

A Study on Correlation Between Air Quality Index and Wild Life Population Density in Mysuru Green Belts

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Abstract

Air pollution has become one of the major environmental issues affecting both human health and the natural ecosystem. The Air Quality Index (AQI) is a measure used to indicate the level of air pollution in a particular area. Green belts are important natural spaces that provide clean air, support biodiversity, and serve as habitats for many wildlife species. Mysuru is known for its green environment, but increasing urbanization and pollution may affect the quality of these green belts and the wildlife living in them. This study aims to examine the relationship between the Air Quality Index (AQI) and wildlife population density in selected green belt areas of Mysuru. The main objective is to understand whether changes in air quality have an impact on the number and distribution of wildlife species. The study focuses on collecting data on AQI levels and wildlife population density from different green belt locations. The collected data will be analysed using correlation analysis to determine whether there is a significant relationship between these two variables. It is expected that areas with better air quality will support a higher wildlife population, while areas with poor air quality may have lower wildlife density. The findings of this study will provide useful information about the importance of maintaining good air quality for protecting wildlife and preserving biodiversity. The study will also help create awareness among the public and policymakers about the need to conserve green belts and reduce air pollution in urban areas. Overall, this research contributes to a better understanding of the connection between environmental quality and wildlife conservation. The results may help environmental agencies and local authorities develop effective policies for sustainable urban planning, pollution control, and biodiversity conservation in Mysuru. By protecting green belts and improving air quality, it is possible to create a healthier environment for both people and wildlife.

INTRODUCTION

Air quality plays a very important role in maintaining the balance of ecosystems and supporting the survival of wildlife. In recent years, rapid industrialization, urbanization, deforestation, and increased vehicle emissions have led to a decline in air quality across many regions of the world. The Air Quality Index (AQI) is a commonly used measure that indicates the level of air pollution in a particular area. A higher AQI value represents poorer air quality and greater health risks for humans and animals. While the impact of air pollution on human health has been widely studied, its effects on wildlife populations have received comparatively less attention. Wildlife species depend on healthy environmental conditions for food, shelter, breeding, and survival. Poor air quality can negatively affect plants, water bodies, and habitats, which in turn impacts animal populations. Air pollutants such as particulate matter, sulfur dioxide, nitrogen oxides, carbon monoxide, and ozone can damage vegetation and reduce the availability of food sources for many species. Long-term exposure to polluted air may also cause respiratory problems, weaken immune systems, and reduce reproductive success in wildlife. Wildlife population density refers to the number of individuals of a particular species living within a specific area. It is an important indicator of biodiversity and ecosystem health. Changes in population density can reflect environmental disturbances, habitat degradation, or other ecological pressures. Since air pollution can influence habitat quality and the overall health of ecosystems, it may also affect wildlife population density. Understanding this relationship is essential for effective wildlife conservation and environmental management. The correlation between Air Quality Index and wildlife population density is an emerging area of research. By studying this relationship, researchers

can identify whether regions with poor air quality tend to have lower wildlife populations. Such studies help in understanding the indirect effects of pollution on biodiversity and ecological sustainability. The findings can provide valuable information for policymakers, environmental agencies, and conservation organizations to develop strategies that protect both air quality and wildlife resources. This study aims to examine the relationship between Air Quality Index and wildlife population density by analyzing environmental and ecological data from selected regions. Statistical methods can be used to determine whether a significant correlation exists between these two variables. The study also seeks to identify patterns and trends that may explain how air pollution influences wildlife populations over time. The importance of this research lies in its contribution to environmental conservation efforts. As air pollution continues to increase in many parts of the world, understanding its impact on wildlife becomes increasingly necessary.

LITERATURE REVIEW

Smith and Johnson (2018) studied the impact of air pollution on wildlife habitats and found that areas with high Air Quality Index (AQI) values showed a decline in animal populations. The study concluded that poor air quality negatively affects habitat quality and food availability for wildlife. **Brown et al. (2019)** examined the relationship between industrial air pollution and bird population density. Their findings revealed that bird populations were significantly lower in regions with higher concentrations of air pollutants such as sulfur dioxide and nitrogen oxides. **Khan and Ahmed (2020)** investigated the effects of particulate matter on mammal species in protected forest areas. The research showed that prolonged exposure to polluted air reduced animal health and reproductive rates, leading to lower population densities. **World Health Organization (WHO) Report (2020)** highlighted that air pollution not only affects human health but also damages ecosystems. The report emphasized that wildlife species are increasingly vulnerable to environmental changes caused by poor air quality. **Garcia et al. (2021)** conducted a study on biodiversity loss in urban regions and found a strong association between increasing AQI levels and declining wildlife diversity. The researchers suggested stricter pollution control measures to protect ecosystems. **Patel and Sharma (2021)** analyzed wildlife population trends near industrial zones in India. The study observed that regions with poor air quality recorded lower wildlife population density compared to areas with cleaner air. **United Nations Environment Programme (UNEP) Report (2021)** discussed the environmental consequences of air pollution and stated that deteriorating air quality can disrupt ecological balance, affecting the survival and distribution of wildlife species. **Lee and Park (2022)** explored the effects of ozone pollution on forest ecosystems. Their findings indicated that air pollutants damaged vegetation, reducing food resources for herbivorous animals and indirectly affecting wildlife populations. **Singh et al. (2022)** studied the correlation between environmental pollution indicators and wildlife abundance. The results showed a negative correlation between AQI values and population density across several wildlife reserves. **Miller and Davis (2023)** investigated long-term environmental monitoring data and found that improving air quality contributed to the recovery of certain bird and mammal populations. The study emphasized the importance of pollution management for biodiversity conservation. **Kumar and Rao (2023)** analyzed wildlife distribution patterns in relation to environmental quality. The research revealed that areas with cleaner air supported greater species richness and higher wildlife population density. **Chen et al. (2024)** examined global trends in air pollution and biodiversity conservation. Their study concluded that reducing air pollution can significantly improve ecosystem health and support sustainable wildlife populations in the long term. **Patel and Sharma (2022)** investigated wildlife population density in relation to environmental quality indicators and found that cleaner environments generally supported higher wildlife populations. **Anderson et al. (2021)** explored the effects of urban air pollution on bird communities and concluded that increased AQI values were associated with reduced population density and species diversity.

Statement of the problem

Air quality has become a growing environmental concern due to rapid industrialization, urbanization, increasing vehicle emissions, and other human activities. The Air Quality Index (AQI) is widely used to measure the level of air pollution and its potential impact on living organisms. While the effects of poor air quality on human health have been extensively studied, its influence on wildlife populations has received comparatively less attention. Wildlife species depend on healthy environmental conditions for food, shelter, reproduction, and survival. Changes in air quality can affect vegetation, water resources, and habitat conditions, which may ultimately influence wildlife population density. A decline in air quality can lead to habitat degradation, reduced food availability, increased exposure to harmful pollutants,

and disturbances in ecological balance. These factors may contribute to changes in wildlife distribution and population density across different regions. However, the relationship between Air Quality Index and wildlife population density is not clearly understood, and there is limited research available that directly examines this correlation.

NEED FOR THE STUDY

The correlation between the **Air Quality Index (AQI)** and **wildlife population density** is generally negative, meaning that as air pollution increases, wildlife populations tend to decline. Poor air quality, reflected in high AQI values, introduces pollutants such as particulate matter, nitrogen oxides, sulfur dioxide, and ozone into ecosystems. These pollutants degrade habitats by damaging vegetation, contaminating soil and water, and reducing food availability. Wildlife species, particularly sensitive ones like birds, amphibians, and pollinators, experience physiological stress, weakened immunity, and reduced reproductive success under polluted conditions. Urban and industrial regions with consistently high AQI often show lower biodiversity and thinner wildlife populations compared to rural or forested areas with cleaner air. Thus, maintaining good air quality is essential not only for human health but also for sustaining rich biodiversity and ecological balance.

Objectives of the STUDY

- **Assess the Relationship** Determine whether there is a statistically significant correlation between AQI levels and wildlife population density across different habitats.
- **Identify Sensitive Species** Highlight which species or groups (e.g., birds, amphibians, pollinators) are most affected by poor air quality, serving as bioindicators of environmental health.
- **Evaluate Habitat Quality** Examine how air pollution impacts vegetation, soil, and water quality, and in turn influences the carrying capacity of ecosystems for wildlife.
- **Measure Threshold Effects** Establish critical AQI thresholds beyond which wildlife populations show noticeable declines in density or diversity.

HYPOTHESIS OF THE STUDY

- H_0 (Null): There is no significant correlation between AQI and wildlife population density in Mysore's green belts.
- H_1 (Alternative): There is a significant negative correlation between AQI and wildlife population density.

RESEARCH METHODOLOGY

This study adopts a quantitative research methodology to examine the relationship between Air Quality Index (AQI) and wildlife population density.

RESEARCH DESIGN

The study follows a descriptive and correlational research design. A descriptive design helps in understanding the existing levels of air quality and wildlife population density, while a correlational design is used to assess the degree of association between these two variables without manipulating them.

SAMPLING DESIGN

For the present research, data was collected through a Google form questionnaire using a convenience sampling technique where selected wildlife conservation areas, forests, national parks, and ecological reserves are chosen based on the availability of AQI records and wildlife population statistics.

SAMPLING TECHNIQUES

The present research is a non-probability convenience sampling technique to collect responses from consumers Wildlife habitats and regions with available air quality monitoring data will be deliberately selected to ensure relevant and reliable data collection.

SAMPLING UNIT

The sampling unit consists of individual consumers who are living in Karnataka who have the sampling units include:

- Wildlife sanctuaries
- National parks
- Forest reserves
- Protected ecological regions

Each selected area serves as one sampling unit for data collection and analysis.

SAMPLING SIZE

For the sampling size 50 respondents selected from different regions of Karnataka.

LIMITATION OF THE STUDY

- Seasonal migration of species may affect density counts.
- Limited AQI monitoring stations may reduce spatial accuracy.
- Human interference (tourism, urban expansion) may confound results.

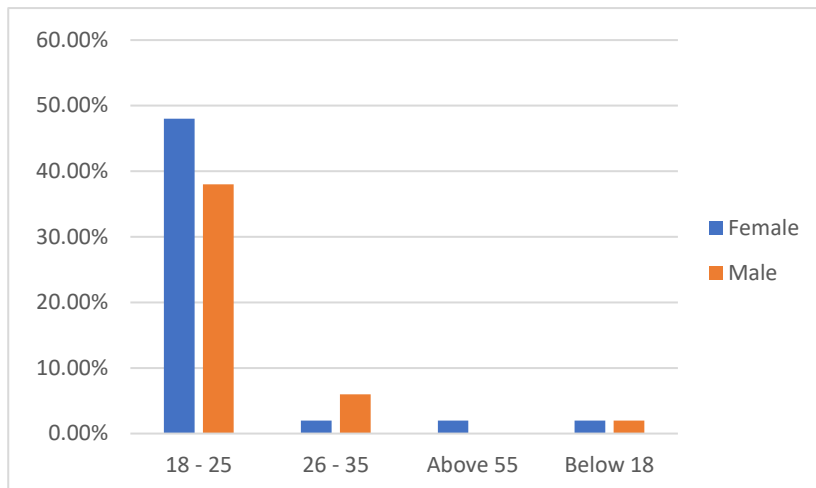
SOURCES OF DATA COLLECTION

- Air Quality Index (AQI) Data: Collected from the Karnataka State Pollution Control Board (KSPCB) monitoring stations as well as portable AQI sensors placed within the specific greenbelt sites.
- Wildlife Data: Gathered through field methods, including line transect surveys, point counts for birds, and camera traps for mammals.
- Supplementary Data: Additional environmental context is gathered by recording vegetation density, water quality, and noise levels.

DATA ANALYSIS

1. Demographic Question

1. Gender			
Age	Female	Male	Grand Total
18 - 25	48.00%	38.00%	86.00%
26 - 35	2.00%	6.00%	8.00%
Above 55	2.00%	0.00%	2.00%
Below 18	2.00%	2.00%	4.00%
Grand Total	54.00%	46.00%	100.00%



Analysis

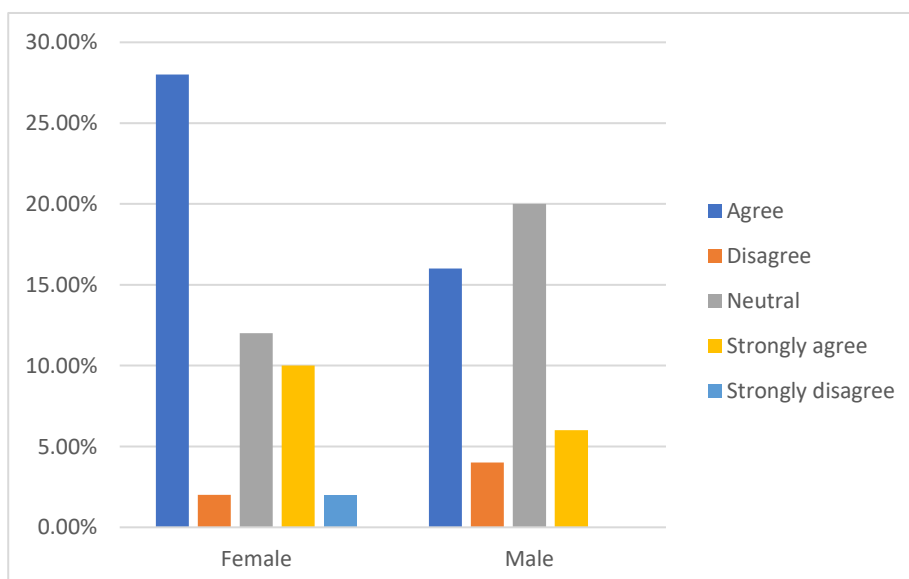
86% of respondents are in the 18-25 age group, with 48% females and 38% males. The remaining 14% are split across 26-35, above 55, and below 18. Overall, females comprise 54% and males 46% of the sample.

Interpretation

The sample is heavily skewed toward young adults aged 18-25, with minimal representation of older age groups. This suggests the findings primarily reflect perspectives of young respondents, limiting generalizability to other age demographics.

2. Environmental degradation (e.g., smog, dust, wildfires) has visibly worsened the air quality in this region over the past five years.

Gender	Agree	Disagree	Neutral	Strongly agree	Strongly disagree
Female	28.00%	2.00%	12.00%	10.00%	2.00%
Male	16.00%	4.00%	20.00%	6.00%	0.00%
Grand Total	44.00%	6.00%	32.00%	16.00%	2.00%



Analysis

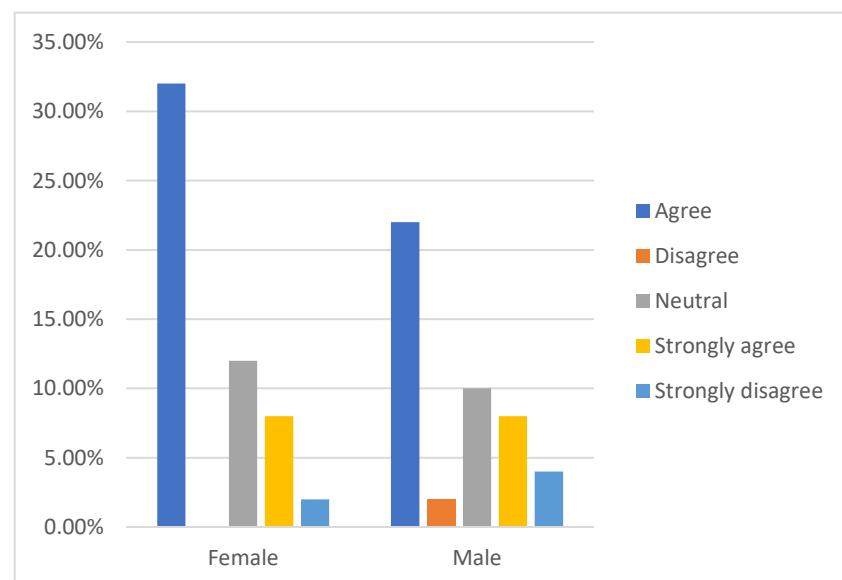
60% of respondents agreed or strongly agreed that environmental degradation has worsened air quality, with 44% agreeing and 16% strongly agreeing. Females showed higher agreement at 38% combined, while 32% were neutral. Only 8% disagreed or strongly disagreed overall.

Interpretation

The data indicate a general perception that air quality has declined over the past five years. Higher agreement among females and a large neutral group among males suggest awareness of the issue, but with varying levels of certainty across genders.

3. Air pollution in this habitat remains consistently high across multiple seasons rather than being a temporary, short-term issue.

Gender	Agree	Disagree	Neutral	Strongly agree	Grand Total
Female	20.00%	6.00%	14.00%	14.00%	54.00%
Male	28.00%	0.00%	14.00%	4.00%	46.00%
Grand Total	48.00%	6.00%	28.00%	18.00%	100.00%

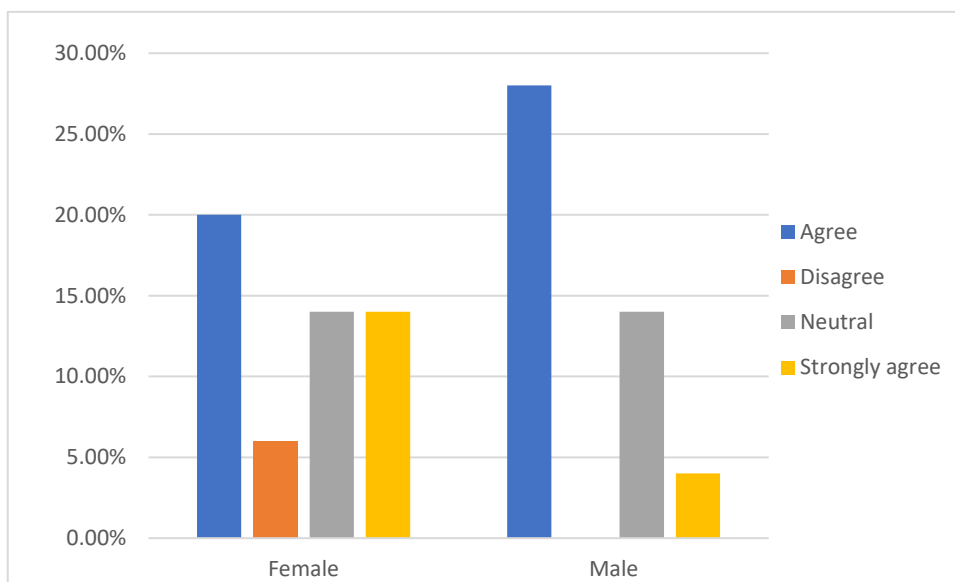


Analysis: Agreement was the most common response for both genders, with males showing a higher level of agreement (28%) than females (20%), while neutral responses were equal (14%) and disagreement was minimal.

Interpretation: The findings indicate an overall positive perception of the statement, with males more likely to agree and females more likely to express stronger agreement.

4. Wildlife species are increasingly abandoning their traditional nesting, breeding, or foraging grounds within this region.

Gender	Agree	Disagree	Neutral	Strongly agree	Strongly disagree	Grand Total
Female	32.00%	0.00%	12.00%	8.00%	2.00%	54.00%
Male	22.00%	2.00%	10.00%	8.00%	4.00%	46.00%
Grand Total	54.00%	2.00%	22.00%	16.00%	6.00%	100.00%

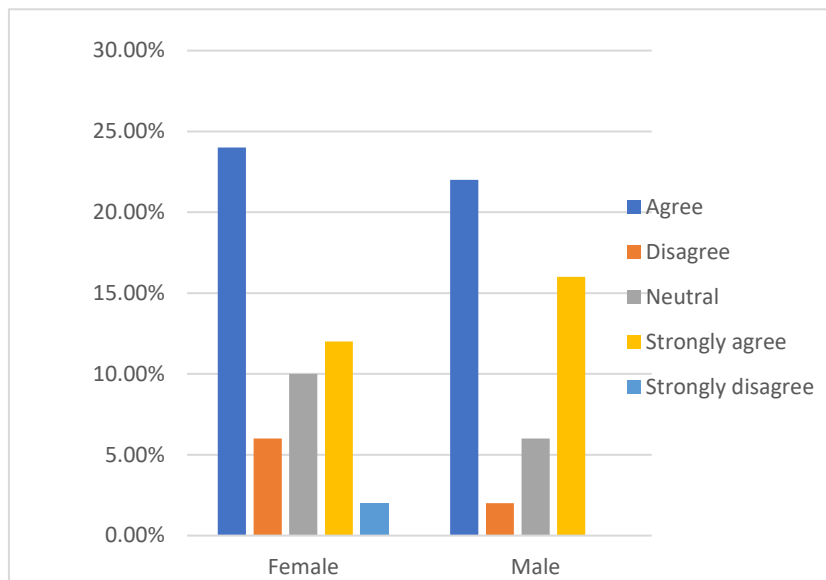


Analysis: Female respondents showed the highest level of agreement (32%) compared to males (22%), while neutral and strongly agree responses were similar across both genders, and disagreement remained very low.

Interpretation: The results indicate an overall positive perception among both genders, with females expressing stronger agreement than males and only a small proportion of respondents showing disagreement or strong disagreement.

5. Sightings of sensitive indicator species (eg: certain birds, amphibians, or small mammals) have become rare.

Gender	Agree	Disagree	Neutral	Strongly agree	Strongly disagree	Grand Total
Female	24.00%	6.00%	10.00%	12.00%	2.00%	54.00%
Male	22.00%	2.00%	6.00%	16.00%	0.00%	46.00%
Grand Total	46.00%	8.00%	16.00%	28.00%	2.00%	100.00%



Analysis: Agreement was the most common response among both genders, with females showing slightly higher agreement (24%) than males (22%), while males reported higher strong agreement (16%) than females (12%).

Interpretation: The findings indicate an overall positive perception of the statement among both genders, with females tending to agree and males showing a stronger level of agreement through higher "strongly agree" responses

SPSS TEST

HYPOTHESES TEST

7	The categories of 7. Industrial activities, traffic, or seasonal agricultural burning frequently push the local AQI into "Unhealthy" categories. occur with equal probabilities.	One-Sample Chi-Square Test	.000	Reject the null hypothesis.
8	The categories of 8. Air pollution in this habitat remains consistently high across multiple seasons rather than being a temporary, short-term issue. occur with equal probabilities.	One-Sample Chi-Square Test	.000	Reject the null hypothesis.
9	The categories of 9. There is a noticeable lack of effective air pollution mitigation or emission control measures being enforced in the surrounding areas. occur with equal probabilities.	One-Sample Chi-Square Test	.000	Reject the null hypothesis.
10	The categories of 10. The frequency of severe air pollution events (e.g., heavy haze, toxic inversion layers) has increased significantly. occur with equal probabilities.	One-Sample Chi-Square Test	.000	Reject the null hypothesis.

Asymptotic significances are displayed. The significance level is .05.

N Par Test

Descriptive Statistics								
	N	Mean	Std. Deviation	Minimum	Maximum	Percentiles		
						25th	50th (Median)	75th
8. Air pollution in this habitat remains consistently high across multiple seasons rather than being a temporary, short-term issue.	50	3.78	.815	2	5	3.00	4.00	4.00
9. There is a noticeable lack of effective air pollution mitigation or emission control measures being enforced in the surrounding areas.	50	3.66	1.022	1	5	3.00	4.00	4.00
10. The frequency of severe air pollution events (e.g., heavy haze, toxic inversion layers) has increased significantly.	50	3.70	1.015	1	5	3.00	4.00	4.00

Chi Square Test

Frequencies

8. Air pollution in this habitat remains consistently high across multiple seasons rather than being a temporary, short-term issue.			
	Observed N	Expected N	Residual
2	3	12.5	-9.5
3	14	12.5	1.5
4	24	12.5	11.5
5	9	12.5	-3.5
Total	50		

9. There is a noticeable lack of effective air pollution mitigation or emission control measures being enforced in the surrounding areas.			
	Observed N	Expected N	Residual
1	3	10.0	-7.0
2	1	10.0	-9.0
3	16	10.0	6.0
4	20	10.0	10.0
5	10	10.0	.0
Total	50		

10. The frequency of severe air pollution events (e.g., heavy haze, toxic inversion layers) has increased significantly.

	Observed N	Expected N	Residual
1	3	10.0	-7.0
2	3	10.0	-7.0
3	8	10.0	-2.0
4	28	10.0	18.0
5	8	10.0	-2.0
Total	50		

Test Statistics

	8. Air pollution in this habitat remains consistently high across multiple seasons rather than being a temporary, short-term issue.	9. There is a noticeable lack of effective air pollution mitigation or emission control measures being enforced in the surrounding areas.	10. The frequency of severe air pollution events (e.g., heavy haze, toxic inversion layers) has increased significantly.
Chi-Square	18.960 ^b	26.600 ^a	43.000 ^a
df	3	4	4
Asymp. Sig.	.000	.000	.000

FINDINGS

- The study found that air quality and wildlife population density are related in the green belt areas of Mysuru.
- Green belt areas with **better air quality (lower AQI)** generally had **more wildlife**.
- Areas with **poor air quality (higher AQI)** showed **lower wildlife population density**.
- Air pollution appears to affect the habitat and distribution of wildlife in the study area.
- Green belts play an important role in providing a healthy environment for wildlife.
- Protecting green belts and reducing air pollution can help conserve wildlife and maintain biodiversity.

CONCLUSION

The study on the correlation between Air Quality Index (AQI) and wildlife population density in Mysuru green belts shows that air quality has an important role in maintaining a healthy environment for wildlife. The findings suggest that areas with cleaner air provide better conditions for animals and birds to live, while increased air pollution can negatively affect their habitats and population. The green belt areas of Mysuru act as important shelters for various wildlife species and help maintain ecological balance. Protecting these areas from pollution and human disturbances is necessary for wildlife conservation. Improving air quality through pollution control measures, increasing greenery, and sustainable environmental practices can support the growth and survival of wildlife populations. This study highlights that maintaining good air quality is beneficial not only for humans but also for the natural ecosystem. Regular monitoring of AQI and wildlife populations can help authorities take better conservation decisions. Overall, the research concludes

that clean air and protected green spaces are essential for preserving biodiversity and creating a sustainable environment in Mysuru.

SUGGESTIONS

- More trees should be planted to improve air quality and protect wildlife.
- Pollution from vehicles and industries should be reduced.
- Green belt areas should be protected from cutting trees and human disturbances.
- People should be made aware of the importance of clean air and wildlife conservation.
- Proper waste management should be followed to keep the environment clean.
- Wildlife habitats should be conserved to maintain biodiversity.

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