

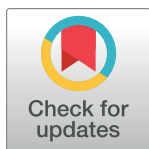
OPINION

# The value of standing forests for birds and people in a biodiversity hotspot

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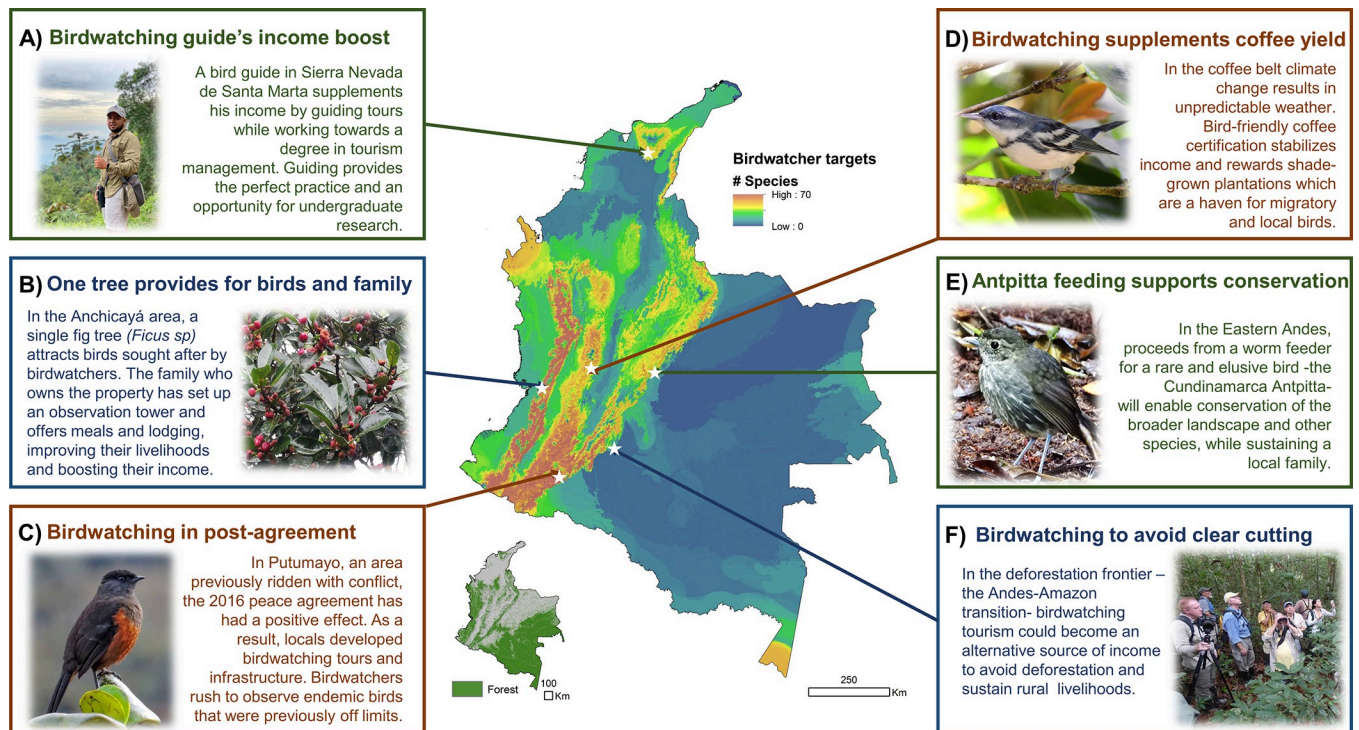
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Colombia is recognised for its overall high biodiversity and being number one for bird richness globally. Colombia's rich biodiversity and the multiple values associated with it are threatened by multiple drivers of change including deforestation and climate change. In this opinion piece, we argue that to succeed in protecting forests and associated biodiversity in Colombia, conservation actions need to consider local communities and focus on win-win situations for biodiversity and people. We highlight the example of birdwatching tourism as a nature-based solution that can help halt deforestation and contribute to climate change adaptation.

Climate induced environmental change is already affecting biodiversity globally [1]. In Colombia, the predicted impacts of climate change are already being observed across different ecoregions, including drier, warmer climates and an increase in extreme events [2,3]. In response to these challenges, the Colombian government has taken an active, and rather pragmatic approach to address climate change. The country's rich biodiversity is often at the core of the country's ambitious goals to address climate change and meet global targets. Climate change and biodiversity are often used in synergy as an opportunity for funding and to engage in international collaborations. An example is Vision Amazonia, a climate mitigation and anti-deforestation program in the Colombian Amazon.

As part of its adaptation commitments Colombia is looking to expand protected areas, increase the protection of water resources, and the conservation of terrestrial and marine ecosystems [4]. However, adaptation actions remain reactive, focusing on disaster risk reduction and engineered solutions. Besides, the Colombian government has been unable to halt ongoing environmental degradation and deforestation rates [5], which are maladaptive actions inconsistent with discourses of biodiversity as an asset. In not addressing deforestation, Colombia is not only compromising its ambitious climate adaptation agenda but nature's capacity to support climate adaptation in the future.

In addressing deforestation, it is important to recognise the relevance of standing forests and trees in supporting climate change policies, but also the multiple benefits for local communities whose livelihoods rely on them [6]. Birdwatching tourism is an example of how forests and trees connect people with nature, resulting in benefits to birds, forest conservation, and rural livelihoods. Birds are good indicators of ecosystem health, serve as proxies for areas of high biodiversity and endemism, and are important sentinels of climate change impacts on ecosystems [7]. Birdwatching tourism is a good example of an adaptation service (also known as nature's contribution to adaptation), which includes ecosystem services that provide alternatives for people to adapt to climate-induced environmental change [8].



**Fig 1. Examples of birdwatching tourism win-win situations for bird and forest conservation, and local communities.** The center shows a map of concentrations of endemic, threatened, and small range birds, which are most sought after by birdwatchers (produced by authors). Small inset shows forest extent in 2016 (IDEAM 2016). Photo credits A) Breiner Tarazona, B) Avistamiento de Aves Doña Dora, C) Brayan Coral-Jaramillo, D) Edwin Múnera, E and F) Scott Winton.

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Birdwatching tourism can diversify rural household income while also enhancing bird conservation through maintaining conserved habitats, forests, and trees (Fig 1). Birds sought after by birdwatchers attract tourism activities to areas that would otherwise not benefit from tourism due to their remoteness or difficult access, including areas that suffered from armed conflict in the past [9] or areas where traditional livelihoods have been affected by climate change. To realize the potential of this kind of specialized tourism, the local communities who benefit from birdwatching tourism revenue must care for bird habitats and protect their populations, develop specialized infrastructure and train personnel, and guarantee the safety of the tourists [10]. Local communities whose livelihoods depend on farming are already facing the impacts of unpredictable weather. For example, coffee farmers are looking to modify and diversify their farming practices, such as protecting and planting shade trees in coffee farms through and engaging in sustainable certification schemes and bird watching tourism to increase their income (Fig 1D).

Birds and their habitats are already threatened by ongoing deforestation and climate change in Colombia [11,12]. Colombia's birdwatching targets are distributed on all ecoregions but there is a strong concentration on Andean forests, where fragmentation is higher and conservation most urgent (forest map inset, Fig 1). Protecting birds through birdwatching tourism, among other strategies, will ensure forest conservation and enhance climate change adaptation. This is particularly important outside of protected areas, where habitat protection through Indigenous peoples, local communities, and private conservation stewardships can complement government-run initiatives. But the potential of realizing conservation and economic benefits from birdwatching tourism is threatened by the interaction of climate change

and deforestation and its impacts on bird distributions and ecology. These threats will affect species inside and outside of protected areas alike, just as deforestation soars inside national parks in Colombia [5].

Despite the challenges, we see many opportunities ahead. Colombia's environmental policies provide guidance to implement biodiversity conservation and climate change action across scales [13], highlighting the potential of local-level actions to leverage ecosystem-based adaptation. It also demonstrates the relevance of promoting locally based environmental governance [14], which is fundamental in developing birdwatching tourism.

Expanding protected areas has been a political instrument to promote security and peace [15], as well as to comply with the country's commitments to international agendas. But this has not been enough to halt deforestation. To succeed in conserving standing forests and allowing ecosystems and people to adapt to climate change, Colombia must shift from a reactive to a proactive agenda, where adaptation strategies that benefit people and nature simultaneously are prioritized. Similarly, Colombia's conservation sector should recognise the multiple ways of relating with and using nature when designing conservation approaches. The steady increase in birdwatching tourism in the last decades in Colombia [9] is an example of the benefits of conserving forests, and offers options to identify, secure funding, and implement other nature-based solutions that involve and benefit local communities and biodiversity.

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