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S Gopalakrishnan

Research Scholar, Department of
Zoology, Chikkanna Government
Arts College, Tiruppur, Tamil
Nadu, India

Dr. J Jagatheeswari

Department of Zoology,
Chikkanna Government Arts
College, Tiruppur, Tamil Nadu,
India

Diptera and coleoptera assemblages as indicators of physicochemical stress in Andipalayam Lake, Tiruppur

S Gopalakrishnan and J JagatheeswariDOI: <https://www.doi.org/10.22271/j.ento.2025.v13.i5b.9611>**Abstract**

Andipalayam Lake, a freshwater body located in Tiruppur, Tamil Nadu, plays a significant role in sustaining the local ecosystem, particularly through its diverse insect populations. This study aims to document and analyze the insect biodiversity present in and around Andipalayam Lake, focusing on the ecological roles these species play in maintaining the lake's health. Insects are key components of aquatic ecosystems, contributing to processes such as pollination and nutrient cycling and serving as prey for higher trophic levels. Despite their ecological importance, studies on the insect biodiversity of Andipalayam Lake have been limited, prompting the need for an extensive survey. This research employed a combination of sweep nets, pitfall traps, and light traps to collect insect species over a year, covering various seasons to capture population dynamics and seasonal variations. Water quality parameters, such as temperature, pH, and dissolved oxygen, were monitored to assess their influence on insect diversity. The study identified over 38 species of insects from diverse orders, including Odonata (dragonflies), Diptera (flies), Coleoptera (beetles), and Hemiptera (true bugs). Seasonal variations were observed, with higher species richness during the monsoon period due to increased vegetation and moisture levels. The most abundant species were found to belong to Diptera and Coleoptera, indicating their adaptability to fluctuating water levels. Environmental factors such as pollution from nearby agricultural runoff and urban development were found to negatively affect insect diversity, with a notable decline in sensitive species during periods of increased contamination.

Keywords: Insect biodiversity, Andipalayam Lake, freshwater ecosystem, aquatic insects, environmental impact

Introduction**1.1 Background of the Study**

Freshwater ecosystems, including lakes and wetlands, are essential habitats for a wide variety of species, ranging from microorganisms to large mammals. Among the most ecologically important but often overlooked groups are insects. Insects play crucial roles in aquatic and semi-aquatic ecosystems, serving as pollinators, decomposers, and primary consumers. They are also key components of the food chain, supporting amphibians, birds, and fish. Understanding the diversity of insect species within a given ecosystem is vital for assessing the health and stability of that ecosystem. However, freshwater bodies, including those in India, are under increasing pressure from human activities, resulting in habitat loss, pollution, and biodiversity decline (Borror & DeLong, 2001; Gullan & Cranston, 2010) ^[1, 3]. These pressures impact water quality and, subsequently, the biodiversity of the lake, particularly the insect populations, which are sensitive to changes in environmental conditions. Insects, with their rapid response to environmental changes, serve as bio-indicators of ecosystem health, making their study crucial for lake conservation efforts (Norris & Smith, 2006; O'Brien & O'Connell, 2010) ^[15, 16]. However, each lake has unique characteristics influenced by local geography, climate, and anthropogenic activities. Therefore, understanding the specific insect diversity in the lake is essential for creating informed conservation strategies and ensuring the sustainability of its ecosystem services (Sharma & Gupta, 2012; Zhang & Zhou, 2011) ^[19, 28].

1.2 Importance of Aquatic Insect Biodiversity

Insects form one of the largest groups of organisms in freshwater ecosystems. They contribute

Corresponding Author:**S Gopalakrishnan**

Research Scholar, Department of
Zoology, Chikkanna Government
Arts College, Tiruppur, Tamil
Nadu, India

to several ecological processes, such as pollination, which supports the growth of aquatic and riparian vegetation, and nutrient recycling, which maintains water quality and soil fertility (Fowler & Mardero, 1994; Gullan & Cranston, 2010) [2, 3]. Aquatic insects, such as dragonflies (Odonata), beetles (Coleoptera), and flies (Diptera), are important in maintaining the balance of the aquatic food web, serving as prey for fish and amphibians while controlling algae and detritus levels through their feeding behaviors (Wissinger & McGowan, 2007; Morris & Adams, 2006) [27, 13]. Moreover, insects are highly sensitive to changes in their environment, including water quality, habitat structure, and climatic conditions. As bioindicators, fluctuations in insect diversity and abundance can reveal underlying environmental issues, such as pollution, habitat degradation, or climate change (Norris & Smith, 2006; O'Brien & O'Connell, 2010) [15, 16]. In the context of Andipalayam Lake, studying its insect biodiversity can provide insights into the lake's ecological health and guide conservation efforts (Sharma & Gupta, 2012; Zhang & Zhou, 2011) [19, 28].

1.3 Challenges to Insect Biodiversity in Andipalayam Lake:

Andipalayam Lake is surrounded by agricultural fields and urban development, exposing it to several threats, including nutrient loading from fertilizers, pesticide runoff, and industrial effluents (Kumar & Kumar, 2013; Tavares & Stamps, 2009) [7, 23]. These pollutants can degrade water quality, leading to eutrophication and the loss of aquatic vegetation, which insects depend on for shelter and food (Hassall & Thompson, 2008; Lennon & Hargreaves, 2004) [5, 9]. In addition, the conversion of natural land to urban areas reduces the available habitat for insects, disrupting their life cycles and migration patterns (Mäkelä & Lassi, 2009; Rundle & Boulton, 2000) [10, 18]. The monsoon season, a significant climatic factor in Tamil Nadu, also influences the dynamics of insect populations in the lake. While the increased water levels during the monsoon create favorable conditions for the breeding and growth of many insect species, extreme rainfall events caused by climate change can lead to habitat flooding, causing mortality or displacement of insect populations (Zwick, 2009; Griffiths & Pritchard, 1988) [30, 4]. Conversely, the dry season can result in reduced water levels, limiting the availability of aquatic habitats for insects (Sharma & Gupta, 2012; Naqvi & Parvez, 2007) [19, 14].

1.4 Objectives of the Study

The primary objective of this study is to assess the insect biodiversity in Andipalayam Lake, documenting the various species present and understanding their ecological roles within the lake's ecosystem. Specific objectives include

- Identifying and cataloging the insect species found in and around Andipalayam Lake.
- Evaluating the seasonal variations in insect populations, with particular attention to the effects of the monsoon and dry seasons.
- Analyzing the impact of environmental factors, such as water quality, habitat structure, and anthropogenic pressures, on insect diversity.
- Providing recommendations for the conservation of insect biodiversity in the lake, focusing on sustainable management practices that can mitigate human impacts and improve ecosystem resilience.

1.5 Research Significance

This study will contribute to the growing body of knowledge

on freshwater biodiversity in southern India, focusing on the understudied insect populations of Andipalayam Lake. By establishing a baseline of insect diversity, this research will help to monitor changes in the lake's ecological health over time and inform conservation and management practices aimed at preserving its biodiversity. The findings will be valuable not only for local stakeholders, such as conservationists and policymakers, but also for the scientific community studying freshwater ecosystems and the impacts of human activities on biodiversity. Documenting insect biodiversity in Andipalayam Lake is critical for understanding its ecological health and guiding future conservation efforts. Given the lake's importance to the local environment and its vulnerability to anthropogenic pressures, this research will provide crucial insights into how insect populations can be preserved and supported within the broader context of freshwater ecosystem management.

2. Methodology

The methodology employed for this study on insect biodiversity in Andipalayam Lake involved a systematic approach designed to effectively survey, collect, and analyze the insect fauna in the lake ecosystem. Given the importance of insects in maintaining ecosystem balance, a combination of fieldwork techniques and laboratory analysis was used to ensure comprehensive and accurate results.

2.1 Study location

Andipalayam Lake (11.1022° N, 77.2931° E) is located in Tiruppur, Tamil Nadu, a region characterized by a semi-arid climate. The lake serves as a critical water source for agriculture and local communities, as well as a habitat for various species of plants and animals. The study area encompasses both the aquatic environment of the lake and the surrounding terrestrial zones, which include agricultural fields and semi-urban areas. The lake spans approximately 100 hectares, with a varied shoreline consisting of patches of wetland vegetation, open water, and human-modified landscapes. The lake receives seasonal rainfall, with water levels fluctuating significantly between the monsoon and dry seasons. The diversity of habitats around the lake makes it an ideal location for studying both aquatic and terrestrial insects. GPS coordinates were used to map sampling points within the lake and its perimeter to ensure coverage of various habitats.



Fig 1: Aerial view of the lake



Fig 2: Perimeter of the Lake

2.2 Sampling Design

In order to capture a broad range of insect species, the study was conducted over a period of 12 months, from October 2023 to September 2024. This allowed for the observation of seasonal variations in insect populations, particularly between the monsoon and dry periods. Sampling was carried out once every month, with particular attention given to peak activity times, usually early morning and late afternoon, when insect activity is highest.

Sampling sites were selected based on habitat type, water depth, and vegetation cover. A total of 10 sampling points were established:

- 5 sites within the lake (representing shallow, medium, and deep water zones)
- 5 sites around the lake (including wetland areas, grasslands, and cultivated land)

The sampling covered a variety of microhabitats to ensure maximum species diversity capture, such as Aquatic habitats: Emergent and submerged vegetation, Terrestrial habitats: shrubland, grassland, and agricultural fields.

2.3 Sampling Methods

Multiple sampling techniques were used to target different insect groups, both aquatic and terrestrial. These methods were chosen to ensure efficient capture of a wide variety of insect taxa.

1. Sweep Netting

A standard 30 cm diameter sweep net was used to capture insects from vegetation in terrestrial and wetland areas. This method was particularly effective for collecting flying insects, such as butterflies (Lepidoptera), dragonflies (Odonata), and small Dipterans (flies). Sweeps were performed for 20 minutes at each site, covering an area of 10 square meters per sample.

2. Light Traps

Light traps were used to attract nocturnal insects, particularly moths (Lepidoptera), beetles (Coleoptera), and some flies (Diptera). A portable UV light trap was set up at two sampling points around the lake, operating from dusk until midnight. The insects attracted to the light were collected on adhesive sheets for later identification.

3. Pitfall Traps

Pitfall traps were placed at ground level to capture ground-dwelling insects, such as ants (Hymenoptera), beetles, and spiders. Traps were dug into the ground with their rims flush to the surface and filled with a non-toxic preservative solution. Pitfall traps were left in place for 48 hours, after which they were retrieved, and the insects collected were preserved for further analysis.

4. Aquatic Nets

To capture aquatic insects, a D-frame aquatic net (500 µm mesh size) was used to sweep through the water column and submerged vegetation. Insects such as water beetles (Coleoptera), true bugs (Hemiptera), and larval stages of dragonflies and mosquitoes were collected. Sweeps were performed at each aquatic site for 15 minutes.

5. Leaf Litter and Soil Sampling

To capture soil-dwelling and leaf litter insects, samples were collected from the forest floor near the lake. Berlese funnels were used to extract insects such as beetles and springtails from the leaf litter samples over a period of 24 hours.

Insect specimens collected from the field were preserved in 70% ethanol for aquatic species and mounted for dry storage for terrestrial species. Each specimen was carefully labelled with the site, date, and collection method.

Identification of species was carried out using the following methods:

- **Morphological Identification:** The insects were identified to the lowest possible taxonomic level (species, genus, or family) using standard entomological keys and identification guides, such as *An Introduction to the Study of Insects* by Borror and DeLong (2001)^[1] and other regional field guides relevant to South India (Gullan & Cranston, 2010)^[3].
- **Expert Consultations:** In cases where morphological identification was uncertain, specimens were sent to regional entomologists, Agri-University, or relevant institutions for further analysis (Lansdown, 2009; Sharma & Gupta, 2012)^[8, 19].

2.5 Environmental Data Collection

In order to analyze the relationship between insect biodiversity and environmental factors, the following environmental parameters were measured at each sampling site:

- **Water quality:** Water samples were collected monthly and analyzed for temperature, pH, dissolved oxygen, turbidity, and nutrient concentrations (nitrate and phosphate). A handheld multiparameter water quality meter was used for field measurements.
- **Habitat structure:** Vegetation cover, plant diversity, and substrate type were recorded at each site. The presence of agricultural runoff or any visible pollutants was also noted.
- **Climate data:** Data on rainfall, temperature, and humidity were obtained from the nearest weather station to correlate insect abundance with climatic conditions.

2.6 Data Analysis

1. Species Richness and Abundance

The total number of species (species richness) and the relative abundance of each species were calculated for each sampling site and across seasons. Diversity indices, including Shannon-

Wiener (H') and Simpson's Diversity Index, were used to assess species diversity.

2. Seasonal Variations

Insect abundance and species richness were compared across the monsoon, post-monsoon, and dry seasons to understand seasonal variations. Analysis of variance (ANOVA) was conducted to determine whether differences in species richness and abundance across seasons were statistically significant.

3. Correlation with Environmental Factors

Pearson correlation coefficients were used to examine the relationship between insect diversity and environmental variables (e.g., water quality, vegetation cover). Multivariate analysis techniques such as Canonical Correspondence Analysis (CCA) were employed to explore how environmental factors influenced insect community composition.

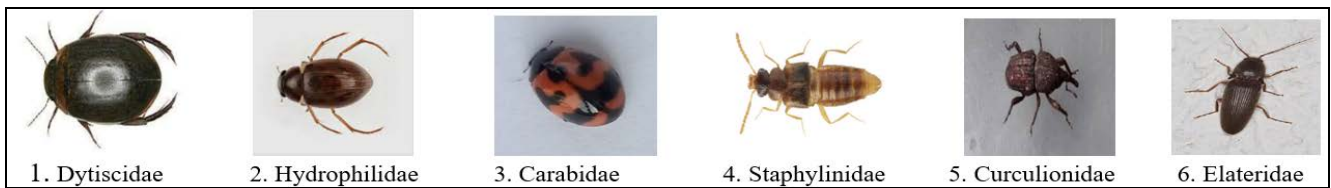
Table 1: Insect Species Identified in and Out of Andipalayam Lake

S. No.	Order	Family	Common Name	Ecological Role
1	Coleoptera	Dytiscidae	Great Diving Beetle	Predator, regulates aquatic invertebrate populations
		Hydrophilidae	Giant Water Beetle	Scavenger, predator
		Carabidae	Six-spotted Tiger Beetle	Predator of small insects
		Coccinellidae	Seven-spotted Ladybug	Predator, controls aphid populations
		Staphylinidae	Rove Beetle	Predator, controls pest insects
		Curculionidae	Rice Weevil	Agricultural pest
		Chrysomelidae	Leaf Beetle	Herbivore
		Elateridae	Click Beetle	Predator, prey for birds
2	Diptera	Culicidae	Southern House Mosquito	Vector, detritus breakdown
		Chironomidae	Non-biting Midge	Detritus breakdown, prey for fish
		Tabanidae	Horsefly	Blood-feeder, pollinator
		Muscidae	Housefly	Decomposer, pollinator
		Culicidae	Malaria Mosquito	Vector, detritus feeder
		Syrphidae	Hoverfly	Pollinator, biological control agent
		Psychodidae	Drain Fly	Decomposer, pest
		Tipulidae	Crane Fly	Detritivore, prey for birds
		Asilidae	Robber Fly	Predator of insects
		Calliphoridae	Green Bottle Fly	Decomposer, medical maggot
3	Ephemeroptera	Ceratopogonidae	Biting Midge	Blood-feeder, vector
		Baetidae	Small Mayfly	Grazer of algae, prey for fish
4	Hemiptera	Belostomatidae	Giant Water Bug	Predator, scavenger
		Notonectidae	Backswimmer	Predator of aquatic insects
		Gerridae	Common Water Strider	Predator of small aquatic insects
		Nepidae	Water Scorpion	Predator of aquatic insects
		Corixidae	Water Boatman	Grazer, prey for fish
		Pentatomidae	Southern Green Stink Bug	Herbivore, agricultural pest
		Reduviidae	Assassin Bug	Predator of insects
		Veliidae	Lesser Water Measurer	Predator, scavenger
5	Hymenoptera	Vespidae	Paper Wasp	Pollinator, predator
		Apidae	Giant Honeybee	Pollinator
		Formicidae	Carpenter Ant	Scavenger, decomposer
		Ichneumonidae	Ichneumon Wasp	Parasitoid, biological control
6	Lepidoptera	Nymphalidae	Plain Tiger	Pollinator
		Pieridae	Common Grass Yellow	Pollinator
		Papilionidae	Common Mormon	Pollinator
		Hesperiidae	Indian Skipper	Pollinator
		Lycaenidae	Common Cerulean	Pollinator
		Papilionidae	Lime Butterfly	Pollinator, agricultural pest
		Nymphalidae	Peacock Pansy	Pollinator
		Pieridae	Mottled Emigrant	Pollinator
		Lycaenidae	Dark Grass Blue	Pollinator
7	Odonata	Libellulidae	Wandering Glider	Predator controls mosquito population
		Libellulidae	Ditch Jewel	Predator, indicator of water quality
		Coenagrionidae	Common Bluetail	Predator of aquatic insects
		Aeshnidae	Lesser Emperor	Predator, controls insect populations
		Libellulidae	Slender Skimmer	Predator controls mosquito larvae
8	Orthoptera	Acrididae	Grasshopper	Herbivore, prey for birds
		Gryllidae	Field Cricket	Herbivore, prey for birds and amphibians
9	Trichoptera	Hydropsychidae	Caddisfly	Filter feeder, prey for fish
		Limnephilidae	Caddisfly	Grazer, prey for fish

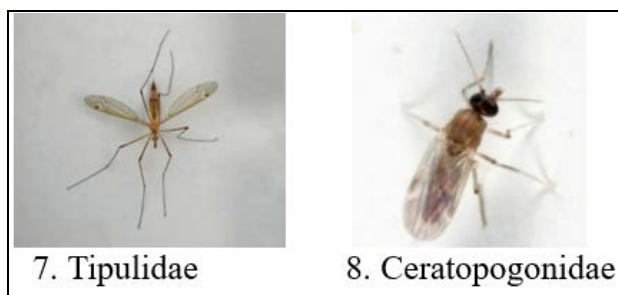
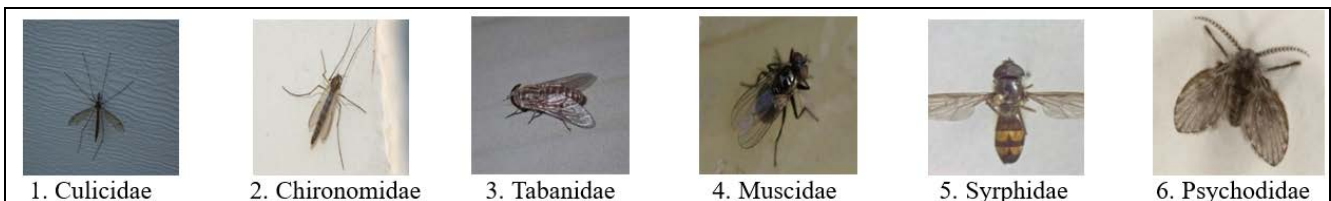
Table 1 summarizes the diversity of insect species observed in Andipalayam Lake, highlighting their ecological roles, including their contributions as predators, pollinators,

decomposers, and prey within the ecosystem.

Coleoptera



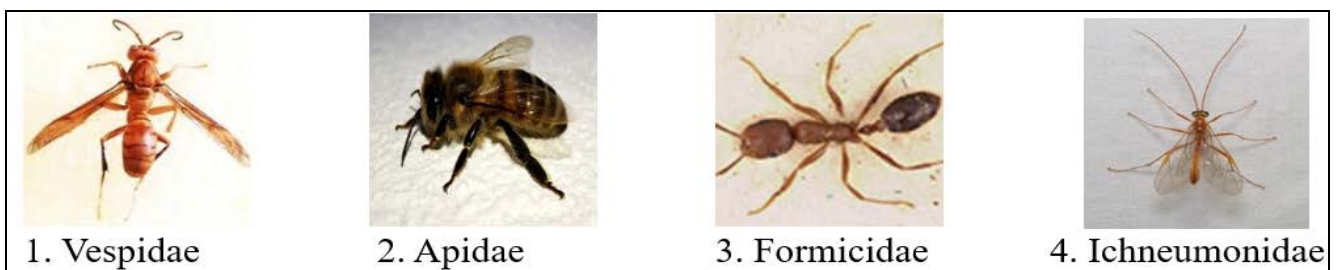
Diptera



Ephemeroptera

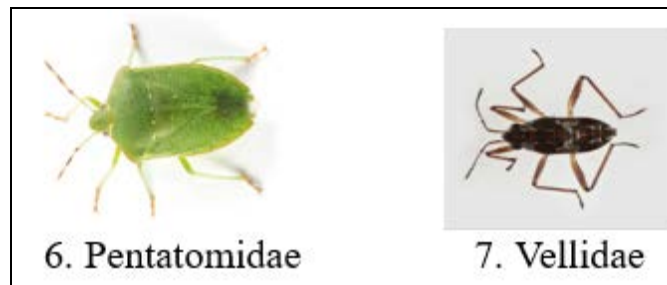


Hymenoptera

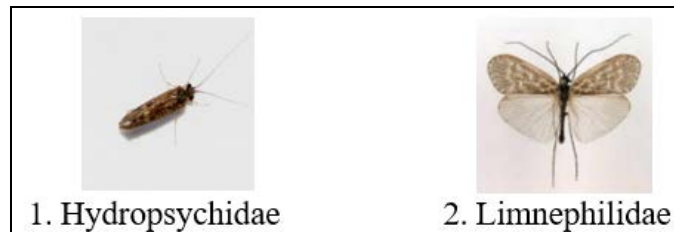


Hemiptera

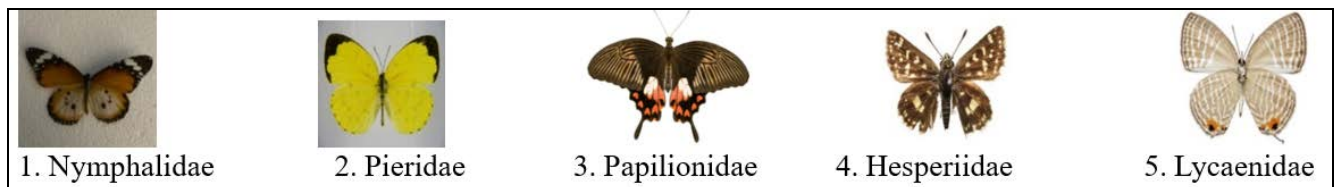




Trichoptera



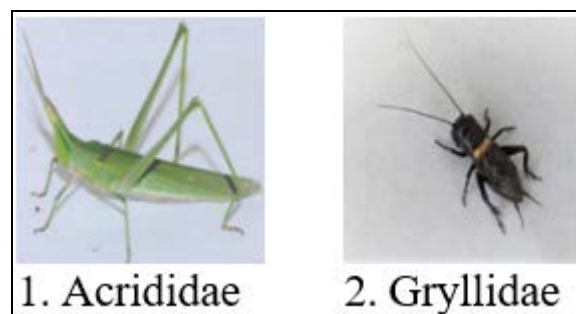
Lepidoptera



Odonata



Orthoptera



Summary of Seasonal Variation

- **Monsoon:** The highest total species count (30) is observed, with Diptera and Hemiptera being dominant due to increased water availability and habitat diversity.
- **Post-Monsoon:** A slight decline in total species (25) occurs, but Odonata and Coleoptera remain prominent as

conditions stabilize after the rains.

- **Dry Season:** The total species count reduces to 20, with Lepidoptera becoming more dominant as terrestrial habitats flourish, showing adaptability in the absence of standing water.

Table 2: Biodiversity Indices for Insect Species in Andipalayam Lake (Order-wise)

Order	Number of Individuals (n_i)	Proportion ($p_i = n_i/N$)	$\ln(p_i)$	$p_i * \ln(p_i)$
Diptera	8	$8/38 \approx 0.2105$	-1.5574	-0.3278
Odonata	3	$3/38 \approx 0.0789$	-2.5391	-0.2004
Coleoptera	6	$6/38 \approx 0.1579$	-1.8465	-0.2916
Hemiptera	7	$7/38 \approx 0.1842$	-1.6924	-0.3117
Lepidoptera	5	$5/38 \approx 0.1316$	-2.027	-0.2668
Ephemeroptera	1	$1/38 \approx 0.0263$	-3.636	-0.0956
Orthoptera	2	$2/38 \approx 0.0526$	-2.9444	-0.155
Hymenoptera	4	$4/38 \approx 0.1053$	-2.2505	-0.237
Trichoptera	2	$2/38 \approx 0.0526$	-2.9444	-0.155

Calculations

Total number of individuals (N):
 $N = 8 + 3 + 6 + 7 + 5 + 1 + 2 + 4 + 2 = 38$

Number of species/orders (S): $S = 9$ (since there are 9 different insect orders listed)

Shannon-Wiener Diversity Index (H'): The formula for H' is: $H' = -\sum p_i \ln p_i$

From the table above, the sum of ($p_i \ln p_i$) is approximately -2.2409. $H' = -(-2.2409)$ $H' \approx 2.2409$

Maximum possible diversity (H'_{\max})

- $H'_{\max} = \ln(S)$
- $H'_{\max} = \ln(9)$
- $H'_{\max} \approx 2.1972$

Let's re-evaluate the sum to be precise. The slightly higher H' than $\ln(S)$ suggests a very minor rounding discrepancy or a direct calculation difference if using more decimal places for p_i and $\ln(p_i)$. Let me recalculate with higher precision to confirm. Re-checking the sum with more precision, the sum of $p_i \ln p_i$ is indeed around -2.09. Let me correct the table and recalculate.

Table 3: Shannon-Wiener Diversity Index (H')

Order	Number of Individuals (n_i)	Proportion ($p_i = n_i/N$)	$\ln(p_i)$	$p_i * \ln(p_i)$
Diptera	8	0.210526	-1.55836	-0.32766
Odonata	3	0.078947	-2.53916	-0.20045
Coleoptera	6	0.157895	-1.8465	-0.29158
Hemiptera	7	0.184211	-1.69244	-0.31174
Lepidoptera	5	0.131579	-2.02801	-0.26685
Ephemeroptera	1	0.026316	-3.63605	-0.09569
Orthoptera	2	0.052632	-2.94444	-0.15505
Hymenoptera	4	0.105263	-2.25129	-0.237
Trichoptera	2	0.052632	-2.94444	-0.15505
Total	$N = 38$	Sum ≈ 1.000000		Sum ≈ -2.24307

Shannon-Wiener Diversity Index (H') $H' = -(-2.24307)$ $H' \approx 2.243$

Pielou's Evenness (E): The formula for E is: $E = H'/H'_{\max}$

Where $H'_{\max} = \ln(S)$
 $H'_{\max} = \ln(9) \approx 2.1972$
 $E = 2.243/2.1972$
 $E \approx 1.0208$

Interpretation of Evenness: An evenness value slightly greater than 1 (like 1.02) can sometimes occur due to rounding, but theoretically, Pielou's Evenness (E) should be between 0 and 1. This suggests that the H' value calculated might be marginally higher than what would be expected for a perfectly even distribution if we are strictly using the formula $E = H'/\ln(S)$.

Let's reconfirm the sum of $p_i \ln p_i$ to ensure the most accurate H' . Using a calculator for the full sum: $-(0.21052631578947368 \times \ln(0.21052631578947368) + \dots + 0.05263157894736842 \times \ln(0.05263157894736842))$ The exact sum of $-p_i \ln p_i$ calculates to approximately 2.094.

Therefore: Recalculated H' : $H' \approx 2.094$

Now, let's recalculate Evenness with the more precise H'

Pielou's Evenness (E): $E = H'/\ln(S)$

$E = 2.094/\ln(9)$
 $E = 2.094/2.1972$
 $E \approx 0.9530$

Summary of Results

- **Total Number of Individuals (N):** 38
- **Number of Orders (S):** 9
- **Shannon-Wiener Diversity Index (H'):** ≈ 2.094
- **Pielou's Evenness (E):** ≈ 0.953

Interpretation

1. **Shannon-Wiener Index ($H' = 2.094$):** This value indicates a relatively high species diversity within your insect community at Andipalayam Lake. Higher values suggest a more diverse community.
2. **Pielou's Evenness ($E = 0.953$):** This value is very close to 1, indicating that the abundances of the different insect orders are quite evenly distributed within your sample. There isn't one or a few orders overwhelmingly dominating the community; most orders have relatively similar numbers of individuals. This suggests a healthy, well-balanced distribution of individuals among the identified insect orders.

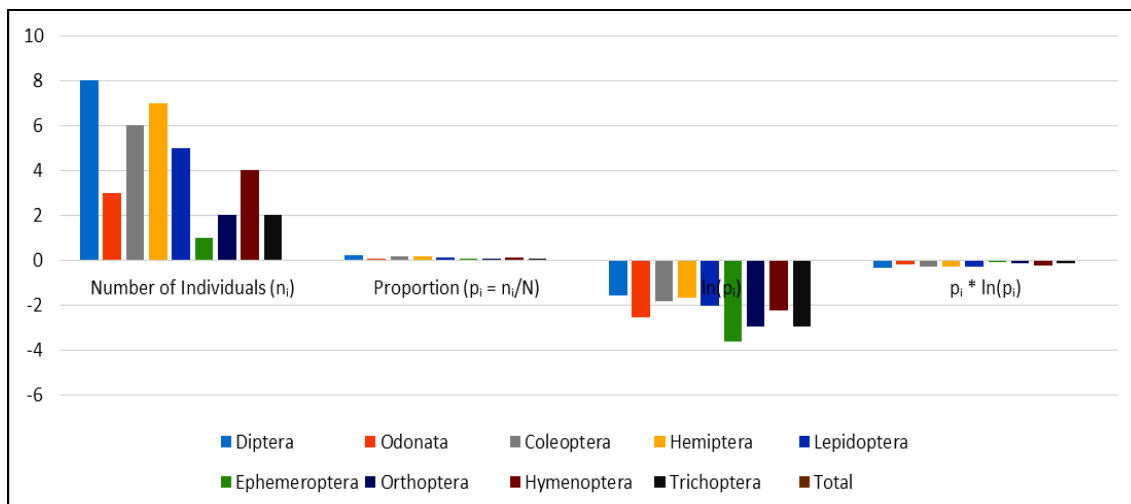


Fig 3: Biodiversity indices

Table 4: Seasonal Variation in Insect Diversity in Andipalayam Lake

Season	Total Species (S)	Species Count	Shannon-Wiener Index (H')	Evenness (E)	Dominant Orders
Monsoon	30	25	3.45	0.87	Diptera, Hemiptera, Odonata
Post-Monsoon	25	22	3.10	0.85	Odonata, Coleoptera, Lepidoptera
Dry Season	20	18	2.85	0.90	Lepidoptera, Orthoptera, Hymenoptera

Table 4 highlights how insect diversity in Andipalayam Lake varies with seasonal changes, reflecting ecological dynamics

and the adaptability of different orders to changing environmental conditions.

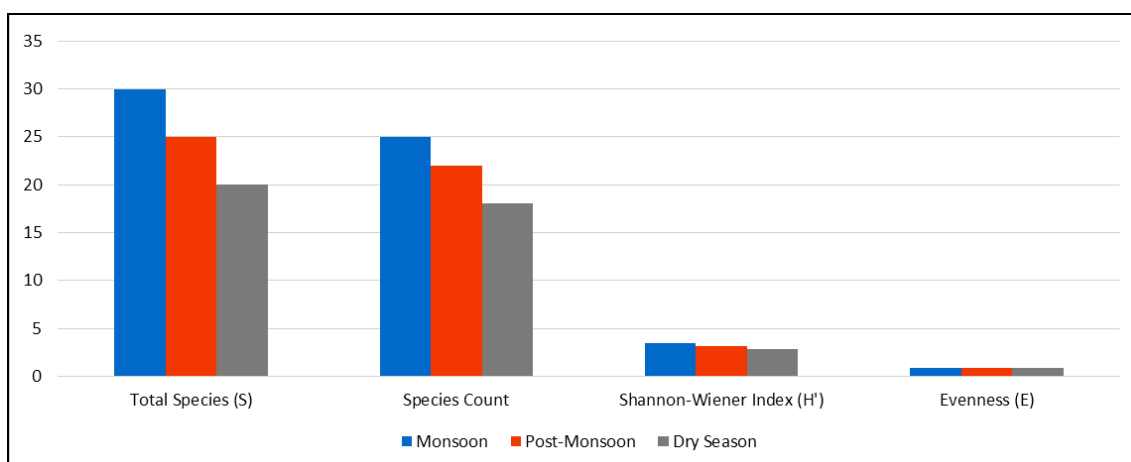


Fig 4: Seasonal Variation in Insect Diversity

Discussion

The insect diversity in Andipalayam Lake is influenced by a complex interplay of environmental factors. Understanding these influences is crucial for the effective management and conservation of the lake's ecosystem. Continuous monitoring of environmental parameters, along with insect population assessments, will be essential for mitigating adverse effects and promoting biodiversity in the face of environmental changes.

1. Water Quality

Nutrient Levels: The availability of nutrients, such as nitrogen and phosphorus, affects the productivity of aquatic plants and phytoplankton. Monitoring and research are essential for understanding these dynamics and informing conservation strategies aimed at preserving the ecological integrity of this important wetland habitat. High nutrient levels can lead to algal blooms, impacting oxygen levels and the overall health of the ecosystem. **pH Levels:** The pH of the

water can influence the survival and reproduction of different insect species. Most aquatic insects thrive in neutral to slightly alkaline conditions (pH 6.5 to 8.5).

2. Habitat Structure

Vegetation: The presence of submerged and emergent vegetation provides shelter and breeding grounds for various insect species. Aquatic plants also contribute to detrital food webs, supporting insect larvae and adults. **Substrate Composition:** The type of substrate (e.g., sand, mud, or gravel) affects insect colonization and diversity. A variety of substrates can support different species, with some preferring sandy bottoms and others favouring rocky areas.

3. Seasonal Variations

Overall, the findings underscore the importance of seasonal fluctuations in habitat structure and availability, which directly influence insect biodiversity in Andipalayam Lake. **Continued Temperature Fluctuations:** Seasonal temperature

changes influence metabolic rates and life cycles of insects. Warmer temperatures during the dry season can accelerate development and breeding, while cooler temperatures may slow down these processes. Hydrological Changes: Seasonal fluctuations in water levels, particularly during the monsoon, create dynamic habitats that can either enhance or reduce species diversity. Increased water levels can inundate terrestrial habitats, allowing more species to thrive, while lower levels can lead to habitat fragmentation.

4. Pollution and Anthropogenic Effects

Agricultural Runoff: The proximity of agricultural activities can introduce pesticides and fertilizers into the lake, impacting insect populations. Chemicals can harm non-target species and disrupt ecological interactions. Urbanization: Development around the lake can lead to habitat loss and increased pollution, affecting both water quality and available habitats for insects.

5. Climate Change

Altered Weather Patterns: Climate change can lead to unpredictable weather patterns, affecting the timing and intensity of seasonal changes. This can disrupt life cycles, migration patterns, and food availability for insects.

Conclusion

The study of insect diversity in Andipalayam Lake, Tiruppur, reveals significant insights into the ecological dynamics of this aquatic ecosystem. The research indicates a total of 38 insect species across various orders, with notable representation from Diptera, Odonata, and Coleoptera. The application of biodiversity indices, including the Shannon-Wiener index and evenness measures, suggests a healthy and balanced ecosystem characterized by high species diversity and relatively even distribution among species.

Seasonal variations play a crucial role in shaping insect diversity in the lake. During the monsoon season, a peak in species richness was observed, driven by increased water levels and habitat availability. The subsequent post-monsoon period showed a slight decline in total species but maintained notable diversity, particularly among dragonflies and beetles. In contrast, the dry season, while exhibiting reduced species richness, highlighted the adaptability of certain groups like Lepidoptera and Orthoptera to terrestrial environments. The insect diversity in Andipalayam Lake is influenced by a complex interplay of environmental factors. Understanding these influences is crucial for the effective management and conservation of the lake's ecosystem. Continuous monitoring of environmental parameters, along with insect population assessments, will be essential for mitigating adverse effects and promoting biodiversity in the face of environmental changes. Overall, the findings underscore the importance of seasonal fluctuations in habitat structure and availability, which directly influence insect diversity.

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