Abhay Kumar and Ashwani

ASSESSING URBAN BIODIVERSITY AND ENHANCING THE SURVIVAL OF STRAY ANIMALS IN INDIAN CITIES

Abstract

Indian urbanization has significantly affected natural ecosystems as well as stray animals' well-being. In this regard, the paper assesses urban biodiversity with specific emphasis on the survival of urban stray animals in cities across India. It looks at the challenges that face the strays like homelessness, lack of food and exposure to climate changes. This research defines areas of high concentration for these pets and also shows how microclimatic factors impact their populations. Moreover, it examines policy frameworks and best practices in town planning that facilitate coexistence of human beings and stray dogs or cats. The paper also underscores the importance of community involvement and public education in promoting responsible pet ownership and improving conditions for homeless animals in cities.

Keywords: *Animal welfare, Micro-climatic changes, Stray animals, Survival issues and Urban Biodiversity.*

Introduction

Urban biodiversity, often overshadowed by the clamour of city life, plays a crucial role in maintaining ecological balance and its preservation is indispensable for the sustainability of urban environments. Stray animals including dogs, cats, and cows, represent an integral part of the urban fabric, yet their survival in the urban environment is fraught with challenges. It examines the ecological impact of these animals, the conflicts that arise between humans and strays and the health concerns they face, shedding light on the interplay between urban biodiversity and the survival of these animals.

Urban Ecology Theory provides a framework to understand the complex relationships between living organisms and their urban environments. This theory emphasizes that cities, while primarily human-dominated, are ecosystems where both human and non-human species, including stray animals, interact. Stray animals like dogs, cats and cows form a vital part of the urban

ABHAY KUMAR, Assistant Professor, Department of Geography, K. S. College, L. N. Mithila University, Darbhanga, Bihar and **ASHWANI,** Research Scholar, Department of Geography, Delhi School of Economics, University of Delhi, New Delhi, India, E-mail Address: ashwani1798@gmail.com

ecosystem, often adapting to challenging environments shaped by urbanization. The term "parallel community" was used by Pirney (2017) to describe these animals that go through unique struggles such as lack of food, shelter and extreme weather conditions. Because of fast expansion and development, the urban environments often degrade natural habitats thus putting them in more vulnerable situations.

According to Kinzig et al. (2005: 10), The Urban Ecology also shows how biodiversity patterns in cities are affected by socio-economic issues and urban planning decisions. There is a need for proper management of these urban areas as there have been cases of fragmented habitats due to rapid urbanization causing intense urban heat islands resulting to the death of many stray animals. By observing cities as moving systems, Urban Ecology Theory emphasizes on the importance of ecological and social factors in urban biodiversity management. This causes a reconsideration of holistic planning frameworks that include considerations on the role of stray animals within the ecology and policies aimed at their welfare to promote sustainable city development (Srivastava & Sharma, 2023: 101).

Cities have been established for thousands of years and in recent decades, have become the dominant human living environment (Perry et al., 2020: 141). They have become increasingly populous and widespread, offering a wide range of habitats and supporting various species. While the diversity of plants in urban areas can decrease due to increased compaction, similar numbers of species can often be found in both urban and rural surroundings (Capotorti et al., 2013: 174). However, urban environments tend to host a higher proportion of non-native plant species. Urban landscapes with greater plant diversity also provide a more extensive array of animal species (Threlfall et al., 2016: 28) and their associated traits (Eggenberger et al., 2019: 1522).

Despite gaining more attention, the study of urban biodiversity, particularly the conservation value of urban ecosystems, remains an area with limited research (Perry et al., 2020: 141; Aronson et al., 2014). The contribution of cities to human well-being, particularly in less affluent regions, as well as their potential to enhance human welfare and the transformative role of new technologies in urban natural resource management are often underestimated (Goddard et al., 2021: 219; Coman et al., 2022: 539). Similarly, there is a lack of research on the influence of human socioeconomic factors on urban biodiversity patterns (Kinzig et al., 2005: 10).

The rapid urbanization of India stands as one of the most significant societal transformations of our era, as cities expand and flourish, ushering in new waves of development and modernity. As this transformation unfolds, it brings with it a profound redefinition of the human experience and with it, complex challenges and opportunities in the realm of urban biodiversity and the coexistence of stray animals within Indian cities. The burgeoning urban

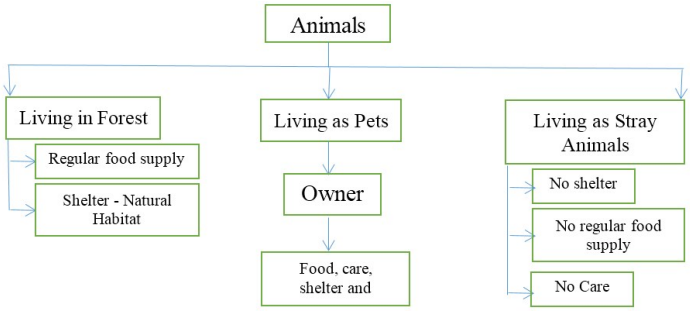
landscapes of India now host a diverse tapestry of life, from towering skyscrapers to the humble creatures that navigate the bustling streets.

The impact of this urbanization on India's ecosystems is profound and as urban areas sprawl and encroach upon the natural world, it is imperative to examine the changes occurring within these cityscapes. While India boasts an exceptional wealth of biodiversity, much of this natural heritage is now confined to fragmented pockets of wilderness, increasingly isolated from urban centers. The challenges presented by urban expansion are multifaceted and range from habitat destruction to pollution, all of which pose significant threats to local flora and fauna. The loss of green spaces, the modification of natural habitats and the proliferation of concrete jungles have consequences that reverberate throughout these urban ecosystems, often impacting species that have adapted to these new environments, including the stray animals that roam the streets. Stray animals in Indian cities, predominantly dogs, cats and cows, are integral to the urban tableau. Their presence, while contributing to the city's unique character, raises questions about the dynamic relationship between urban biodiversity and the welfare of these animals. Stray animals face myriad challenges in the urban milieu, struggling for survival amidst a cacophony of human activity. This juxtaposition of city life and these resilient creatures creates a complex tapestry of coexistence, with both positive and negative aspects that deserve scrutiny.

This research embarks on an exploration of the intricate interactions between urban biodiversity and the survival of stray animals in Indian cities. It seeks to unravel the ecological, social and policy dimensions of this phenomenon, examining the impact of urbanization on biodiversity, the challenges and opportunities presented by stray animal populations and the potential for harmonious coexistence between humans and these urban-adapted animals. By doing so, it aims to shed light on the complex urban dynamics that define the modern Indian city and to provide insights that can guide policy development and practices for the preservation of both urban biodiversity and the well-being of stray animals.

Presently, the landscapes of urban areas (towns and cities) are known for two identifiable features viz. dominant grey infrastructure and sparse, rarefied vegetation cover. The developmental processes involved in the alteration of landscapes lead to biodiversity loss in towns and cities and force animals to live life as stray animals. These animals are stray in nature and play a major ecological role in urban systems therefore, 'stray animals' can't be treated as secondary community (Pirney 2017). It will be apt to call stray animals a 'parallel community' which feels everything like human beings whether it is hunger or harsh conditions of extreme weather activities during the summer and winter season.

Fig.1: Animals and related aspects



Source: Prepared by the author after a thorough literature review

2. Methodology

The research methodology for assessing urban biodiversity and enhancing the survival of stray animals in Indian cities is designed to provide a comprehensive understanding of the complex dynamics at play (Fig.1). This methodology employs a combination of quantitative and qualitative approaches, incorporating data collection, analysis and on-site investigations. The research follows a multi-stage process: Review of existing literature and academic research on urban biodiversity, urban ecology and the survival of stray animals in Indian cities. This step provides a foundation for understanding the existing knowledge and identifying research gaps.

Surveys to assess the population and distribution of stray animals in select urban areas. This may include counts, mapping and categorization of species. And Collection of data on conflicts between humans and stray animals, including incidents, injuries, and economic impacts. Gathering data on the health and welfare of stray animals, including disease prevalence, access to food and water, and shelter conditions. Veterinary records and field assessments may be used.

Furthermore, Analysis of existing policies, regulations and practices related to urban biodiversity and stray animal management at the national, state and local levels. This includes a review of relevant laws and their enforcement.

This methodology is designed to provide a comprehensive and well-rounded assessment of urban biodiversity and the survival of stray animals in Indian cities, encompassing ecological, social and policy aspects. It aims to contribute to the development of sustainable strategies for coexistence and conservation in the urban landscape of India.

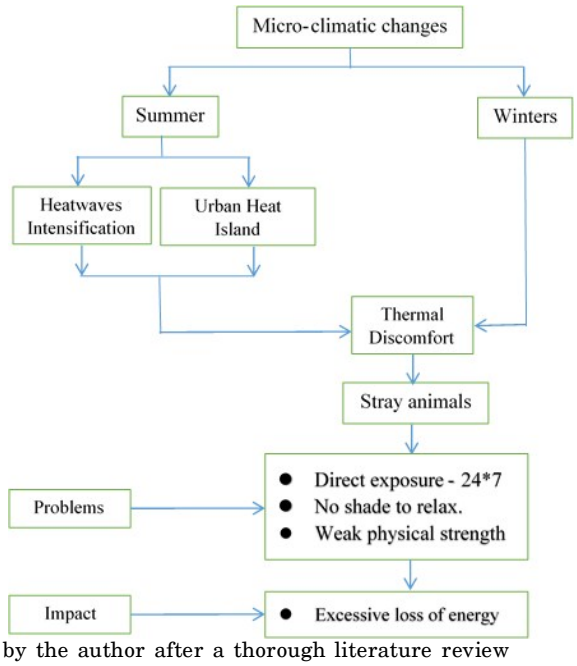
3. Results and Discussion

3.1 Stray Animals - A deprived ecological community of animals

The community of stray animals is quite different from animals living

in forests or as pets in towns and cities. Animals living in forests have a high degree of survival tendency and are self-dependent. Forests provide regular food supply and shelter (Zoological Survey of India, 2018). Animals in forests play a direct role in the food chain and food web and maintain ecological balance. Now, as we move away from forests and towards cities and towns animals are forced to live in anthropogenic urban environments either as pets in homes or 'stray animals' on concrete roads. Pets live a highly comfortable life with proper care, training and food supply provided by the owner. The owners consult veterinary doctors from time to time to get health suggestions for their pets. But stray animals are deprived of all the benefits of forests as they live in urban environment and care of owners as nobody owns them. This deprived community survive solely on the mercy of inhabitants of cities and towns. The animals viz. Cows, cats, dogs, donkeys, he-buffaloes and monkeys can easily seen roaming on the streets of towns and cities. On the one hand, stray animals are homeless creatures with no regular and timely supply of food while on the other hand, these stray animals remain exposed to extreme weather activities around the clock. Due to sparse and rarefied vegetation, there is no provision for 'shade' for such animals. During summers, they remain exposed to scorching heat and during winter, they shiver due to cold waves.

Fig.2: Micro-climatic changes and their impact on stray animals



Source: Prepared by the author after a thorough literature review

The most important question to be answered over here is -

1 What made these animals live life of stray animals?

The animals under this category are either disowned by their owners (domestic animals like cows, ox) or animals (monkeys, cats and dogs) multiplying on their own. Farmers disown their domestic animals when they become old, suffer from any disease, or become disabled in one form or the other while, dogs, cats and monkeys multiply on their own and are highly mobile in nature.

3.2 Stray animals and micro-climate changes

Land transformation is responsible for the changes in the microclimate of any city and town. The clearing of forests and expansion of concrete cover results in considerable changes in the local heat budget of towns and cities. The changes in the local heat budget take place due to excessive heating of concrete cover and the absence of the cooling effect of vegetation. Due to the absence of a cooling effect, the temperature does not get regulated to a considerable level and results in excessive heating of surroundings. This excessive heating results in the intensification of the urban heat island (UHI) effect and heat waves during the summer season. The urban heat island effect makes cities and towns hotter at the core as compared to the periphery and heat waves also contribute to making the core hotter. Such hot surroundings result in thermal discomfort for both human beings and animals. However, human beings protect themselves in rooms and offices by using air conditioners (ACs) and air coolers. But animals especially stray animals remain exposed to heat and survive in thermal discomfort (Fig.2).

Stray animals spend 24 hours and 365 days in the open either on the road or sitting under the shade of the tree. Their degree of exposure to heatwaves during winter is high and thus, stray animals are more vulnerable to 'thermal discomfort' during the summer season and winter seasons. The conditions are further worsened by the vegetation destruction giving rise to the problem of 'no green shade' for stray animals in urban areas (Sandoe et. al. 2019). Moreover, the unprecedented growth of grey infrastructure during the past few decades has resulted from an increase in surface temperature which in lieu intensified the urban heat island effect and heatwave intensification during the summer season.

From the above discussion, we can say that stray animals face two major problems-The absence of tree shade and dominance of concrete cover force stray animals to roam here and there which results in loss of their energy and consequently, stray animals suffer from various health ailments. Secondly, they are exposed to harsh weather activities during the summer season, winter season and rainy season which makes their survival really difficult. Thirdly, 'no provision' of food supply forces them to stay in starving conditions resulting in loss of their physical strength.

The urbanization and industrialization facilitated the human life through all sorts of developmental activities. But human beings while maintaining the

pace with the fast-moving life became indifferent towards the parallel community of 'stray animals. This parallel community was ill-treated and considered as 'alien'. The stray animals survive solely at the mercy of human beings. These helpless creatures with no food supply, no shelter and zero care, starve to death slowly in front of human beings (Guillox et. al. 2018: 89). Human beings consider these animals as a black spot in painting which spoils the entire beauty.

4. Recommendations and suggestions

The following recommendations and suggestions need to be followed to solve the problems of 'stray animals': Community awareness should be created about the ecological importance and role of human beings towards stray animals. People should be encouraged to adopt stray animals and not ill-treat them. The government should make common shelters for stray animals so that they can stay in the shade and protect themselves from the scorching heat during the summer season, cold waves during the winter season and rainwater during the rainy season. Cooling points with dense trees should be made in order to beat heatwaves during the summer season. Also, provisions for regular food supply should be shared by the government and the community people equally and community people should be encouraged to treat stray animals with love, respect and care. Enhancing urban biodiversity and improving the survival of stray animals in Indian cities require a multi-pronged approach involving ecological, social, and policy dimensions. Here are some recommendations and suggestions for addressing these challenges in India:

Plate 1: Primary Survey

Integrating green spaces and wildlife-friendly elements into urban planning is essential for creating habitats that support native species. Sustainable

landscaping practices, particularly those that utilize indigenous plants, play a crucial role in bolstering local ecosystems. Furthermore, designing pedestrian-friendly areas is necessary to mitigate vehicle-related risks to stray animals. Efforts to identify and protect green corridors and critical habitats within urban areas are paramount. Initiatives such as afforestation and reforestation must be promoted to enhance urban tree cover, thereby providing habitats for birds and other wildlife. Additionally, establishing urban wildlife reserves and corridors will facilitate the movement of species within city landscapes. Effective stray animal management requires the enforcement of responsible pet ownership practices, including licensing, vaccination and spaying/neutering. It is equally important to establish and support animal shelters, adoption centers and community-driven animal care initiatives to offer safe havens for stray animals. Moreover, trap-neuter-return (TNR) programs should be promoted as a humane strategy for managing feral cat populations. Public awareness campaigns are vital in educating residents about the importance of urban biodiversity and responsible pet ownership. Integrating environmental education into school curricula will raise awareness among future generations. Additionally, organizing community workshops, seminars and webinars will engage residents in conservation efforts. Fostering community involvement in urban biodiversity conservation and stray animal welfare initiatives is essential. Citizen science programs should be established to involve residents in wildlife monitoring and data collection. Local communities should be encouraged to participate in activities such as tree planting, bird feeding and animal care. The development and support of wildlife rescue centers and organizations are necessary to care for injured or sick wildlife. Local authorities and volunteers should be trained and equipped in humane animal rescue and release techniques. Collaboration with wildlife experts is important to develop guidelines for handling urban wildlife encounters. The strengthening and enforcement of animal welfare laws and regulations, including anti-cruelty laws and stray animal management guidelines, are crucial. The adoption and implementation of city-specific urban biodiversity and animal welfare policies should be encouraged. Collaboration with relevant government agencies is necessary to develop and enforce policies that protect urban wildlife. Ongoing research on urban biodiversity and the dynamics of stray animal populations is critical. Data on species diversity, population trends and health indicators of both urban wildlife and stray animals should be collected and maintained. Sharing research findings and data with local authorities, NGOs and the public will inform decision-making processes. Fostering partnerships between government agencies, non-governmental organizations, and private companies is vital to fund and execute urban biodiversity and animal welfare projects. Corporate responsibility programs that contribute to biodiversity conservation and animal welfare should be encouraged. Enforcement mechanisms for wildlife protection and animal welfare laws must be strengthened. Regular monitoring and evaluation of conservation and animal welfare programs are essential to ensure their effectiveness. By implementing these recommendations

and fostering a collective effort among government bodies, NGOs, communities and individuals, significant strides can be made in preserving urban biodiversity and enhancing the survival of stray animals in India's cities (Srivastava & Sharma, 2023: 101; Singh et al., 2022: 219).

5. Conclusion

This study emphasizes the critical need to acknowledge the significance of urban wildlife as well as the wellbeing of homeless creatures in Indian towns. As cities keep growing larger, the relationship between men and stray animals gets more and more complicated. It points out the difficulties that stray animals experience, such as lack of housing, food and exposure to severe weather conditions. These animals cannot be considered as secondary communities but rather play a vital role in keeping city environments functioning and therefore deserve more attention by both urban planners and policy makers.

For urban development to enhance harmonious coexistence, it must integrate sustainable practices that serve both humans and animals. This creates a pressing need for more public awareness campaigns and responsible pet ownership towards creating favorable conditions for stray animals. Future strategies should also focus on improving regulatory frameworks that address these issues ensuring their survival vis-a-vis rapid urbanization. By confronting these interrelated issues, cities can become more inclusive and balanced ecosystems that benefit both urban biodiversity and the welfare of stray animals. Furthermore, this will require further research into how micro-climatic changes as well as urban planning practices affect stray pets so as inform future policy decisions.

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