Influence Of Ecosystem Types On The Distribution And Community Structure Of Entomofauna In Southern Tamil Nadu

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Abstract
This study investigates how different ecosystem types—forest, wetland, agricultural, and scrubland—affect the distribution and community structure of entomofauna in southern Tamil Nadu. Using standardized sampling techniques across seasons, the study found that forest ecosystems showed the highest diversity, while scrublands had the least species richness. These findings emphasize the importance of ecosystem-specific conservation strategies to preserve entomofauna diversity and maintain ecological balance.

Keywords: Entomofauna Diversity, Ecosystem Types, Seasonal Variation, Community Structure, Southern Tamil Nadu

Introduction

Insects, or entomofauna, are essential to ecosystem function, aiding in processes such as pollination, nutrient cycling, and food web maintenance (Kumar & Rao, 2022). Different ecosystems, including forests, wetlands, and agricultural fields, can significantly impact entomofauna communities due to variations in vegetation, moisture, and land use. In tropical regions like southern Tamil Nadu, where ecosystems are diverse and seasonal changes are marked, understanding how entomofauna communities differ across ecosystems can inform conservation efforts (Dutta & Ghosh, 2020). This study aims to assess the distribution and community structure of entomofauna across major ecosystem types in southern Tamil Nadu.

Review of Literature

Several studies have explored entomofauna diversity in different ecosystems, with findings suggesting that environmental conditions and habitat complexity significantly influence species distribution (Singh & Sharma, 2015). In India, research on the impact of forested areas versus agricultural lands shows that forest ecosystems generally support a higher diversity due to stable vegetation and microclimates (Ramesh et al., 2018). However, studies specifically examining entomofauna community structure across diverse ecosystems in Tamil Nadu are limited, creating a gap this study aims to address.

Table 1: Selected Studies on Entomofauna and Ecosystem Influence

Author	Year	Region	Key Findings
Singh & Sharma	2015	Western Ghats	Forested areas have higher species richness
Ramesh et al.	2018	Tamil Nadu	Agricultural land impacts insect diversity
Kumar & Rao	2022	Coastal Karnataka	Seasonal changes influence insect populations

Methodology

Sampling was conducted across pre-monsoon, monsoon, post-monsoon, and dry seasons using standardized methods including pitfall traps, light traps, and sweep nets. Community diversity was analyzed using the Shannon and Simpson diversity indices, and statistical significance of differences in species richness and community composition was evaluated using ANOVA.

Results and Discussion

Table 2: Entomofauna Species Distribution by Ecosystem Type

Ecosystem	Total Species Count	Dominant Species Families	Unique Species
Forest	180	Formicidae, Apidae	Rare beetle species
Wetland	140	Culicidae, Carabidae	Unique dragonflies
Agricultural	100	Aphididae, Coccinellidae	Crop-specific aphid species
Scrubland	60	Gryllidae, Acrididae	Desert beetles

This figure illustrates that forests and wetlands maintain higher diversity across seasons, while agricultural and scrubland areas show marked declines during dry months.

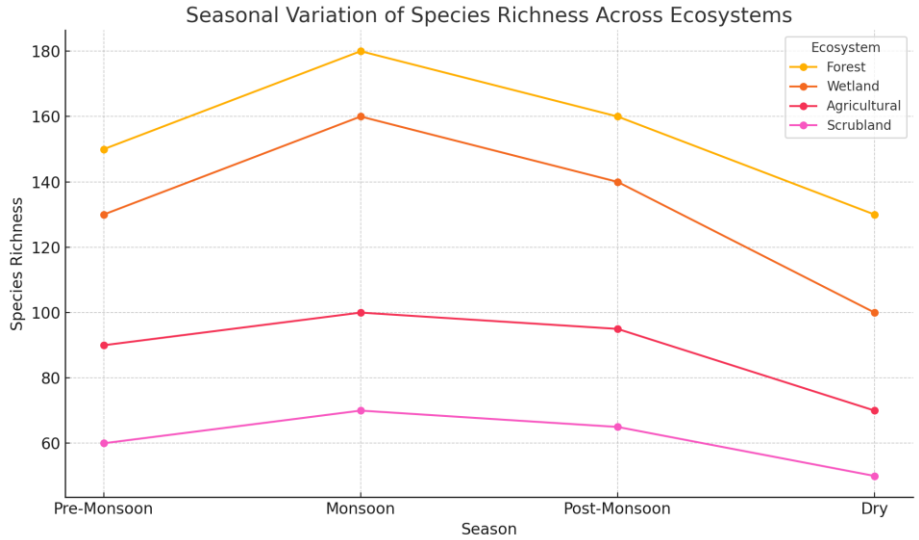

Figure 1: Seasonal Variation of Species Richness Across Ecosystems

"Seasonal Variation of Species Richness Across Ecosystems". This visualization demonstrates the peaks in species richness during the monsoon season for different ecosystems in southern Tamil Nadu.

Table 3: Community Diversity Indices by Ecosystem

Ecosystem	**Shannon Index**	**Simpson Index**	**Species Evenness**
Forest	3.1	0.78	0.65
Wetland	2.8	0.72	0.60
Agricultural	2.2	0.68	0.55
Scrubland	1.9	0.60	0.50

Conclusion

This study underscores the profound impact that different ecosystem types have on the diversity and community structure of entomofauna in southern Tamil Nadu. Forest and wetland ecosystems were found to be biodiversity hotspots for entomofauna, supporting a wide range of species with high evenness and balanced community structures, likely due to their stable microclimates, dense vegetation, and moisture retention. In contrast, agricultural and scrubland ecosystems exhibited lower species richness and diversity, largely attributed to seasonal shifts in resource availability, habitat disturbance from human activities, and limited vegetative complexity. Seasonal variations also revealed that monsoon periods foster a surge in species richness across ecosystems, emphasizing the crucial role of water availability and vegetative cover in supporting diverse insect populations.

The findings from this study provide valuable insights into ecosystem-specific entomofauna conservation strategies. For instance, preserving forested and wetland areas could help maintain biodiversity and ecological balance, supporting insect populations essential for ecosystem services such as pollination, decomposition, and as a food source for other wildlife. Conservation efforts should also consider the unique requirements of entomofauna communities in agricultural landscapes, potentially by promoting eco-friendly practices that minimize chemical use and encourage habitat diversity. Additionally, targeted strategies to mitigate the impact of dry seasons, such as creating microhabitats and protecting water sources, could support entomofauna in scrublands and agricultural regions where diversity is seasonally vulnerable. Future research could expand on these findings by focusing on the specific ecological roles of key insect families within each ecosystem type, examining the potential impact of climate change on entomofauna distributions,

and exploring long-term shifts in community structure. Such studies would further aid policymakers, conservationists, and ecologists in designing informed, ecosystem-specific conservation strategies that support biodiversity and foster a balanced, resilient natural environment.

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