Planting trees may save Costa Rican birds threatened by intensive farming

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The insect-eating pale-billed woodpecker is almost always found in a forest.

(PhysOrg.com) -- The colorful birds of Costa Rica play a crucial role in the country's rural landscapes, by distributing seeds, controlling pesky insects and pollinating plants.

But knocking down the Costa Rican forest to make room for farms and pastures can drive away the birds and the benefits they bring to farmers.

That's the bad news. The bit of good news is that data from 10 years of

careful counting of birds in rural Costa Rica have led Stanford researchers to conclude that birds and farmers can co-exist, to everyone's benefit, if some trees are left in the fields and pastures.

"The take-home message is that local-scale action by farmers can help," said Daniel Karp, a graduate student at Stanford's Center for Conservation Biology. "Taking small steps like leaving some trees interspersed around their fields and planting several crop species instead of just one can make a difference."

Stanford biology professors Gretchen Daily and Paul Ehrlich established the study a decade ago to address a critical question: how to sustain vital life-support services in farmland.

"Nature reserves alone will never be sufficient to provide flood control, climate stability, pest control, pollination and other benefits on the scale required," Daily said. "Yet there is great scope for harmonizing conservation and food production – there are smart ways to achieve multiple, economically crucial benefits."

The data for the study, published in the *Proceedings of the National Academy of Sciences*, came largely from an American bird expert who first went south to Costa Rica as a Peace Corps volunteer decades ago.

The fiery-billed aracari is a fruit-eating bird found in the Costa Rican forest or in areas of low-intensity agriculture. (Photos courtesy of Daniel Karp)

Walking the line

To collect his decade's worth of data, ornithologist Jim Zook regularly walked the same lines (transects, in the research world) along paths and roads in Costa Rica. For 30 minutes he would take careful notes of the birds he saw and the impressive number of birds he identified by sound. He did this six times a year: three times in the rainy season and three in the dry.

"It's an amazingly comprehensive database," Karp said.

It includes, for example, the fruit-eating fiery-billed aracari, which might be found in areas of low-intensity agriculture, and the pale-billed woodpecker, seen snacking on insects in the forest.

Zook's transects ran through four regions of the country, with diverse climates and land-use histories. All were originally forest, but had grown to include agriculture, from melon, rice, and cattle to coffee, pineapple, and sugar cane.

The findings? Seed-dispersing, insect-eating, and pollinating birds persisted in more traditional, low-intensity farms, but declined dramatically on industrialized, intensified farms.

Further, in highly intensified areas, bird communities were less stable, showing pronounced yearly fluctuations in abundance and species numbers.

For the birds

Even simple measures can help the birds' numbers and diversity. Instead of fences around their fields, farmers can plant rows of trees, known as live fences.

"That's actually really good for birds," Karp said.

These actions might also help the farmers. Karp said he and his fellow researchers are hopeful that they will soon show that birds provide economic benefits to local growers by pollinating crops and eating insect pests.

More information: www.pnas.org/content/early/201 …/1118276108.abstract

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