

The Value of Biodiversity: Evidence from Migratory Birds

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2025-06-23

Abstract

We estimate the economic value of biodiversity by estimating the value of pest control services provided by migratory birds to U.S. agriculture and forestry. Exploiting exogenous variation in migratory bird returns driven by winter habitat conditions in South America, we find that a 10% decline in avian biodiversity reduces crop revenues by 1.1% and increases forest pest outbreaks by up to 1.2%. We find that the elasticity of substitution among bird species is high in agricultural landscapes and lower in forests, implying that ecosystem service provision in agriculture depends more on the total abundance of birds, while in forests it depends more on the number of species. These findings identify biodiversity as a productive input and highlight cross-border externalities from environmental degradation.

1 Introduction

“That insectivorous birds are of immense value to the farmer and the forester is so well-known that their protection is now believed to be absolutely necessary to the welfare of any country.” (Henshaw, 1907)¹

Biodiversity is essential for ecosystem functioning and a wide range of economic activities that it supports. Yet, the economic consequences of its global decline remain largely unmeasured. While economists have long theorized the value of biodiversity (Weitzman, 1992, 2000; Brock and Xepapadeas, 2003; Polasky et al., 2005; Fenichel et al., 2024; Dasgupta, 2021), empirical estimates of its causal impact on economic production remain scarce. A growing literature has begun to document the economic impacts of species’ decline or recovery (e.g., Raynor et al., 2021; Frank and Sudarshan, 2024; Frank, 2024), but most studies focus on individual species or groups of similar species in isolation. This misses a central insight from ecology: ecosystem services provided by biodiversity depend

¹Henry Henshaw was the head of the U.S. Biological Survey and a proponent of the Weeks-McLean Act for protecting migratory birds. The Act was signed by President Woodrow Wilson in 1913. More than 100 years later, empirical evidence supporting the benefits of birds to farmers and foresters remains elusive.