

Role of Insects as Bio Indicators in Environmental Health

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DESCRIPTION

Insects, the tiny inhabitants of our planet, play a pivotal role in our ecosystems. Beyond their ecological importance, these small creatures are increasingly gaining recognition as bio indicators of environmental health. Bioindicators are species or organisms whose presence, abundance, behaviour, or physical condition can provide insights into the quality of their surrounding environment. Insects, due to their sensitivity to environmental changes, serve as valuable indicators of the overall health of ecosystems. This article explores the fascinating world of insects as bioindicators and highlights their significance in environmental monitoring.

The role of insects as bioindicators

Insects are incredibly diverse, with an estimated 10 million species on Earth, and they occupy various niches within ecosystems. Their adaptability and short lifespans make them highly responsive to environmental changes, making them ideal candidates for monitoring purposes. Here are several ways in which insects serve as bioindicators:

Sensitivity to pollution: Insects, particularly aquatic ones like mayflies and stoneflies, are extremely sensitive to water pollution. The presence or absence of these insects in a water body can indicate the quality of the water. For instance, the absence of sensitive species and the dominance of pollution-tolerant species can signify poor water quality.

Climate change indicators: Changes in temperature and weather patterns due to climate change have a profound impact on insect populations. Shifts in the timing of insect emergence, altered migration patterns, and changes in the distribution of species can all serve as indicators of climate change effects.

Pesticide and chemical exposure: In agriculture, insects can signal the presence of harmful chemicals. Bee populations, for example, are highly susceptible to pesticides, and monitoring bee health can provide insights into pesticide exposure and its effects on ecosystems.

Habitat quality: Insects are integral to the functioning of ecosystems as pollinators, decomposers, and prey for other

organisms. Their presence or absence can reveal the overall health and stability of an ecosystem.

Biodiversity assessment: Insects represent a substantial portion of global biodiversity. Studying changes in insect diversity and abundance can help scientists assess the overall health of an ecosystem and its response to environmental stressors.

Examples of insects as bioindicators

Butterflies and climate change: Butterflies are sensitive to temperature changes and are often cited as indicators of climate change. Shifts in their distribution and emergence patterns have been observed as temperatures rise. For instance, the range of the once rare Southern Small White butterfly has expanded northward in Europe, attributed to warming temperatures.

Dragonflies in wetlands: Dragonflies are excellent bio indicators of wetland health. They require clean water for their larval development, and the presence of diverse dragonfly species in a wetland signifies good water quality.

Honey bees and pesticides: The declining health of honey bee populations, primarily attributed to pesticide exposure, has garnered global attention. Monitoring honey bee colonies helps track the impact of pesticides on pollinators and, by extension, the food supply chain.

Ants as Soil Health Indicators: Ants are known to be sensitive to soil disturbance and contamination. Changes in ant diversity and behaviour can signal soil degradation and the need for conservation efforts.

CONCLUSION

Insects, with their abundance, diversity, and sensitivity to environmental changes, offer invaluable insights into the health of our ecosystems. As bioindicators, they serve as early warning systems, helping scientists and policymakers monitor and address environmental challenges, from pollution and climate change to habitat degradation. However, harnessing the full potential of insects as bioindicators requires interdisciplinary collaboration, taxonomic expertise, and long-term monitoring efforts. As we continue to grapple with the consequences of

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human activities on the natural world, the tiny creatures buzzing around our gardens and streams remind us that the health of our planet is interconnected with the well-being of even its

smallest inhabitants. By understanding and protecting insects, we take a crucial step toward preserving the delicate balance of our ecosystems and ensuring a sustainable future for all life on Earth.