Pesticides and pollinators: A socioecological synthesis

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Abstract

The relationship between pesticides and pollinators, while attracting no shortage of attention from scientists, regulators, and the public, has proven resistant to scientific synthesis and fractious in matters of policy and public opinion. This is in part because the issue has been approached in a compartmentalized and intradisciplinary way, such that evaluations of organismal pesticide effects remain largely disjoint from their upstream drivers and downstream consequences. Here, we present a socioecological framework designed to synthesize the pesticide-pollinator system and inform future scholarship and action. Our framework consists of three interlocking domains-pesticide use, pesticide exposure, and pesticide effects–each consisting of causally linked patterns, processes, and states. We elaborate each of these domains and their linkages, reviewing relevant literature and providing empirical case studies. We then propose guidelines for future pesticide-pollinator scholarship and action agenda aimed at strengthening knowledge in neglected domains and integrating knowledge across domains to provide decision support for stakeholders and policymakers. Specifically, we emphasize (1) stakeholder engagement, (2) mechanistic study of pesticide exposure, (3) understanding the propagation of pesticide effects across levels of organization, and (4) full-cost accounting of the externalities of pesticide use and regulation. Addressing these items will require transdisciplinary collaborations within and beyond the scientific community, including the expertise of farmers, agrochemical developers, and policymakers in an extended peer community.

Read the article in *Science of the Total Environment* [1].

Associated Project:
Putting pesticides on the map to guide conservation of pollinators and their ecosystem services. [2]

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Links
[1] https://www.sciencedirect.com/science/article/pii/S0048969719300166
[2] https://www.sesync.org/project/propose-a-pursuit/putting-pesticides-on-the-map-to-guide-conservation-of-pollinators-and