

## **Smaller farmer's fields can reduce biodiversity loss and increase wild plants, birds, beetles and bats**

Imagine if we only had one-day weekends.

That's how Lenore Fahrig looks at the loss of biodiversity that human activity has caused, noting that an estimated 15 per cent of species, or about one in seven, have become extinct in the last century and a half.

"I tell my students, it's like all the Saturdays for the rest of your life are gone," says the Carleton University chancellor's professor in biology. "From my perspective, it's just a crime that we are destroying the biodiversity on the planet."

Studies show that the bird population has dropped by almost 30 per cent since 1970, amphibians are disappearing at a rate of nearly four per cent per year, while the decline of insects stands at about nine per cent per decade.

Over most of the past decade, Fahrig has been leading the way in research, both in Eastern Ontario and across Europe, to identify ways to slow this environmental purge. In an article published last month in the journal *The Conversation*, she identified a pair of important factors — the sizes of agricultural fields and crop variety — that contribute to biodiversity, and suggests ways farmers could help ameliorate these losses.

A landscape ecologist, Fahrig studies how factors such as deforestation, urban buildup and roads affect biodiversity. Nothing, she says, matches the worldwide effects of agriculture.

"Of course, people need to eat and we have to have agriculture, but we were wondering if there was a way to arrange crop fields in a way that would reduce the impact on biodiversity."

She and her colleagues examined 93 Eastern Ontario landscapes, each measuring one square kilometre and chosen to represent varieties of field sizes and crop diversity.

They then sampled the numbers of birds, bees, plants, spiders, carabid beetles, frogs, syrphid flies, bats and butterflies in each, both in the fields and at their edges. Many of these species, Fahrig says, are important for pollination and pest control, and their loss could have serious consequences.

They discovered much greater biodiversity where smaller fields were used. Fahrig admits that some of this increase can be accounted for by the fence lines, ditches and hedgerows separating fields, but greater numbers of fauna were also found where fields of different types of crops were not otherwise separated.

Even accounting for such noncropped strips, they discovered that as average field sizes fell from eight to two hectares, biodiversity rose by about 50 per cent.

"Even when you have these very narrow bits between crops, that still represents a refuge. So that a species that's in a crop field when something's going on — plowing, for example — that's a place they can go to sit out the storm, so to speak, without having to go great distances, which many of them can't do.

"People are worried right now about the crisis in the numbers of pollinators," she adds. "The numbers of birds, frog and insects are all declining, and all of these actually do things for us without us being aware of it.

They eat pests in the fields, pollinate crops, while plants reduce soil erosion.

“Most of the things we do rely on natural species.”

Fahrig subsequently led similar fieldwork in more than 300 landscapes in seven different regions and climates in Europe, including those in England, France, Germany and Spain, where their results were consistent with their Ontario data.

Their findings go against an increasing trend toward the economy of scale and operational efficiency of having larger fields on even larger farms, but Fahrig said she believes the benefits to farmers of biodiversity have been left out of that economic equation, and she would like to eventually include that calculation in her group’s research.

“Many farmers really do love nature, so if they could be convinced that they could make their fields smaller, have this large benefit to nature and not reduce their profit, they would probably be pretty amenable to it.”

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