Areas

The United Nations prioritizes 125 municipalities for postconflict development. The criteria to identify these municipalities were previous permanent presence of armed conflict, high levels of poverty, and need for social development (United Nations – Colombia, 2014). We use the United Nations list of priority areas, as the Colombian government has not declassified its own list as of May 2017. The UN categorizes municipalities as either medium or high priority for postconflict development (Figure 1).

Bird Lists

We use the popular, open source database eBird (Sullivan et al., 2009) to map the relative popularity of bird-watching throughout Colombia. We downloaded all eBird observations from Colombia (October 2016 data update), which we aggregated into individual complete checklists. Each complete checklist represents a discrete visit to a site by a bird-watching party. Thus, the number of complete checklists submitted serves as an indicator of the relative popularity of bird-watching sites. We consider only recently submitted checklists (2011–2016) to avoid bias from historic observations or surveys. For each bird-watching site that has received at least 10 complete checklists, we calculate the proportion submitted in 2016, as an indicator of bird-watching sites which are newly popular. We interpret such sites in postconflict zones as representing an early response to the peace process by bird-watchers eager to visit sites that were formerly inaccessible.

Postconflict Opportunities

To prioritize postconflict municipalities by potential for bird-watching, we sorted them according to mean concentration of HVBs. We define postconflict municipalities with a mean of 25 or more HVBs as having high UBP. Protected areas within postconflict municipalities

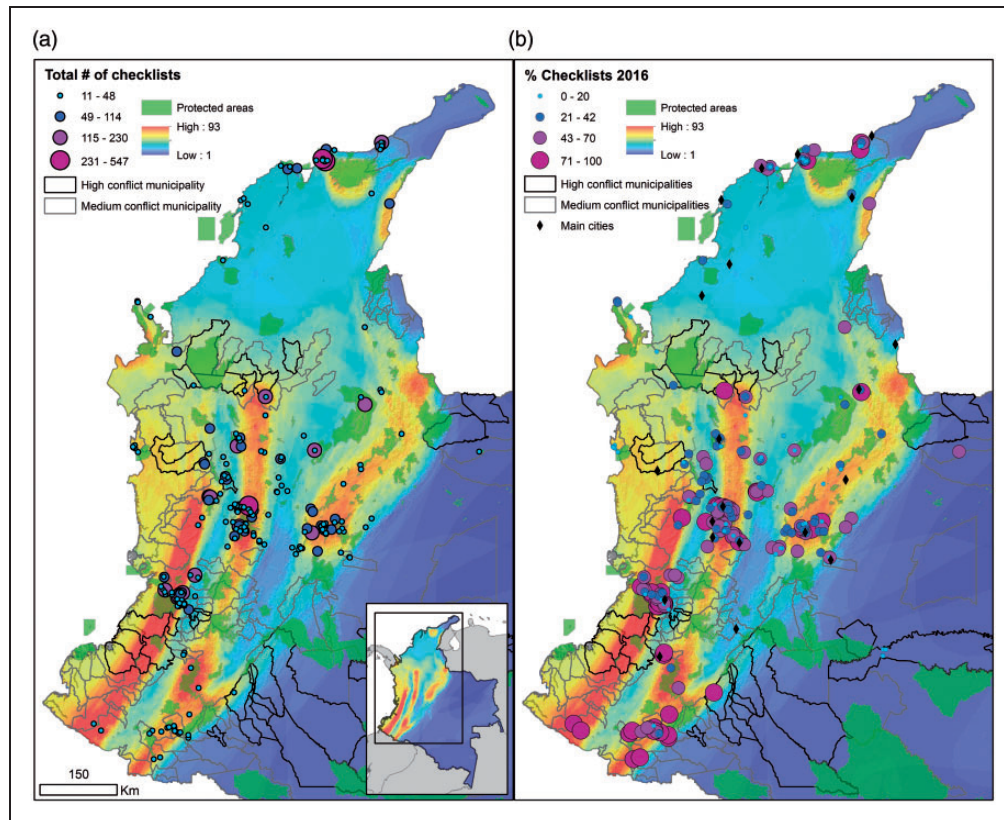


Figure 1. Maps of Colombian bird-watching sites (eBird hot spots with more than 10 complete checklists) overlaid on a heat map of concentration of endemic, near-endemic, small-ranged, threatened, and near-threatened birds with outlines of medium and high conflict municipalities, and protected areas. eBird hot spots are scaled and color coded by (a) total number of submitted checklists, to highlight most frequently visited birding sites and (b) percent of total checklists submitted in 2016, to highlight newly established or newly popular birding areas.

represent an opportunity to leverage existing resources, so we map those provided by the World Database on Protected Areas (IUCN & UNEP-WCMC, 2017) and highlight the ones that overlap with the municipalities identified as having high UBP.

Results

Mapping eBird checklist density reveals that bird-watchers have almost completely avoided Colombian municipalities suffering from recent conflicts with visits focused in the Andes and Sierra Nevada de Santa Marta, where HVBs are concentrated and conflicts absent (Figure 1(a)). Most of the exceptional hot spots in conflict-affected municipalities are new, with high proportions of all bird-watching activities logged in 2016 (Figure 1(b)). These new hot spots in postconflict areas are concentrated in the southwestern corner of the country, in the Andes near the border with Ecuador and along the Andes–Amazon transition at the eastern slope of the Eastern Andes where there are high concentrations of HVBs.

Starting with the 125 municipalities identified by the United Nations as priority for postconflict development (United Nations – Colombia, 2014), we highlight 67 with

high potential for bird-watching tourism based upon their high concentrations of HVBs (Figure 2, Supplemental Table 1). These selected municipalities span essentially the entire length of the Western Andes and cover large areas of the Central and Southeastern Andes (Figure 2). The municipalities with bird-watching potential are widespread, with 10 of the 18 Colombian departments affected by conflict having at least one, and also concentrated in four departments that have 11 or more. To assess whether the potential for bird-watching has been realized, we map established eBird hot spots (those with at least 10 complete checklists) and find that very few (33 of 268) overlap with these municipalities. We find that many protected areas (121 of 608) overlap with high bird-watching potential municipalities (Supplemental Table 2).

Discussion

Attractiveness of Colombia as a Bird-Watching Destination

Nothing motivates bird-watchers like the chance to see a rare or endangered species that may be difficult or impossible to see in another part of the world

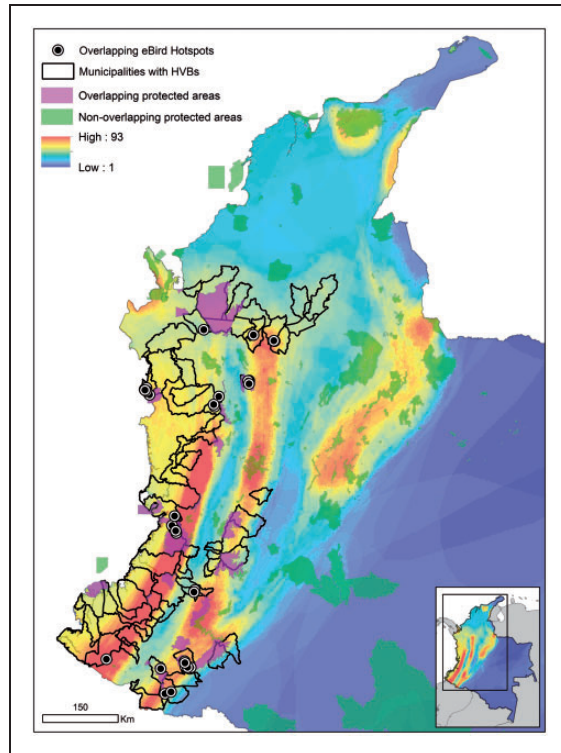


Figure 2. Colombian municipalities (black outlines) formerly affected by conflict with high unrealized bird-watching potential based on the mean concentration of birds highly valued by bird-watching tourists and conservationists. Protected areas and established eBird hot spots overlapping with these municipalities are highlighted in purple and by black points, respectively. Background gradient shows concentration of endemic, near endemic, small-ranged, and threatened birds.

(Booth et al., 2011) and Colombia's large number of HVBs (Supplemental Figure 1) make it a particularly attractive bird-watching destination. The patterns of bird-watching visits concentrated in the parts of Colombia with many HVBs demonstrate where bird-watching effort has been most intensive to date (Figure 1(a)) and point to where it has the most potential to expand in the future as access becomes safe.

Bird-Watching and Safety

U.S. bird-watchers interviewed by the National Audubon Society cited safety as one of their major reasons for not visiting Colombia in the past (Maldonado et al., 2016). Thus, areas that suffered during the armed conflict but with important bird-watching potential (i.e., high concentrations of HBV) remain largely unvisited by bird-watchers (Sekercioglu, 2002). The department of Cauca, for example, which has the most bird species of any Colombian department with 1,102 (Ayerbe-Quinones et al., 2008), is just 21st (of 32) in terms of number of eBird checklists submitted.

More recently, bird-watching has expanded to areas that were formerly unsafe (Figure 1(b)) and host high concentrations of HVBs. The Putumayo department, which spans the Andes–Amazon transition, is a newly safe region that has been discovered by the bird-watchers. The area was once an important stronghold of the FARC and seldom visited by bird-watchers, but its bird-watching popularity has already grown as indicated by a high proportion of checklists submitted in 2016 (Figure 1(b)).

Enhancing the Bird-Watching Industry in Postconflict Colombia

The development of bird-watching tourism in Putumayo has the potential to be replicated in many other areas that will become accessible and safe as the conflict ceases. With no shortage of attractive birds and safety concerns diminishing, a major barrier preventing other departments from following Putumayo's lead is a lack of the necessary infrastructure and resources. Comfortable lodging, good roads, reliable transportation, bilingual and bird-focused guides, and attention to bird-watchers' peculiar needs (early breakfast, canopy towers, silent boat tours, etc.) will be needed in order for the bird-watching industry to reach its potential in Colombia. The local surge in bird-watching activity at Putumayo was facilitated by the presence of knowledgeable local guides and the opening of a new birding lodge.

Independent bird-watchers rarely travel without a well-trained professional guide who knows how to find the HVBs (Sekercioglu, 2002). Local people often make the best guides, as they have intimated first-hand experience with the local landscape and wildlife. However, the learning curve to becoming a guide can be steep, as training in bird identification and foreign language skills (i.e., English) is required. So in addition to physical infrastructure, the training of tourism staff and especially, specialized bird guides, will be critical to building the capacity for success.

Intact forest is currently abundant in much of the war-affected areas of Colombia (Sánchez-Cuervo & Aide, 2013; Supplemental Figure 2), but outside of protected areas its future integrity is far from certain (Baptiste et al., 2017; Negret et al., 2017). While opportunities to designate new public and private protected areas in postconflict Colombia may arise, investments in other bird-watching infrastructure may be most fruitful in municipalities that contain existing protected forests (Figure 2). Leveraging such preexisting protected areas into bird-watching sites will have synergistic effects on both conservation and the local bird-watching tourism industry while following the objectives of the National Park service (Parques Nacionales Naturales de Colombia, 2017). Protected areas that provide value to local communities are far more likely to persist, and the protected status of

forests will help ensure that investments in bird-watching infrastructure are not wasted because of habitat loss.

The Value of Bird-Watching Tourism in Postconflict Colombia

The potential revenues that bird-watching tourism could bring to postconflict Colombian communities are promising. The average bird-watcher is relatively wealthy (Cordell & Herbert, 2002) and willing to pay a premium to see Colombian birds: US\$310 per person per day (Maldonado et al., 2016). The National Audubon Society projects that 150,000 bird-watchers will visit Colombia from the United States over the next decade, generating US\$47 million annually and sustaining 7,500 new jobs. These rosy numbers could be gross underestimates if Colombia can emulate the recent surge in bird-watching tourism in neighboring Peru, where the number of bird-watching tourists doubled from 2012 to 2013, yielding an annual gross of US\$89 million (Lacouture, 2017). Demand for bird-watching tourism appears to be sustainable, as the global market is already very large, with 46 million bird-watchers in the United States alone, and research shows the hobby to be gaining popularity (Cordell & Herbert, 2002).

Critically, bird-watching revenues are more likely to remain in local communities, preventing the type of economic leakage seen in extractive industries (Sekercioglu, 2002). Thus, the bird-watching tourism industry in Colombia has the potential to meet important criteria for social sustainability. Training programs for new guides, cooks, drivers, and other service providers could stimulate impoverished communities in which mean monthly incomes are often less than US\$100 per individual. For example, in Cauca, the department with the most municipalities with high unrealized bird-watching potential, 52% of people currently live in poverty (monthly income less than US\$250 for a family of four; Departamento Administrativo Nacional de Estadística, 2016). South Africans living under analogous conditions saw their salaries rise from US\$114 to \$362 after they began working as bird-watching guides (Biggs, Turpie, Fabricius, & Spenceley, 2011). On top of competitive wages, jobs in ecotourism come with lower external social costs, such as health risks, associated with physically demanding mining and logging work.

Implications for Conservation

The potential for conservation of Colombia's birds and ecosystems cannot be overstated. Bird-watching tourism has the potential to generate funds for protected areas (both government and privately managed), engage the public about the value of natural ecosystems, and provide alternative livelihoods to compete with unsustainable extractive industries (Sekercioglu, 2002). Of course, ecotourism is

not always a panacea for conservation and must be implemented responsibly to be sustainable (Krüger, 2005). Yet, bird-watchers are recognized as environmentally and socially responsible tourists, and so bird-watching in Colombia has every opportunity to be a sustainable form of ecotourism (Steven, Morrison, & Castley, 2015). Some of the postconflict municipalities have restrictions over the use of the land, some with 80% of the land designated for conservation (United Nations – Colombia, 2014). Bird-watching tourism offers the chance to make protected lands be economically productive, without compromising national and international conservation commitments. Following guidelines for sustainably run bird-watching tourism activities will be fundamental to the success of this industry in Colombia (Ministerio de Comercio, Programa de Transformación Productiva [PTP] del Ministerio de Comercio, & Fondo Nacional de Turismo, 2017).

By tragic coincidence, conservation in Colombia has been facilitated by a conflict that has prevented development and deforestation from encroaching into disputed rural areas (Sánchez-Cuervo & Aide, 2013). With half a century of unrest coming to an end, the nation lies at a critical juncture where it must make economic and environmental decisions of enormous consequence to the futures of species and generations of rural communities. Will it learn from its Latin American peers that have embraced and profited from the ecotourism industry, as pioneered by Costa Rica and more recently finding success in Ecuador and Peru? We find that an ecotourism strategy based around bird-watching has immense potential in Colombia and that the industry could provide an important source of income for postconflict communities and create incentive for conservation if implemented responsibly.

We recommend that the government continue to support bird-watching tourism by investing in infrastructure, training guides, and other service providers and promoting Colombia as the world-class bird-watching destination that it is capable of becoming. By taking this path, Colombia will improve the social and natural well-being of rural communities that live in territories formerly dominated by the FARC, while simultaneously meeting its goals for economic growth.

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