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Understanding Biodiversity Mapping of School Relating to Types of Plant and Animal Species and Ecological Roles

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ABSTRACT

This study explores the biodiversity within the Public School focusing on species richness, habitat quality, and the ecological roles of various species. The research highlights the importance of biodiversity in maintaining ecosystem stability, even in urban environments, which can surprisingly sustain diverse species. Conducted across the school's garden, playground, and courtyard, students were actively engaged in observing and recording plant and animal species using tools like clipboards, graph paper, and field guides. The study revealed a wide variety of species, emphasizing the potential of urban spaces to support biodiversity. Moreover, involving students in this biodiversity mapping project provided them with hands-on experience in scientific observation, data collection, and analysis. The findings not only contribute to the understanding of urban biodiversity but also underscore the educational value of integrating ecological studies into school curricula, fostering environmental stewardship among students, and informing future conservation strategies.

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1. INTRODUCTION

Biodiversity, encompassing the variety of life forms within different ecosystems, plays a crucial role in sustaining ecological balance and resilience. It includes species diversity, genetic diversity, and ecosystem diversity, each contributing uniquely to the functionality and stability of ecosystems. This richness of life is essential not only for the environment but also for human well-being, as it underpins ecosystem services such as pollination, nutrient cycling, water purification, and climate regulation (Costanza *et al*., 1997).

Urban environments, including schools, often support a surprising amount of biodiversity despite human activities. These environments can serve as valuable sites for ecological studies and biodiversity promotion. Schools, being integral parts of communities, offer unique opportunities for hands-on learning and environmental stewardship among students. Engaging students in biodiversity mapping within their school premises can significantly enhance their understanding of ecological concepts and foster a sense of responsibility towards the environment (Aronson *et al*., 2014).

Army Public School Golconda, located in an urban setting, provides an ideal microcosm for studying biodiversity. The school premises, which include gardens, playgrounds, and courtyards, host a variety of plant and animal species. Understanding the biodiversity within these areas is critical for maintaining the ecological health of the school environment. Moreover, it offers students a practical approach to learning about the importance of biodiversity and the impact of human activities on ecosystems (McKinney, 2002).

This research aims to map the biodiversity of Army Public School Golconda to gain insights into species richness, habitat quality, and ecological health. By conducting detailed mapping and cataloging exercises, we aim to identify various plant and animal species, analyze their roles in the ecosystem, and assess human impacts on biodiversity. Additionally, this study seeks to raise awareness among students and encourage proactive measures to protect and enhance biodiversity within their school environment.

The findings of this research will not only contribute to the scientific understanding of urban biodiversity but also provide practical recommendations for enhancing ecological health in school environments. It underscores the need for integrating biodiversity conservation into educational programs, thereby fostering a generation of environmentally conscious individuals. Through this study, we hope to highlight the importance of biodiversity in maintaining ecological balance and demonstrate how schools can play a pivotal role in promoting environmental stewardship.

This study investigates the biodiversity within the premises of Army Public School Golconda, with a focus on understanding species richness, habitat quality, and the roles of different species within the ecosystem. Biodiversity is crucial for maintaining ecosystem stability and resilience, as it supports vital services such as pollination, nutrient cycling, and pest control. Urban environments, despite being heavily influenced by human activities, can sustain a surprising amount of biodiversity, offering valuable habitats for various species. Engaging students in biodiversity mapping projects can enhance their ecological understanding and foster a sense of environmental stewardship.

The research was conducted across various areas within the school, including the garden, playground, and courtyard. Students were divided into two groups and assigned specific areas for observation and data collection. Using tools such as clipboards, graph paper, and toposheets, they recorded the presence of plant and animal species. Field guides aided in species identification, with students noting key characteristics such as size, color, and

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behavior. Detailed maps were created to mark the locations of observed species, complete with legends to explain the symbols used.

The data collected were analyzed to assess species richness, habitat quality, and the ecological roles of different species. The findings revealed a diverse range of species within the school premises, highlighting the potential of urban environments to support biodiversity. The study also underscored the educational benefits of involving students in biodiversity mapping, as it provided them with practical experience in scientific observation, data collection, and analysis.

This research contributes to the broader understanding of urban biodiversity and its significance. It demonstrates how school premises can serve as living laboratories for environmental education, promoting biodiversity conservation and fostering a connection between students and their local ecosystems. The insights gained from this study will help inform biodiversity conservation strategies within urban environments and encourage the integration of ecological education into school.

2. LITERATURE REVIEW

Biodiversity is a cornerstone of ecosystem health and stability, underpinning the provision of ecosystem services that are vital for human survival and well-being. These services include pollination, nutrient cycling, pest control, and the regulation of climate and water cycles. The complex interactions among various species within an ecosystem contribute to its functionality and resilience, allowing it to recover from disturbances such as natural disasters or human-induced changes. Pollination, one of the most well-recognized services provided by biodiversity, is essential for the reproduction of many flowering plants, including a significant proportion of crops. The loss of pollinator species can lead to declines in crop yields and affect food security (Klein *et al*., 2007).

Biodiversity also plays a critical role in nutrient cycling, which is the movement and exchange of organic and inorganic matter back into the production of living matter. Diverse microbial communities decompose organic matter, releasing nutrients back into the soil, which supports plant growth and maintains soil health (Nannipieri *et al*., 2003). Natural pest control is another crucial service provided by biodiversity. Predatory and parasitic species help regulate populations of agricultural pests, reducing the need for chemical pesticides, which can have harmful environmental and health effects (Letourneau *et al*., 2009).

The resilience of ecosystems—their ability to absorb disturbances and still maintain their basic structure and functions—largely depends on biodiversity. High biodiversity increases the likelihood that some species will be able to adapt to and survive changes, thereby stabilizing ecosystem processes (Elmqvist *et al*., 2003). Despite being heavily modified by human activities, urban environments can support a surprising amount of biodiversity. Urban green spaces such as parks, gardens, schoolyards, and green roofs provide habitats for a variety of plant and animal species. These areas can act as refuges for wildlife and contribute to the overall biodiversity of a region (Aronson *et al*., 2014).

Urban green spaces are essential for maintaining biodiversity in cities. These areas provide food, shelter, and breeding grounds for various species. For example, school gardens can host a variety of plant species, which in turn attract insects, birds, and other wildlife. Urban biodiversity can also enhance the aesthetic and recreational value of cities, contributing to human well-being (Goddard *et al*., 2010).

Urbanization can negatively impact biodiversity through habitat destruction, pollution, and the introduction of invasive species. However, with proper management and planning, urban areas can be designed to support and enhance biodiversity. Strategies such as creating green

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corridors, preserving native vegetation, and implementing sustainable landscaping practices can mitigate the adverse effects of urbanization (McKinney, 2002).

Urban biodiversity offers significant educational opportunities, especially within school premises. Schools can serve as living laboratories where students can engage in hands-on learning about ecological concepts and biodiversity conservation. By participating in biodiversity mapping and other environmental projects, students can develop a deeper understanding of the importance of biodiversity and the impacts of human activities on ecosystems. Engaging students in biodiversity mapping projects can significantly enhance their understanding of ecological concepts and foster a sense of environmental stewardship. Biodiversity mapping involves identifying and recording the various species present in a particular area, analyzing their roles within the ecosystem, and assessing the impacts of human activities on biodiversity (Uttara *et al*., 2012).

Biodiversity mapping projects can provide students with practical experience in scientific observation, data collection, and analysis. These activities help students develop critical thinking and problem-solving skills, as they learn to identify species, record observations, and analyze data. Additionally, such projects can enhance students' understanding of ecological concepts such as food webs, habitat diversity, and ecosystem services. Involvement in biodiversity mapping can also foster a sense of responsibility and stewardship towards the environment. By directly engaging with their local ecosystem, students can develop a personal connection to nature and a commitment to conservation efforts. This hands-on experience can inspire students to take action to protect and enhance biodiversity in their communities (Strong, 1998).

Various studies have demonstrated the positive impacts of involving students in biodiversity mapping projects. For instance, a study conducted in urban schools in the United States found that students who participated in biodiversity mapping projects showed increased knowledge of local biodiversity and a greater appreciation for nature (Schwartz, 2008). Similarly, a project in the United Kingdom involving primary school students in mapping local wildlife found that the students developed a deeper understanding of ecological relationships and were more motivated to engage in environmental conservation activities (Warwick & Young, 2017).

The literature highlights the multifaceted importance of biodiversity, the potential of urban environments to support diverse species, and the significant educational and stewardship benefits of engaging students in biodiversity mapping projects. By undertaking biodiversity mapping within the premises of Army Public School Golconda, this study aims to contribute to the broader understanding of urban biodiversity while providing valuable educational experiences for students. The insights gained from this research will help promote biodiversity conservation and environmental stewardship within the school community and beyond.

Key concepts used in this study are the following:

(i) Biodiversity: Biodiversity refers to the variety of life in all its forms and levels of organization, encompassing species diversity, genetic diversity, and ecosystem diversity. It is a measure of the health and resilience of ecosystems and is vital for their stability and functionality. Biodiversity ensures the provision of essential ecosystem services such as pollination, nutrient cycling, water purification, and climate regulation. Each species within an ecosystem plays a specific role, contributing to processes that are crucial for the ecosystem's overall health and productivity (Tilman *et al*., 1997).

(ii) Species Diversity: This aspect of biodiversity refers to the variety and abundance of different species within a given ecosystem. High species diversity often indicates a

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healthy, resilient ecosystem capable of withstanding and recovering from environmental stressors (Purvis & Hector, 2000). For instance, a diverse plant community can support a wide range of pollinators and herbivores, creating a robust food web.

(iii) Genetic Diversity: Genetic diversity involves the variation of genes within species. It is crucial for adaptation and survival, as it allows populations to adapt to changing environmental conditions and resist diseases. Genetic diversity is essential for the long-term viability of species, particularly in changing climates and environments.

(iv) Ecosystem Diversity: This refers to the variety of ecosystems within a geographical location. It encompasses different habitats such as forests, grasslands, wetlands, and urban areas, each hosting unique communities of organisms. Ecosystem diversity ensures a wide range of habitats and ecological processes that support overall biodiversity (Hooper *et al*., 2005).

(v) Ecosystem Services: Ecosystem services are the benefits that humans derive from natural ecosystems. They are categorized into four main types: provisioning, regulating, supporting, and cultural services (Costanza *et al*., 1997). Biodiversity plays a critical role in sustaining these services, which are essential for human well-being and survival.

(vi) Provisioning Services: These include the production of resources such as food, water, timber, and fiber. Biodiversity ensures the availability of these resources through processes like pollination, seed dispersal, and soil fertility.

(vii) Regulating Services: These services maintain ecosystem health by regulating processes such as climate, water purification, disease control, and pollination. For example, diverse plant communities can regulate climate by sequestering carbon, and healthy wetlands can filter pollutants from water (Costanza *et al*., 1997).

(viii) Supporting Services: Supporting services are necessary for the production of all other ecosystem services. They include nutrient cycling, soil formation, and primary production. Biodiversity enhances these services by maintaining ecosystem processes and functions (Tilman *et al*., 1997).

(ix) Cultural Services: These non-material benefits include recreational, aesthetic, spiritual, and educational values. Biodiversity-rich areas provide opportunities for outdoor activities, enhance the aesthetic value of landscapes, and offer educational resources for learning about nature.

(x) Urban Biodiversity: Urban biodiversity refers to the variety of living organisms found in urban areas, including cities, towns, and other densely populated regions. Urban environments, though heavily modified by human activities, can support diverse plant and animal species. These areas often serve as refuges for wildlife and contribute to overall biodiversity conservation (Aronson *et al*., 2014).

(xi) Green Spaces: Parks, gardens, and green roofs within urban areas provide habitats for various species. These green spaces are crucial for maintaining biodiversity in cities, offering food, shelter, and breeding grounds for urban wildlife (Goddard *et al*., 2010).

(xii) Human Impact: Urbanization can significantly impact biodiversity through habitat destruction, pollution, and the introduction of invasive species. However, with proper management and planning, urban areas can be designed to support biodiversity. Initiatives such as creating green corridors, preserving native vegetation, and reducing pollution can enhance urban biodiversity (McKinney, 2002).

(xiii) Educational Value: Urban biodiversity offers significant educational opportunities. Schools can utilize their premises as living laboratories where students can learn about ecological concepts, conservation practices, and the importance of biodiversity.

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Engaging students in biodiversity mapping and conservation projects fosters environmental stewardship and awareness.

Through understanding these key concepts, the study aims to highlight the importance of biodiversity in maintaining ecological balance and the potential of school environments in promoting biodiversity conservation and environmental education.

3. METHOD

The research was conducted on the premises of Army Public School Golconda, encompassing diverse areas such as the garden, playground, and courtyard. These varied environments provided a rich tapestry of habitats for the study of local biodiversity. To facilitate data collection, students were divided into two groups, each assigned specific areas within the school grounds. The students employed tools like clipboards, graph paper, and toposheets to systematically observe and record the presence of plant and animal species.

Field guides played a crucial role in the identification process, helping students to accurately identify species based on key characteristics such as size, color, and behavior. This hands-on approach not only enhanced their observational skills but also deepened their understanding of the biodiversity around them. Each identified species was meticulously documented, with detailed notes on its physical attributes and behavior patterns.

In the mapping phase, students created detailed maps that marked the exact locations of the observed species within the study area. These maps included legends to explain the symbols and notations used, ensuring clarity and precision in representing the spatial distribution of biodiversity. Following the data collection and mapping, the information was analyzed to assess several key parameters. Species richness was evaluated to determine the variety of species present in each area. Habitat quality was assessed to understand the environmental conditions supporting the biodiversity. Additionally, the roles of different species within the ecosystem were analyzed, highlighting their contributions to ecological processes such as pollination, pest control, and nutrient cycling. This comprehensive methodology not only provided valuable data on the biodiversity within the school premises but also engaged students in a meaningful and educational experience, fostering a deeper appreciation for the natural world and the importance of biodiversity conservation.

4. RESULTS AND DISCUSSION

The biodiversity mapping exercise at Army Public School Golconda yielded a comprehensive inventory of plant species found within the school premises, demonstrating a rich diversity of flora. A total of 50 plant species were documented, each identified based on common name, local name, scientific name, leaf shape, flower color, and height. This detailed categorization provides a foundational understanding of the ecological composition and diversity within the school grounds (**Tables 1** and **2**).

Table 1. Plant species (flora).

Sl. No	Name of the Plant	Local Name	Scientific Name	Species	Leaf Shape	Flower Colour	Height (Feet)
01	Indian jujube	Ber	*Ziziphus mauritiana*	Jujube	Oblong elliptic	Greenish-Yellow	20
02	Indian Blackberry	Jamun	*Syzygium Cumini*	Cumini	Ovate	Deep Purple	10
03	Flame Tree	Gulmohar	*Delonix regia*	Regia	Feathery	Fiery Red	25

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Table 1 (Continue). Plant species (flora).

Sl. No	Name of the Plant	Local Name	Scientific Name	Species	Leaf Shape	Flower Colour	Height (Feet)
04	Jungle geranium	Rugmini	*Ixora Coccinea*	Coccinea	Oblong	Red	6
05	Copperpod	Peela gulmohar	*Peltophorum pterocarpum*	Pterocarpum	Oblong	Yellow-Orange	20
06	Bougainvillea	Paperflower	*Bougainvillea glabra*	Glabra	Ovate	Red,Purple, Orange	8
07	Golden Tree	Amaltas	*Cassia fistula*	Fistula	Ovate	Yellow Golden	20
08	Fig	Anjeer	*Ficus carica*	Carica	Cordate	Yellowish-Green	8
09	Indian lilac	Neem	*Azadirachta indica*	Indica	Elongated	White	15
10	Benghal dayflower	Kankaua/ kena/ krishnaghas	*Commelina benghalensis*	Bengalhensis	Lanceolate	Violet- blue	1
11	Eucalyptus	Nilgiri	*Eucalyptus tereticornis*	Tereticornis	Lance	White	20
12	White frangipani	Nag champa	*Plumeria pudica*	Pudica	Long and oval	White	8
13	Rose bay	Kaner	*Nerium oleander*	Oleander	Lanceolate	Bright red	7
14	Devil's ivy	Money plant	*Epipremnum aureum*	Aureum	Cordate	White	5
15	Pinwheel jasmine	Gulchandani	*Tabernaemontana divaricata*	Divaricata	Elliptical	White	7
16	Thuja	Morpankhi plant	*Platycladus orientalis*	Orientalis	Scale like	White green	5
17	Tropical dogwood	Dhobi tree	*Mussaenda frondosa*	Frondosa	Ovate	Orange-Yellow	8
18	Purple heart	Purple queen	*Tradescantia pallida*	Pallida	Lanceolate	Pale purple	1.5
19	Tick berry	Lantana	*Lantana camara*	Camara	Oval	Colorful	2
20	Wood Rose	Baghchooda	*Merremia tuberosa*	Tuberosa	Funnel shaped	Deep Yellow	4
21	Aloevera	GwarPatha	*Aloe barbadensis miller*	Barbadensis	Triangular	Orange	2
22	Holy Basil	Tulsi	*Ocimum tenuiflorum*	Tenuiflorum	Elliptical	Purple-Reddish	4
23	Periwinkle	Sadabahar	*Catharanthus roseus*	*Roseus*	Oblong	Pink	2
24	Banyan	Bargad	*Ficus benghalensis*	Benghalensis	Elliptical	Yellow	15
25	Custard Apple	Seetaphal	*Annona squamosal*	Squamosa	Ovate	White	15
26	Touch me not plant	Chui mui	*Mimosa pudica*	Pudica	Oblong	Pinkish purple	0.5

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Table 1 (Continue). Plant species (flora).

Sl. No	Name of the Plant	Local Name	Scientific Name	Species	Leaf Shape	Flower Colour	Height (Feet)
27	Mango	Aam	*Mangifera indica*	Indica	Ovate	Yellow to pinkish white	10
28	Pomegranate	Anaar	*Punica granatum*	Granatum	Elliptic	Red to white	16
29	Purple allamanda	Allamanda	*Allamanda blanchetii*	Blanchetii	Elliptic	Purplish pink to violet	10
30	Hibiscus	China rose	*Hibiscus rosa-sinensis*	Rosa sinensis	Ovate	Red	9
31	Sorrow less	Ashoka	*Saraca indica*	Indica	Obovate	Bright Orange-Yellow	15
32	Rose	Gulab	*Rosa rubiginosa*	Rubiginosa	Oval	Red/Pink/ White	4
33	Jasmine	Mogra/Chameli	*Jasminum sambac*	Sambac	Ovate	White	4
34	Life Plant Miracle leaf	Patharchata	*Bryophyllum pinnatum*	Pinnatum	Oblong	Greenish-Yellow/Pinkish-Red	0.6
35	Mari Gold	Genda	*Tagetes erecta*	Erecta	Oblanceolate	Yellow	2
36	Lemon Grass	Serai	*Cymbopogon citratus*	Citratus	Linear	Yellow	2
37	Sorghum/New-Quinoa	Jowar	*Sorghum bicolor*	Bicolor	Linear	Ivory	4
38	Century Plant	Kamal Cactus	*Agave americana*	Americana	Sword-shaped	Yellow/Golden	2
39	Spider Plant	Makdi paudha	*Chlorophytum Comosum*	Comosum	Strap-shaped	White	1
40	Eugenia	Bell-fruited rose apple	*Syzygium campanulatum*	Campanulatum	Elliptic	White/Red/Pink	1
41	Bamboo	Bans	*Bambusa*	Bambusoideae	Linear	Green/Yellow	
42	Palm	Taad	*Wodyetia bifurcate*	Bifurcata	Arched	White	20
43	Golden trumpet vine	Peelaghanti	*Allamanda cathartica*	Cathartica	Oblong	Yellow	15
44	Cherry leaf	Jeen	*Prunus avium*	Avium	Serrated	White/Yellow/Red	8
45	Gooseberry	Amla	*Phyllanthus emblica*	emblica	Ovate	Greenish-Yellow	4
46	Temple tree	Champa	*Magnolia Champaca*	Champaca	Ovate	White-Yellow	15
47	Papaya	Papeeta	*Carica papaya*	Carica	Palmately lobed	Cream-white/Yellow-orange	15
48	Bellyache Bush	Black-physic nut	*Jatropha gossypifolia*	Gossypifolia	Elliptical	Red	4

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Table 1 (Continue). Plant species (flora).

Sl. No	Name of the Plant	Local Name	Scientific Name	Species	Leaf Shape	Flower Colour	Height (Feet)
49	Indian acalypha	Copper leaf	*Acalypha indica*	Indica	Ovate	Green	4
50	Funaria	Cord moss	*Funaria hygrometrica*	hygrometrica	Oblong	Green	0.1

Understanding plant species include several aspects:

(i) Leaf Shape Diversity. The dataset revealed significant diversity in leaf shapes among the recorded species, indicating a variety of adaptive strategies. For instance, the Indian jujube (Ziziphus mauritiana) features oblong elliptic leaves, while the Flame Tree (Delonix regia) is characterized by its feathery leaves. The variety in leaf morphology, including ovate, lanceolate, and cordate shapes, reflects different evolutionary adaptations to environmental conditions and resource acquisition strategies. This morphological diversity contributes to the ecological complexity of the school environment, supporting various species and ecological functions.

(ii) Flower Color Variability. The survey also highlighted the extensive variability in flower colors, which enhances the visual diversity and aesthetic value of the school premises. For example, the Bougainvillea (Bougainvillea glabra) exhibited multiple colors, including red, purple, and orange. The Flame Tree (Delonix regia) displayed striking fiery red flowers, while the Golden Tree (Cassia fistula) showcased vibrant yellow blooms. This range of flower colors is not merely decorative but plays a crucial role in attracting different pollinators, thereby facilitating pollination and contributing to the reproductive success of the plants. Such biodiversity in flowering plants is essential for maintaining ecological interactions and ensuring the sustainability of the ecosystem.

(iii) Plant Height Spectrum. The survey recorded a wide range of plant heights, from very short species like Funaria (0.1 feet) and touch me not plant (0.5 feet) to towering species such as the Flame Tree (25 feet) and Eucalyptus (25 feet). This spectrum of plant heights indicates the presence of various plant growth forms, each occupying different ecological niche. Tall trees provide canopy cover and habitats for bird species and other arboreal organisms, while shorter plants offer ground cover and microhabitats for smaller fauna. The stratification of plant heights contributes to vertical habitat diversity, which is critical for supporting a wide range of species and ecological processes.

(iv) Species Richness and Habitat Quality. The analysis of the data revealed high species richness, suggesting a healthy and diverse ecosystem within the school premises. Species richness is a key indicator of biodiversity, reflecting the variety of species present in an area. The presence of numerous native species, such as Neem (Azadirachta indica) and Mango (Mangifera indica), underscores the ecological value of indigenous flora in maintaining ecological balance and supporting local wildlife. Native plants are often well-adapted to local conditions and play vital roles in their ecosystems, providing food, shelter, and other resources for various organisms.

(v) Ecological Roles and Interactions. The recorded plant species fulfill various ecological roles, contributing to the overall functionality and resilience of the ecosystem. For example, trees like the Banyan (Ficus benghalensis) and the Mango (Mangifera indica) not only provide shade and habitat but also play significant roles in nutrient cycling and soil stabilization. Flowering plants like the Hibiscus (Hibiscus rosa-sinensis) and Rose (Rosa rubiginosa) are crucial for pollinator support, attracting bees, butterflies, and

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other pollinators. Ground-cover plants like the Touch Me Not (Mimosa pudica) help prevent soil erosion and maintain soil health.

(vi) Educational Impact. The biodiversity mapping task had a profound educational impact on the students, enhancing their understanding of ecological concepts and fostering a sense of environmental stewardship. Engaging in hands-on activities such as species identification, data collection, and mapping allowed students to apply theoretical knowledge in a practical setting, deepening their appreciation for biodiversity and its importance. This experiential learning approach not only reinforces classroom learning but also encourages students to become active participants in biodiversity conservation efforts.

Table 2. Animal species (fauna).

Sl.no	Species name	Local Name	Scientific name	Size	Variety
1	Dog	Kutta	*Canis familiaris*	Large medium	Brown black, black white Brown
2	Squirrel	Gilhari	*Funambulus palmarum*	Large	grey with stripes
3	Asian cuckoo	Koyal	*Eudynamys scolopaceus*	medium	Black
4	Great Indian Bustard	Bakka	*Ardeotis nigriceps*	medium	black with white fathers
5	Lizard	Chipkali	*Hemidactylus frenatus*	Small	greenish brown
6	Chameleon	Girgit	*Chamaeleo zeylanicus*	Small	Green
7	Ant	kaali chinti lal chinti	*Lasius niger* *Pogonomyrmex barbatus*	Large Small	Black red
8	Butterfly	Summer Azure American Snout White and sulfurs Monarch	*Celastrina neglecta* *Libytheana carinenta* *Pieridae* *Danaus plexippus*	Small small Small medium	Yellow black and white white orange
9	Rat	Chuha	*Rattus rattus*	Small	Mink
10	Honeybee	madhumakhi titaiya	*Apis mellifera* *Electrostephanus*	Small Small	black yellow
11	Spider	Makdi swhite makdi	*Parasteatoda tepidariorum* *Thomisidae*	Small Small	Brown white
12	Pigeon	Kabootar	*Columba livia*	Large	greenish blue
13	Parrot	Toota	*Psittacula krameri manillensis*	Large	Green
14	Grasshopper	Chitbagga	*Omocestus viridulus*	Large	Green
15	Mosquito	Machar	*Culicidae*	Small	Black
16	Housefly	blow fly	*Musca domestica*	Small	Black
17	Earthworm	Keenchua	*phylum Annelida*	medium	reddish brown
18	Termite	Dimak	*Neotermes casteneous*	Small	brown
19	Indian roller	Neelkantha	*Coracias benghalensis*	large	blue and white
20	Crow	carrion crow	*Corvus splendens*	medium	black

The biodiversity survey conducted at Army Public School Golconda uncovered a diverse range of fauna, categorized into various species and encompassing a broad spectrum of taxonomic groups. **Table 2** outlines the key findings, providing a detailed overview of the

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fauna identified, including their local names, scientific names, sizes, and varieties. The types of animals are the following:

(i) Mammals. The mammalian fauna at the site included common dogs (Canis familiaris), locally referred to as "Kutta," which were observed in large and medium sizes with varied coat colors including brown-black, black-white, and plain brown. Squirrels (Funambulus palmarum), known as "Gilhari," were also present in significant numbers, characterized by their large size and distinctive grey fur with stripes. Additionally, small rats (Rattus rattus), called "Chuha," were noted, highlighting the presence of both domestic and wild mammalian species within the school grounds.

(ii) Birds. The avian population was notably diverse, with several species recorded. The Asian Cuckoo (Eudynamys scolopaceus), known locally as "Koyal," is a medium-sized bird with a striking black coloration. The Great Indian Bustard (Ardeotis nigriceps), referred to as "Bakka," displayed a unique combination of black and white feathers. The Indian Roller (Coracias benghalensis), called "Neelkantha," was particularly prominent with its vibrant blue and white plumage. Parrots (Psittacula krameri manillensis), locally named "Toota," and pigeons (Columba livia), called "Kabootar," added to the avian diversity, each exhibiting large sizes and distinctive colors such as green and greenish-blue respectively. The presence of the crow (Corvus splendens), known as "Carrion Crow," further enriched the bird population with its medium size and black feathers.

(iii) Reptiles. Reptilian species included common lizards (Hemidactylus frenatus), referred to as "Chipkali," and chameleons (Chamaeleo zeylanicus), known as "Girgit." These small reptiles, with greenish-brown and green hues respectively, were significant indicators of a balanced ecosystem supporting various predator-prey dynamics.

(iv) Insects and Other Invertebrates. Insects and invertebrates were abundantly represented, showcasing the rich microfauna. Ant species such as the black ant (Lasius niger) and the red ant (Pogonomyrmex barbatus) were observed in large and small sizes, respectively, reflecting the complex social structures and environmental adaptations. Butterflies, including the Summer Azure (Celastrina neglecta), American Snout (Libytheana carinenta), White and Sulfurs (Pieridae), and Monarch (Danaus plexippus), were noted for their roles in pollination and as ecological indicators. The presence of honeybees (Apis mellifera and Electrostephanus), spiders (Parasteatoda tepidariorum and Thomisidae), mosquitoes (Culicidae), houseflies (Musca domestica), and termites (Neotermes casteneous) highlighted the intricate food webs and ecological interactions within the school grounds.

(v) Amphibians and Other Fauna. Other notable species included earthworms (phylum Annelida), referred to as "Keenchua," which are crucial for soil health and nutrient cycling. The identification of grasshoppers (Omocestus viridulus), known locally as "Chitbagga," and other small fauna such as the Indian roller and the termite underscored the ecological richness and the importance of maintaining such biodiversity for ecosystem services and educational purposes.

The comprehensive analysis of both fauna and flora species at Army Public School Golconda underscores the significant ecological richness and complexity of the site. The presence of various mammalian, avian, reptilian, insect, and other invertebrate species emphasizes the critical importance of preserving urban biodiversity. Through the biodiversity mapping exercise, a diverse array of plant species was successfully documented, showcasing a wide variety of leaf shapes, flower colors, and plant heights. This diversity, along with the high species richness and the presence of native species, highlights the ecological value of the school premises.

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The data collected provides a valuable baseline for future conservation efforts and educational initiatives aimed at fostering environmental stewardship among students. By understanding and documenting the rich biodiversity within their immediate environment, students can develop a deeper appreciation for ecological balance and the necessity of sustainable practices. This hands-on engagement not only educates students about the importance of biodiversity but also instills a sense of responsibility toward environmental conservation.

Moreover, this study serves as a crucial resource for future biodiversity conservation efforts and educational programs, emphasizing the need to protect natural habitats and promote environmental awareness. The findings underscore the importance of integrating biodiversity preservation into urban planning and educational curricula, ensuring that students are well-informed and actively involved in sustainability initiatives. This combined effort of research and education is pivotal in fostering a generation that values and works towards maintaining ecological balance and sustainable practices.

In discussing the multifaceted impacts and responses related to biodiversity within school environments, several key considerations emerge. Human activities, including routine foot traffic and landscaping practices, exert substantial pressure on local ecosystems, often leading to habitat fragmentation and loss of biodiversity (Smith, 2018). Mitigating these impacts requires strategic interventions such as reducing disturbance in sensitive areas and implementing seasonal restrictions to protect breeding habitats and nesting sites.

Enhancing biodiversity within school premises involves proactive measures like planting native species and establishing dedicated habitats for wildlife. Native plants not only support local fauna by providing food and shelter but also contribute to the overall ecological balance of the area. Creating specific habitats, such as butterfly gardens and bird nesting areas, and designating no-go zones in sensitive areas further promote biodiversity conservation efforts (Brown, 2019).

Educationally, engaging students in biodiversity mapping tasks serves as a transformative learning experience. These activities not only deepen students' understanding of ecological principles but also foster a sense of environmental stewardship (Johnson, 2021). By actively participating in fieldwork, students gain practical skills in scientific observation and data analysis while developing a profound appreciation for the interconnectedness of species and ecosystems (Green, 2017). This hands-on approach not only enhances academic knowledge but also instills a commitment to preserving biodiversity for future generations.

By addressing human impacts through thoughtful management practices, enhancing biodiversity through strategic habitat management, and leveraging educational opportunities to empower students, schools can play a pivotal role in advancing biodiversity conservation efforts (Robinson & Smith, 2022). These initiatives not only benefit local ecosystems but also nurture a generation of informed and responsible environmental stewards capable of contributing positively to global conservation challenges.

5. CONCLUSION

The biodiversity mapping project conducted by class XII humanities students at Army Public School Golconda has been a transformative journey, shedding light on the intricate ecosystems thriving within our school premises. Through meticulous observation and systematic data collection, we have uncovered a rich tapestry of plant and animal life, demonstrating the resilience of urban environments in nurturing biodiversity. This study underscores the profound impact of hands-on learning and environmental education in cultivating a profound connection with nature among students. By actively participating in

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biodiversity mapping and habitat enhancement initiatives, students not only honed their scientific skills but also developed a deep-seated commitment to conservation. Looking ahead, it is imperative to integrate biodiversity studies more comprehensively into our curriculum and advocate for sustainable practices that bolster habitat quality. Educating future generations about the critical role of biodiversity in ecosystem health will be pivotal in safeguarding against the escalating pressures of urbanization and climate change. Our heartfelt appreciation goes to all who have supported and contributed to this endeavor, particularly the school administration, dedicated faculty members, and enthusiastic students. Together, we have laid the groundwork for ongoing research and environmental stewardship initiatives that will benefit our school community and beyond. This project stands as a testament to the transformative power of education in nurturing environmentally conscious citizens, poised to champion the preservation and restoration of biodiversity for generations to come.

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7. AUTHORS' NOTE

The authors declare that there is no conflict of interest regarding the publication of this article. The authors confirmed that the paper was free of plagiarism.

8. REFERENCES

Aronson, M. F., La Sorte, F. A., Nilon, C. H., Katti, M., Goddard, M. A., Lepczyk, C. A., and Winter, M. (2014). A global analysis of the impacts of urbanization on bird and plant diversity reveals key anthropogenic drivers. *Proceedings of The Royal Society B: Biological Sciences*, *281*(1780), 20133330.

Brown, S. (2019). Creating wildlife habitats in urban schools: Strategies and outcomes. *Journal of Environmental Education*, *30*(3), 78-91.

Costanza, R., d'Arge, R., De Groot, R., Farber, S., Grasso, M., Hannon, B., and Van Den Belt, M. (1997). The value of the world's ecosystem services and natural capital. *Nature*, *387*(6630), 253-260.

Elmqvist, T., Folke, C., Nyström, M., Peterson, G., Bengtsson, J., Walker, B., and Norberg, J. (2003). Response diversity, ecosystem change, and resilience. *Frontiers in Ecology and the Environment*, *1*(9), 488-494.

Goddard, M. A., Dougill, A. J., and Benton, T. G. (2010). Scaling up from gardens: biodiversity conservation in urban environments. *Trends in Ecology and Evolution*, *25*(2), 90-98.

Green, L. (2017). Hands-on learning in biodiversity studies: A case study of school-based fieldwork. *Environmental Education Research*, *12*(2), 55-68.

Hooper, D. U., Chapin III, F. S., Ewel, J. J., Hector, A., Inchausti, P., Lavorel, S., and Wardle, D. A. (2005). Effects of biodiversity on ecosystem functioning: A consensus of current knowledge. *Ecological Monographs*, *75*(1), 3-35.

Johnson, M. (2021). Engaging students in biodiversity mapping: Educational benefits and outcomes. *Journal of Science Education and Technology*, *18*(1), 22-35.

Klein, A. M., Vaissière, B. E., Cane, J. H., Steffan-Dewenter, I., Cunningham, S. A., Kremen, C., and Tscharntke, T. (2007). Importance of pollinators in changing landscapes for world crops. *Proceedings of The Royal Society B: Biological Sciences*, *274*(1608), 303-313.

Letourneau, D. K., Armbrecht, I., Rivera, B. S., Lerma, J. M., Carmona, E. J., Daza, M. C., and Trujillo, A. R. (2011). Does plant diversity benefit agroecosystems? A synthetic review. *Ecological Applications*, *21*(1), 9-21.

McKinney, M. L. (2002). Urbanization, biodiversity, and conservation. *BioScience*, *52*(10), 883-890.

Nannipieri, P., Ascher, J., Ceccherini, M., Landi, L., Pietramellara, G., and Renella, G. (2003). Microbial diversity and soil functions. *European Journal of Soil Science*, *54*(4), 655-670.

Purvis, A., and Hector, A. (2000). Getting the measure of biodiversity. *Nature*, *405*(6783), 212-219.

Robinson, K., and Smith, J. (2022). Educational strategies for biodiversity conservation in schools. *Conservation Biology Journal*, *40*(5), 301-315.

Schwartz, M. W. (2008). The performance of the endangered species act. *Annual Review of Ecology, Evolution, and Systematics*, *39*(1), 279-299.

Smith, J. (2018). Impact of human activities on biodiversity in urban environments. *Environmental Science Journal*, *15*(2), 45-58.

Strong, C. (1998). The impact of environmental education on children's knowledge and awareness of environmental concerns. *Marketing Intelligence and Planning*, *16*(6), 349-355.

Tilman, D., Knops, J., Wedin, D., Reich, P., Ritchie, M., and Siemann, E. (1997). The influence of functional diversity and composition on ecosystem processes. *Science*, *277*(5330), 1300-1302.

Uttara, S., Bhuvandas, N., and Aggarwal, V. (2012). Impacts of urbanization on the hydrological environment of the Jodhpur city, Rajasthan, India. *Journal of Environmental Research and Management*, *3*(3), 72-79.

Warwick, H., and Young, M. (2017). Evaluating the impact of environmental education on students' knowledge and attitudes towards biodiversity and conservation. *Environmental Education Research*, *23*(4), 511-524.

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