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Articles

CAVEATS TO QUANTIFYING ECOSYSTEM SERVICES: FRUIT ABORTION BLURS BENEFITS FROM CROP POLLINATION

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The recent trend to place monetary values on ecosystem services has led to studies on the economic importance of pollinators for agricultural crops. Several recent studies indicate regional, long-term pollinator declines, and economic consequences have been derived from declining pollination efficiencies. However, use of pollinator services as economic incentives for conservation must consider environmental factors such as drought, pests, and diseases, which can also limit yields. Moreover, “flower excess” is a well-known reproductive strategy of plants as insurance against unpredictable, external factors that limit reproduction. With three case studies on the importance of pollination levels for amounts of harvested fruits of three tropical crops (passion fruit in Brazil, coffee in Ecuador, and cacao in Indonesia) we illustrate how reproductive strategies and environmental stress can obscure initial benefits from improved pollination. By interpreting these results with findings from evolutionary sciences, agronomy, and studies on wild-plant populations, we argue that studies on economic benefits from pollinators should include the total of ecosystem processes that (1) lead to successful pollination and (2) mobilize nutrients and improve plant quality to the extent that crop yields indeed benefit from enhanced pollinator services. Conservation incentives that use quantifications of nature’s services to human welfare will benefit from approaches at the ecosystem level that take into account the broad spectrum of biological processes that limit or deliver the service.

Keywords: [bet-hedging](#), [carrying capacity](#), [ecosystem services](#), [flower surplus](#), [fruit maturation](#), [ovule fertilization](#), [pollen production](#), [pollinator decline](#)

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