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Biodiversity Unveiled: A Study of Faunal Diversity and Student Conservation Mindset at V.H.N.S.N. College

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Abstract

A research project titled "Biodiversity Unveiled: A Study of Faunal Diversity and Student Conservation Mindset at V.H.N.S.N. College" was conducted at V.H.N.S.N. College in Virudhunagar from December 18, 2022, to December 18, 2023. The college campus, spanning 145.3 acres, boasts a verdant environment. However, a comprehensive and up-to-date report on the campus's faunal diversity was previously unavailable. The investigation covered various areas of the campus, revealing 285 faunal species. These included invertebrates (219 Arthropoda and 6 Mollusca) and vertebrates (7 Amphibia, 7 Reptiles, 42 Aves, and 4 Mammalia). Seasonal temperature fluctuations were also noted. The study employed a carefully crafted questionnaire to gather information from 114 zoology department students. The primary objective was to assess students' perceptions and approaches towards species and their conservation at V.H.N.S.N. College. Findings indicated that while students possessed basic taxonomic knowledge, they lacked in-depth understanding at the taxonomic level. Nevertheless, students expressed interest in learning about species identification and conservation. Based on these results, the researchers recommend incorporating field trips into the curriculum. Such experiences would broaden students' perspectives on environmental and wildlife conservation, potentially inspiring them to pursue research in faunal diversity.

Keywords: Biodiversity, Wildlife conservation, Faunal Diversity, Student Conservation

1. Introduction:

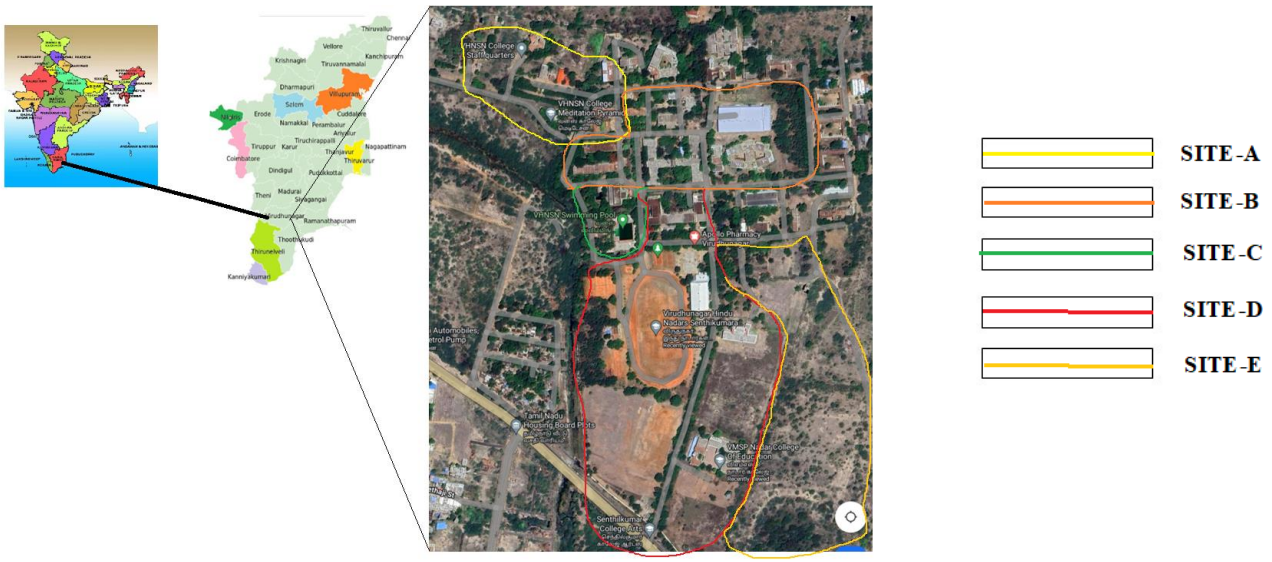
Biodiversity refers to the range and variability of living organisms within a specific area on Earth. It encompasses ecosystem, genetic, and species diversity. India is renowned for its diverse geomorphology and consequently rich biodiversity. Although many Indian cities boast a wide array of flora and fauna, rapid urbanization has led to a concerning decrease in biodiversity (Narayana et.al.,2017). Comprehending the diversity across various habitats is crucial for grasping community structures and niche relationships, as well as identifying the significance of regional or local landscapes for biological preservation. The global erosion of biodiversity, or life's variability, is primarily due to various human activities (Magurran

2004; Pereia et.al., 2010). Factors such as species richness, representation, and rarity play a vital role in determining the biodiversity value of a terrestrial site, providing a scientifically sound framework for conservation efforts (Regan et.al.,2007). The growing trend of urbanization is a key factor contributing to biodiversity decline, mainly through habitat alteration and fragmentation of natural vegetation (Tratalos et.al., 2007). Biodiversity data is essential for conservation purposes, making it necessary to first comprehend existing diversity to effectively monitor and maximize it. The diverse species in an ecosystem are intricately connected. Any disruption to these connections can lead to a reduction or elimination of linked species populations. Therefore, continuous monitoring of animal species diversity is crucial. Virudhunagar, a city in the Indian state of Tamil Nadu, serves as the administrative center for the Virudhunagar district. It is situated 506 km southwest of Chennai, the state capital, and 53 km south of Madurai. The Virudhunagar municipality oversees an area of 6.39 km^2.The climate in Virudhunagar is on the cusp of being classified as hot semi-arid, falling just short of the tropical savanna category. Similar to the rest of Tamil Nadu, Virudhunagar experiences high temperatures from April to June, with cooler weather in December and January. Daily temperatures fluctuate between a high of 38.5 °C and a low of 30 °C. The city receives an average annual rainfall of 829.6 mm, which is below the state average of 1,008 mm. The southwest monsoon, occurring from June to August, brings minimal precipitation. The majority of rainfall occurs during the northeast monsoon, spanning October to December. The V.H.N.S.N. College campus in Virudhunagar is a haven for diverse plant and animal life. Spanning 145.3 acres, the grounds are characterized by lush greenery. However, until now, a comprehensive and up-to-date report on the campus's animal diversity had not been compiled. This study was therefore initiated to assess and review the faunal diversity within the college premises. The research aimed to examine animal species in relation to climate conditions and to spark student interest in the unique characteristics and classification of various fauna.

MATERIALS AND METHODS:

STUDY SPOT:

The survey utilized the primary records of faunal species found within the V.H.N.S.N. College, Virudhunagar. This was done at different sites of the campus from December 2022 to December2023. The records, collected from various locations, were categorized into Site-A, B, C, D, and E. Site-A has a Pyramid, Girls Rest Room, Staff Quarters, Administrative Block, Cage for Birds, and IT & Department of English Blocks. The Department of Zoology, Administrative Office, Placement Cell, Canteen, Commerce, Auditorium, Girls hostel, Department of Economics, and Physics are located at Site-B. The Department of Chemistry, Microbiology, Botany, Commerce, Library, Swimming pool, Boys Cycle shed, and Playground make up Site-C. The Department of MBA, Boys hostel, NCC, Controller office, RRC and NSS are located in Site-D. Voc Department, and Gym. An unknown sector comprises Site-E.



SEASONAL WISE STUDY:

The Indian Meteorological Department divides the year into four seasons: Winter (December to February), Pré-monsoon or summer (March to May), Monsoon or Rainy (June to September), and Autumn (October to November). During the winter months of December through February, temperatures in Virudhunagar are noticeably cooler. The temperature during this season hovers between 18°C and 28°C on average. ideal for outdoor activities due to pleasant weather and minimal precipitation during this period. Some fauna shows a decrease in activity due to the contrast between cooler nights and mild daytime warmth.In Virudhunagar, temperatures and dryness increase during the pre-monsoon season from March to May. The temperature fluctuates between 35°C-40°C during the day and 25°C-30°C at night. This season features intense heat and occasional heatwaves, resulting in faunal activity reduction and potential water scarcity due to animals' need for shelter during the day. Under the dry, arid circumstances, wildlife and vegetation face difficulties. The monsoon season in Virudhunagar lasts from June to September, providing respite from the scorching summer heat. This period experiences temperatures between 25°C and 35°C. The arrival of the southwest monsoon triggers a renewal of plant and animal life through moderate to heavy rainfall. Many species become more active and visible due to increased humidity and water availability, enabling feeding and reproduction. Autumn in Virudhunagar, occurring in October and November, marks the transition from monsoon to winter. Temperatures vary from 25°C to 32°C during the day and from 20°C to 25°C at night. The environment stays moist due to occasional post-monsoon showers despite the generally pleasant weather. During the monsoon's aftermath, animals are busy preparing for winter with heightened faunal activity.

DATA COLLECTION AND IDENTIIFCATION METHOD:

Data was collected twice daily, between 6:00 am-9:00 am and 4:30 pm-6:30 pm, with temperature readings taken each time. We employed the Samsung Galaxy F23's 2 MP, f/2.4 Macro lens Zoom Mobile Lens, attached, with a Redmi Note Pro 6 and a Canon PowerShot SX20 for data gathering. 12.1 megapixels enable high-resolution images for enlarging and cropping without loss of quality during editing. The species was photographed from various angles for identification purposes. The manual from websites such

as Indian Biodiversity Portal, Butterflies and Moth of India, I Naturalist, Bug Guide, Project Noah, and eBird helped in identifying the species.

DIVERSITY STUDIES:

Diversity studies concentrate on the spectrum of life forms within an ecosystem, highlighting species richness, evenness, and the ecological functions of organisms. Understanding ecosystem function, resilience, and human impacts on natural environments relies on the study of biodiversity. In ecology, the Shannon-Wiener Index is commonly utilized to measure community diversity. It evaluates species richness and evenness. The index is based on the given formula by Shannon, C. E. (1948)

$$H' = -\sum \quad (P_i \text{ x } \ln Pi)$$

P_i= Proportion of Individuals of species

i= Total number of species

The distribution of individuals among species in a community is referred to as species evenness. Biodiversity is determined by the distribution of individuals among species, whether it's skewed towards a few or spread evenly. The evenness of species distribution is reflected in ratios approaching 1. The analysis reveals the relative abundance of various species contributing to the ecosystem's species richness. The formula was derived by Smith, B., & Wilson, J. B. (1996).

$$c = \frac{H'}{logS}$$

H'=Shannon Wiener Index

S= Number of species

N= Number of individuals in community

The total count of distinct species in a specific location represents biodiversity's simplest assessment, termed species richness. The text disregards individual species counts, focusing solely on species diversity. Complex and stable ecosystems often harbor higher species richness due to the presence of multiple niches and interactions. The formula derived by

$$\text{Species Richness} = \frac{S-1}{LogN}$$

S= Number of species present in the community

N=number of Individuals in community

STUDENT SURVEY METHOD:

Zoology students were surveyed to assess their interests and perspectives on faunal diversity. 114 responses were gathered through a google forms questionnaire.

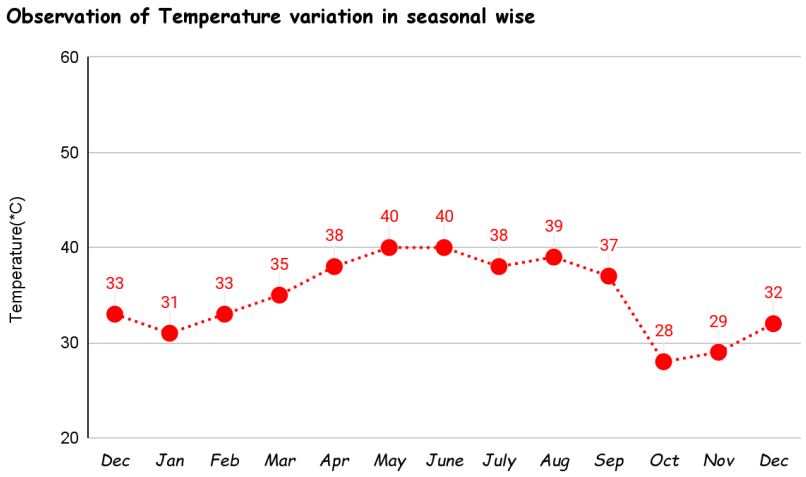
RESULT AND DISCUSSION:

1. **Species Collection:**

During the period from December 2022 to December 2023, a total of 304 species were identified on our campus. Among invertebrates, Arthropoda populations have shown growth following molluscs, while in vertebrates, Aves populations have expanded after amphibians, reptiles, and mammals. A comprehensive dataset, including photographs, common and scientific names, families, identification keys, ecological roles, and species counts, has been compiled in a tabular format and made available as supplementary material in a Google Drive folder: https://drive.google.com/drive/folders/1MGqa2Nzh_FsMA_tkh7xzJ9YwEMqdnfKj Figure 1 illustrates the species count identified at V.H.N.S.N. College during the study period. Arthropoda emerges as the dominant group in the campus ecosystem. The campus serves as a significant contributor to the area's biodiversity inventory, underscoring its importance as a biodiversity hotspot. The global prevalence of Arthropoda, accounting for 78.3% of species worldwide, aligns with their dominance in this study (Stork et al., 2018). The diverse avian population on campus indicates its suitability as a habitat for both resident and migratory birds, attributed to its varied microhabitats and vegetation. The 219 arthropod species documented in this study surpass the numbers reported in comparable research from other campuses or urban areas (John & Kannan, 2016; Pramanik et al., 2021). Factors such as minimal human disturbance, diverse microhabitats, and rich floral diversity contribute to the sustained high arthropod diversity. The presence of 42 bird species aligns with similar findings in green urban or semi-urban settings (Khera et al. 2010). The identification of 7 amphibian species suggests the existence of wetland or aquatic habitats crucial for their reproduction and survival, while also indicating an unpolluted and stable environment. The presence of seven reptile species demonstrates the campus's ability to support both arboreal and terrestrial species. As human impact on natural environments continues to grow, the importance of preserving green spaces on campuses becomes increasingly evident. The species inventory provides valuable baseline data for future biodiversity monitoring and conservation efforts. The campus hosts a diverse array of bird species, ranging from common to rare, and may serve as important stopover points for migratory species.

2. **Temperature flocculation:**

Line diagram -1 demonstrates that the diversity of animal species on college grounds can be substantially affected by fluctuations in seasonal temperatures. The yearly temperature changes on campus create a shifting environment for fauna, impacting their conduct, cycles of activity, and ecological interactions. The graph depicts the monthly temperature averages recorded during the research period. Temperature serves as a crucial environmental element influencing the geographic spread, actions, and endurance of all animal species. Temperature fluctuations affect various groups in distinct ways.



Line chart-1: Temperature variation identified in the V.H.N.S.N. College during the study period (2022-2023)

2.1 Arthropoda:

Cooler winter temperatures (31°C to 33°C) may restrict the activities of arthropods, especially those adapted to warmer environments. Nevertheless, these temperatures remain within the acceptable range for numerous tropical species, enabling moderate levels of activity and reproduction (Kaspari et al., 2015). As temperatures climb (up to 40°C), some arthropods might become less active, while others may seek refuge in cooler, shaded areas. Research indicates that extremely high temperatures can negatively impact foraging efficiency and increase mortality rates in many insect species (Parmesan, 2006). Despite elevated temperatures (around 39°C), the heightened humidity during monsoon season likely supports arthropod diversity. The abundance of water and plant growth during this time provides resources for numerous arthropod species. As temperatures decrease (37°C to 29°C), arthropod activity may intensify, coinciding with post-monsoon plant growth, which offers food sources (Kaspari & Weiser, 2000)

2.2Mollusca:

Terrestrial gastropods and other molluscs are susceptible to water loss during high temperatures and depend on moist conditions for their survival and reproduction. Winter's cooler temperatures (31°C to 33°C) create a more suitable environment for molluscs, allowing them to retain moisture and perform regular physiological functions. As temperatures increase in the pre-monsoon period, molluscs may reduce their activity or enter a state of aestivation to prevent desiccation (Lester et al., 2007). This phase is crucial for molluscs since the combination of elevated temperatures and increased humidity provides ideal conditions for activity, reproduction, and movement. Precipitation during this time is essential for land-dwelling molluscs to survive. Like arthropods, molluscs thrive in the cooler temperatures and increased moisture following the monsoon, resulting in heightened activity and breeding.

2.3Aves:

Birds, being homeothermic, maintain a constant body temperature but are influenced by environmental temperatures in their foraging, nesting, and migratory behaviours. The cooler temperatures

of winter (31°C to 33°C) generally promote increased bird activity. This season also coincides with the arrival of migratory species, drawn by the milder weather conditions (McKechnie & Wolf, 2010). During this time, birds experience improved foraging efficiency as they are less affected by heat stress. In contrast, the high temperatures of summer (up to 40°C) can compel birds to limit their activities during the hottest parts of the day, reducing foraging time and increasing their dependence on shaded areas or water sources (Wolf, 2000). Despite the persistent high temperatures, the monsoon season brings increased water availability and vegetation growth, providing plentiful food resources that support breeding and foraging activities for numerous species. As temperatures decrease, birds experience a resurgence in foraging activity and food availability. This period may also witness the arrival of migratory species, enhancing the diversity of bird species on campus.

2.4 Reptiles:

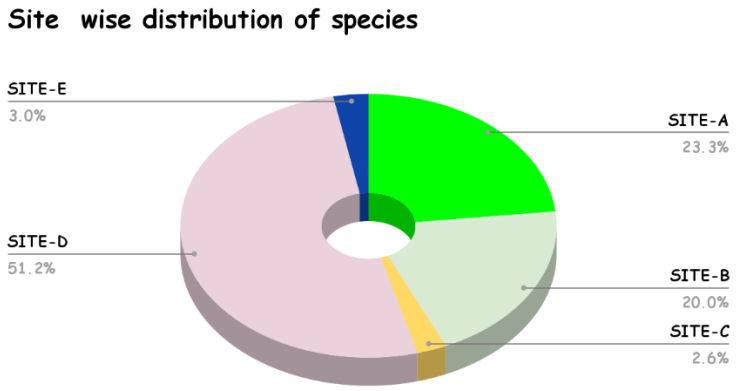
Similar to arthropods, reptiles are cold-blooded creatures that rely on external sources of heat to control their body temperature. They exhibit increased activity in warmer conditions, though excessively high temperatures can be detrimental. Despite lower temperatures in winter, the climate remains sufficiently warm (31°C to 33°C) for reptiles to stay active, albeit at reduced levels compared to warmer periods. During this time, reptiles may engage in sunbathing to elevate their body temperature (Huey et al., 2012). The high temperatures (40°C) experienced during this season can cause reptiles to seek shelter in cooler or shaded areas. Extended exposure to high temperatures may result in overheating, compelling reptiles to restrict their activities (Huey & Kingsolver, 1989). The monsoon season, characterized by warmth and moisture, creates ideal conditions for reptile activity. Amphibious reptiles, in particular, thrive due to the increased availability of water sources. In the post-monsoon period, reptiles, like other cold-blooded species, flourish in the cooler temperatures, displaying increased foraging behavior and reproductive activity.

2.5Mammalia:

Unlike ectothermic species, mammals, being homeothermic, are not as directly affected by surrounding temperatures. However, they still experience the effects of extreme heat and its consequences on their habitat and food sources. Typically, mammals are most active during the colder winter months, as the reduced temperatures lower the risk of heat stress and enhance foraging efficiency (Terrien et al., 2011). In high-temperature conditions, mammals may shift to more nocturnal behavior, avoiding daytime activities to prevent overheating. The scarcity of water during hot periods can also put strain on mammal populations, particularly herbivores that depend on moisture-rich plants. The monsoon season, with its increased water availability and vegetation growth, supports mammalian populations by providing more abundant food and shelter resources. This favorable period may also lead to increased reproductive activity among mammals (Jędrzejewska & Jędrzejewski, 1998). The cooler temperatures following the monsoon create ideal conditions for mammalian activity, as water and food remain plentiful while heat stress is reduced.

3.Site wise Distribution:

The research findings reveal considerable spatial differences in biodiversity throughout the investigated region, as demonstrated by the distribution of species across various sites. Multiple factors contribute to this observed variability, including the diversity of habitats, the accessibility of resources, localized climate conditions, and human-induced impacts on the environment.



Pie chart-3: Site wise distribution of species identified in the V.H.N.S.N.College during the study period(2022-2023)

Site-D:

Site-D stands out as the main biodiversity center in the study area, accounting for 51.2% of the total observed faunal species. The exceptional species richness in Site-D may be attributed to various ecological elements. This location potentially encompasses a diverse array of habitats, such as different types of vegetation, aquatic environments, and areas with ample shade, offering a multitude of ecological niches. Research indicates that regions with greater habitat diversity support increased biodiversity by providing an assortment of resources and microenvironments suitable for various species (Tews et al., 2004). The abundance of food sources, including plant matter for herbivores and prey animals for carnivores, likely contributes to the high species diversity. Invertebrates (Arthropoda and Mollusca) may find suitable nutrition, leading to ripple effects throughout the food web, benefiting avian, reptilian, and mammalian species. Site-D might also possess more favourable microclimatic conditions, such as moderate temperature and humidity levels, which enhance species survival and reproduction. Shaded regions or water bodies could potentially mitigate temperature extremes, creating more stable conditions for faunal activities.

Site A and B:

Together, Site-A (23.3%) and Site-B (20.0%) represent almost half of the remaining species population, suggesting that these locations offer appropriate, albeit somewhat less varied, conditions for fauna. These areas likely provide a spectrum of habitats that sustain various species, though the range of resources and habitat types may be more restricted compared to Site-D. Research has shown that moderate levels of habitat complexity and resource accessibility can maintain a reasonable level of biodiversity

(Huston, 1994). The degree of competition between species could also influence species abundance at these sites. The principle of competitive exclusion may prevent certain species from reaching high population densities, resulting in a balanced but moderately rich biodiversity. For instance, avian species and small mammals might experience competition for food sources or nesting locations.

Site C and E:

The lowest species abundances are observed at Site-C (2.6%) and Site-E (3.0%), indicating these locations are less conducive to supporting a diverse range of species. These areas may have undergone some form of habitat degradation or loss, such as urban development, pollution, or deforestation, which could restrict the availability of food and shelter for various organisms. Studies have shown that habitat destruction is a major cause of species decline, especially for small vertebrates and invertebrates (Sala et al., 2000). The limited availability of essential resources like food, water, or nesting materials may constrain the number of species that can flourish in these areas. Molluscs and certain arthropods, in particular, may be highly vulnerable to changes in resource availability, resulting in population declines. These sites might also experience more severe microclimatic conditions, including higher temperatures, reduced humidity, or less shelter, creating challenging environments for less resilient species (Suggitt et al., 2018). For instance, extreme heat during the pre-monsoon period could discourage many species from inhabiting these locations. The significant variation in species abundance across different sites highlights the necessity of habitat conservation and management. Areas with higher biodiversity, such as Site-D, are vital for maintaining ecological equilibrium and should be prioritized in conservation efforts. Conversely, locations with lower biodiversity, like Site-C and Site-E, require focused habitat restoration and resource management to enhance their ecological capacity. Given its high species richness, Site-D likely serves a crucial role in sustaining the broader ecosystem. Conservation strategies should aim to protect its diverse habitats and minimize any human-induced disturbances that could threaten the local fauna (Mace et al., 2000). Low-diversity areas such as Site-C and Site-E could benefit from habitat restoration initiatives, including reforestation, pollution control, or the creation of ecological corridors to connect fragmented habitats. Such interventions could improve the resilience of these sites and facilitate species recolonization. The observed pattern of species distribution aligns with other biodiversity studies that demonstrate the importance of habitat complexity and resource distribution in influencing species richness. For example, comparable findings have been reported in tropical forest ecosystems, where areas with greater structural complexity tend to support higher faunal diversity (Brokaw & Lent, 1999).

4.Diversity indices:

The species diversity assessment conducted at V.H.N.S.N. College campus from 2022 to 2023 offers a comprehensive examination of the variety and distribution of organisms across different taxonomic categories. This evaluation employs three crucial metrics: the Shannon Diversity Index, species richness, and species evenness. Together, these indicators provide a thorough insight into the ecological diversity present within the campus environment.

Shannon Diversity Index:

The Shannon Diversity Index (H') quantifies species diversity by evaluating both abundance and evenness. In the study period, values ranged from 0.451 to 2.817 across identified taxa. Arthropoda

exhibited the highest index at 2.817, suggesting a rich and well-distributed species community. This aligns with arthropods' known ecological adaptability and versatility (Cardoso et al., 2020). Aves followed with an index of 2.194, also indicating significant diversity. Bird diversity often correlates with habitat variety, food sources, and microclimate conditions (Gregory et al., 2009). Lower Shannon values were recorded for Mollusca (1.037), Amphibia (0.829), Reptilia (0.599), and Mammalia (0.451). These reduced diversity scores may reflect fewer species or greater dominance by certain species, potentially due to restricted habitats or specific environmental influences on their populations.

Species Richness:

The phylum Arthropoda exhibits the greatest species diversity, boasting a richness value of 62.76, which confirms its position as the most species-rich group. This remarkable diversity can be attributed to the extensive range of ecological niches these organisms occupy and their exceptional ability to adapt to diverse environmental conditions (Mandelik et al., 2012). The class Aves, representing birds, displays a moderate species richness of 8.08, which is consistent with the expected avian diversity in a semi-urban environment such as a college campus. The variety of bird species acts as a vital indicator of habitat quality, often reflecting a well-balanced ecosystem (Crooks et al., 2004). Other taxonomic groups, including Mollusca, Amphibia, Reptilia, and Mammalia, show significantly lower species richness values, with Mammalia recording the lowest at 1.361. These reduced values may indicate constraints in habitat availability or human-induced pressures, such as habitat fragmentation or disturbances (Clavel et al., 2011).

Species Evenness:

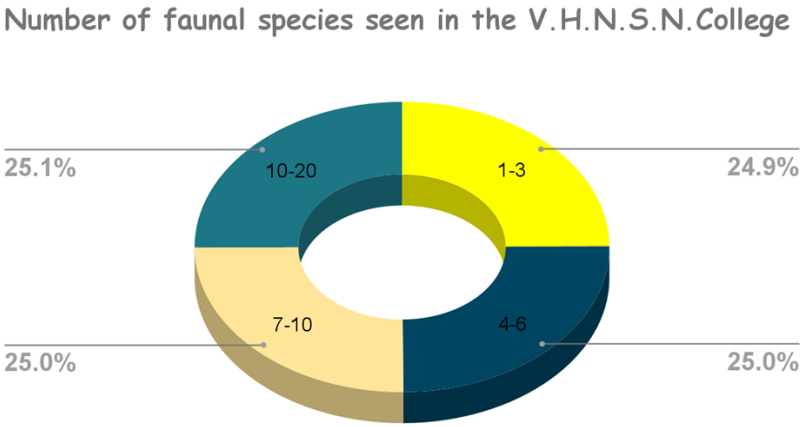
The distribution of individuals among species within a community is reflected by species evenness. A higher evenness value indicates a more equal distribution of population sizes across species, while a lower value suggests that certain species dominate. Among the taxa studied, Amphibia exhibited the greatest species evenness at 1.377, with Mollusca following closely at 1.332. These high values suggest a relatively uniform distribution of individuals within these groups, potentially indicating stable and balanced populations. Arthropoda showed a comparatively high evenness of 1.202, though some species may still be more prevalent than others. In contrast, Aves and Reptilia displayed lower evenness scores of 0.708 and 0.858, respectively, implying that some species in these groups have larger populations than others. This disparity could be attributed to various environmental factors, such as habitat preferences, resource availability, or interspecies competition (Gregory et al., 2009). Mammalia demonstrated a relatively low evenness (0.749), which may indicate the dominance of a few species and possibly overall low population numbers, potentially due to human-induced factors like habitat loss (Crooks et al., 2004).

5.Survey:

5.1 Species Observation in Campus:

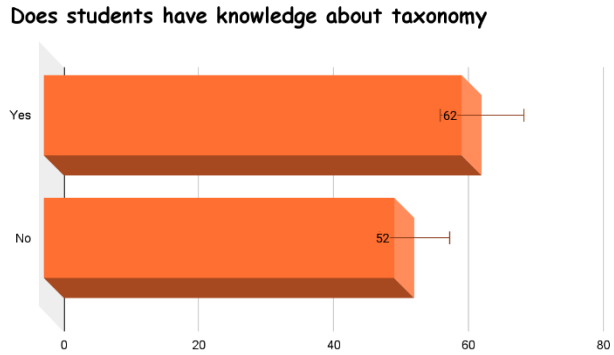
Pie chart 1 reveals that a quarter (25.1%) of the student population has encountered over 10 species near the college campus, demonstrating substantial student involvement with local flora and fauna. An equal proportion (25%) has observed 4-10 species, while 24.9% have spotted 1-3 species. These statistics indicate varying levels of student interaction with local wildlife, with a considerable portion having minimal contact, potentially due to differing interests or field study opportunities. This corresponds with

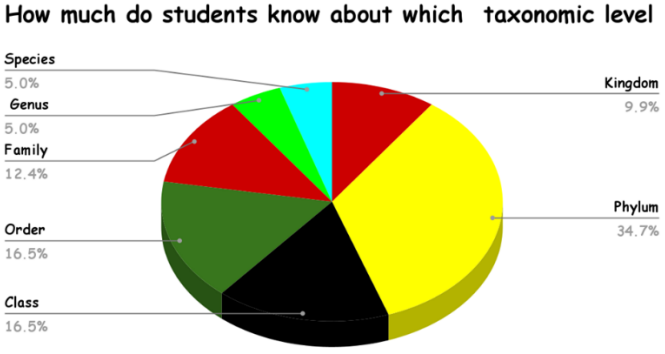
research highlighting the effectiveness of practical, hands-on learning, particularly fieldwork, in enhancing student engagement and biodiversity awareness. Numerous studies underscore the value of experiential learning in cultivating biodiversity knowledge (Prokop & Tunnicliffe, 2010; Ballouard et al., 2011). Moreover, the range of species noted by students implies a rich campus ecosystem, offering extensive possibilities for future ecological research and educational enhancement (Louise & Tadesse, 2021).



5.2 Taxonomic Knowledge:

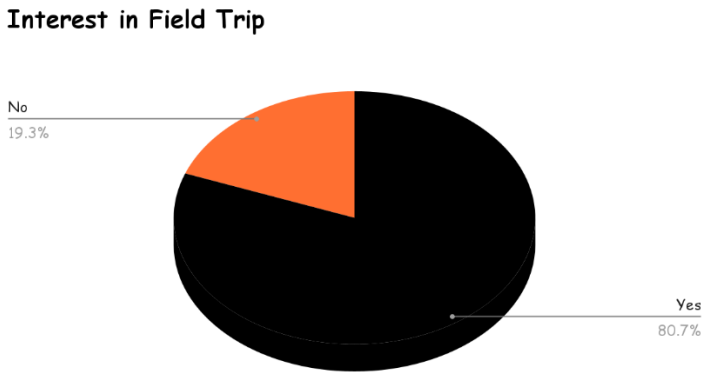
Chart 1 reveals an almost equal distribution of students with and without taxonomic knowledge, with 62 possessing such knowledge and 52 lacking it. This reflects a widespread issue in biology education, where taxonomy is often underemphasized in course content despite its crucial role in comprehending biodiversity. Gregory (2009) emphasizes the necessity of enhancing taxonomic expertise, as it underpins biological sciences and conservation endeavors. Pie chart 4 demonstrates that students are more familiar with broader taxonomic categories like order (33%) and phylum (34.7%), while fewer are acquainted with the more specific family (12.4%) or species/genus levels (10%). This gap in detailed taxonomic understanding may be attributed to the intricacies of classification systems, particularly when students have limited practical experience (Taylor, 2021).

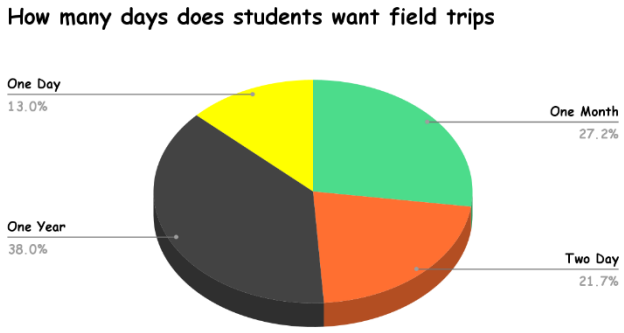




5.3 Interest in Field Trip:

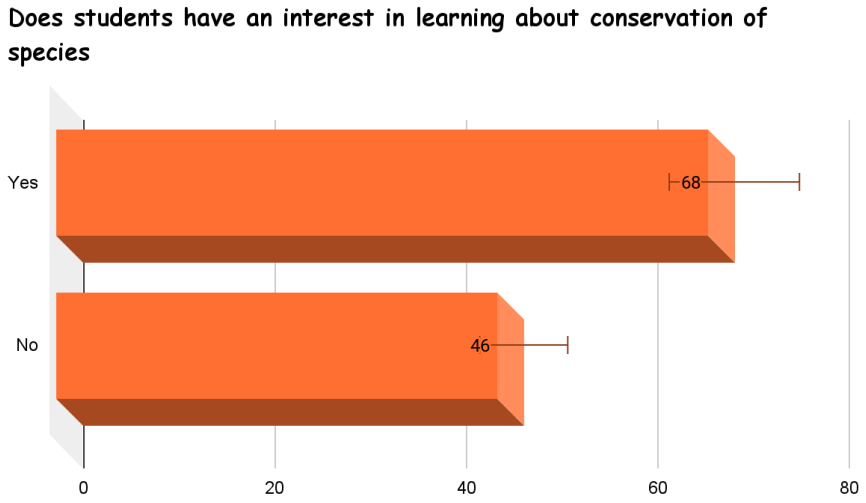
The pie chart indicates that 80.7% of students showed enthusiasm for biodiversity-focused field excursions, aligning with scholarly research that emphasizes the importance of such trips in boosting student involvement and grasp of ecological principles (Orion & Hofstein, 1994). This strong inclination towards hands-on learning experiences underscores the vital role field trips play in enhancing students' comprehension of biodiversity, as noted by Ballantyne and Packer (2009), who stress the transformative nature of education in the field. Additionally, the third pie chart demonstrates that 38% of students prefer field trips lasting an entire year, while 27.2% favor monthly outings. These results suggest that students appreciate the benefits of ongoing interaction with biodiversity, which can markedly improve learning outcomes through repeated exposure to various species and ecosystems over time (Falk & Dierking, 2010).





5.4 Interest in Conservation:

Bar chart 2 shows that 68 students expressed interest in learning about species conservation, while 46 did not. This suggests a general trend toward increasing student interest in conservation biology, reflecting broader societal shifts toward sustainability and conservation awareness (Kopnina, 2012). Engaging students through conservation projects or fieldwork related to local biodiversity could further enhance their interest, as hands-on conservation experiences have been shown to foster a greater commitment to environmental stewardship (Chawla & Cushing, 2007).



Recommendations:

Preserving and enhancing biodiversity on campus requires a focus on habitat protection and restoration. Priority should be given to safeguarding areas like Site-D, which exhibit the highest species diversity. Locations with lower biodiversity, such as Sites C and E, need rehabilitation through tree planting, contaminant elimination, and the establishment of ecological pathways to link fragmented ecosystems. Studies show that restoring habitats, particularly through reforestation or wetland rehabilitation, boosts animal diversity by offering essential resources for sustenance, protection, and reproduction (Sala et al., 2000; Mace et al., 2000). Minimizing human interference in ecologically sensitive zones is essential for maintaining species variety. Limiting human activity in biodiversity-rich areas like Site-D can aid in sustaining populations of vulnerable species, including amphibians, reptiles, and invertebrates. Encouraging eco-friendly practices, such as proper waste handling and decreased use of chemicals, can contribute to ecological equilibrium (Clavel et al., 2011). Considering that seasonal temperature changes influence species behaviours and interactions, conservation strategies should incorporate climate adaptation measures. Creating microenvironments, such as shaded spots, water features, and climate-resistant vegetation, can help mitigate the adverse effects of extreme weather on animal populations (Huey & Kingsolver, 1989; Parmesan, 2006). Introducing small ponds or water bodies could benefit amphibians and reptiles, while providing shelter could assist birds and mammals during periods of extreme heat or cold. Establishing biodiversity corridors between high-diversity zones, such as Site-D, and neighbouring areas can help reduce habitat fragmentation and facilitate species movement for accessing food, shelter, or breeding grounds. These corridors have been shown to effectively improve connectivity and decrease population isolation, particularly for invertebrates, birds, and small mammals (Tews et al., 2004).

Future directions:

Continuous surveillance programs are crucial for evaluating the success of preservation initiatives and observing extended patterns in species variety, range, and population well-being. The species catalog developed during your research provides a reference point for future evaluations, aiding in the assessment of changes across time. Launching community science projects with student involvement can enhance

data gathering while promoting awareness (Gregory et al., 2009). Considering the strong interest among students in nature excursions and preservation (80.7% expressed enthusiasm for field trips), educational curricula should be created to improve students' understanding of classification, species recognition, and conservation methods. Integrating fieldwork into the academic program and providing practical conservation activities can deepen their comprehension of biodiversity and ecosystem stewardship (Orion & Hofstein, 1994). As demonstrated by the temperature variation analysis in your study, climate change presents an increasing danger to biodiversity. Future preservation strategies should emphasize resilience to climatic shifts by nurturing biodiversity hotspots capable of withstanding changing weather conditions. Introducing drought-tolerant vegetation and safeguarding water resources will ensure habitat stability (McKechnie & Wolf, 2010; Parmesan, 2006). Participate in joint conservation research with municipal authorities and environmental groups to shape policy formulation aimed at safeguarding green areas on campus and beyond. Policies should concentrate on protecting urban biodiversity and addressing habitat degradation and fragmentation (Crooks et al., 2004).The occurrence of uncommon or vulnerable species within your study's faunal diversity, such as migratory birds or sensitive amphibians, necessitates particular attention. Conservation efforts should focus on protecting these species by ensuring minimal habitat disruption during their crucial life phases (breeding, migration) and tackling specific threats like pollution or habitat loss (Mace et al., 2000).

Conclusion:

The findings from this study underscore the critical importance of preserving and enhancing biodiversity within campus ecosystems. By prioritizing habitat protection and restoration, particularly in biodiversity-rich areas like Site-D, we can mitigate the ongoing threats to species diversity. The recommendations presented, such as minimizing human interference, promoting sustainable practices, and creating climate-resilient microenvironments, provide a multifaceted approach to conservation. Additionally, the establishment of biodiversity corridors will facilitate species movement and enhance ecological connectivity, further supporting the campus's rich fauna. Looking forward, continuous monitoring and community engagement through citizen science initiatives will be vital for assessing the effectiveness of conservation strategies and fostering a culture of ecological stewardship among students. Educational programs that integrate hands-on experiences with theoretical knowledge will enhance students' understanding of biodiversity and promote proactive conservation measures. Addressing the challenges posed by climate change requires resilience-oriented strategies, including the protection of vulnerable species during critical life stages. Collaborative research with local authorities and environmental organizations will play a significant role in shaping policies that protect urban biodiversity and counter habitat degradation. Collectively, these efforts can contribute to a sustainable future, ensuring that the rich tapestry of life on campus not only survives but thrives for generations to come.

Declaration:

Data avaliabilty statement:

A comprehensive dataset, including photographs, common and scientific names, families, identification keys, ecological roles, and species counts, has been compiled in a tabular format and made available as supplementary material in a Google Drive folder: https://drive.google.com/drive/folders/1MGqa2Nzh_FsMA_tkh7xzJ9YwEMqdnfKj

Ethical statement:

Ethical review and approval were waived for this study by the Institutional Ethics Committee of [V.H.N.S.N. College (Autonomous) Virudhunagar, as per local/national guidelines, because the study involved only field observations of wildlife with no interaction with human participants or animal experimentation.

Informed consent statement:

Informed consent to participate in this study and to publish the results was obtained from all participants. No participants were not under the age of 18.

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