

Understanding of Insects and Their Ecological Roles

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Abstract: *Insects are the most diverse and functionally important group of animals on Earth, playing vital roles in maintaining ecosystem stability, productivity, and resilience. This study offers a comprehensive synthesis of insect ecological contributions—focusing on key functions such as pollination, nutrient cycling, biological control, symbiotic relationships, and bioindication. By exploring core ecological concepts like functional diversity and ecosystem services, the research highlights the significance of major insect orders including Coleoptera, Lepidoptera, Hymenoptera, and Diptera, as well as their global distribution and ecological specialization.*

The analysis demonstrates that insect-mediated processes are central to both natural and managed ecosystems, with pollination and decomposition emerging as particularly critical services. However, multiple threats—including habitat loss, pesticide pollution, climate change, and invasive species—are driving widespread declines in insect populations and undermining the services they provide. In response, the study evaluates a range of conservation strategies, from in-situ habitat protection and ex-situ breeding programs to agroecological practices and policy-based interventions. Public awareness and participatory approaches, such as citizen science, are also emphasized as essential components of long-term conservation success.

This research underscores the ecological and societal urgency of conserving insect biodiversity, not only to protect individual species, but to safeguard the foundational processes that sustain life across ecosystems..

Keywords: Insect Biodiversity, Ecosystem Services, Functional diversity