



PROJECT TITLE: HOW NOISE POLLUTION AFFECT WARM BEHAVIOUR

PARTICIPANT NAME: M.SAAKINA

NSF ID: NSF-SCH-2025-219

GRADE: IX

LEVEL: JUNIOR LEVEL. SECTION: PHYSICAL SCIENCE

SCHOOL: MOUNT HIRA MATRICULATION SCHOOL

CITY & STATE: NELLIKUPPAM, TAMIL NADU

Table of contents

I. Introduction	3
II. Abstract.....	4
III. Research questions	5
IV. Hypothesis answers.....	6
V. Guiding principle	7
VI. Purpose of the project	8
VII. Methodology	9
VIII. Variables	11
IX. Discussion	13
X. Results.....	17
XI. Risk and safety measures.....	20
XII. Conclusion.....	21
XIII. Bibliography.....	22
XIV. Acknowledgments.....	23

INTRODUCTION:

As human civilization has expanded, it has generated an often-overlooked and pervasive form of environmental degradation: noise pollution. While the detrimental effects of airborne and waterborne pollutants are widely recognized, the constant, unnatural din from traffic, construction, and industry presents an invisible but significant threat to wildlife, disrupting the crucial role of sound in natural ecosystems. For animals, many of whom depend on acoustic cues for their very survival, this anthropogenic noise can have far-reaching behavioral and physiological consequences. This paper explores the diverse ways in which noise pollution fundamentally alters animal behavior, including its impact on essential activities such as communication, foraging, reproduction, and the fundamental dynamics between predators and prey. By synthesizing current findings on these disruptions, this review emphasizes that noise pollution is a serious environmental stressor with the potential to cause complex and cascading effects that threaten biodiversity and the long-term health of both terrestrial and aquatic ecosystems. These behavioural changes, such as shifts in mate choice or increased stress hormone levels, can ultimately affect an individual's survival and the health of populations.

Abstract :

PROJECT TITLE: HOW NOISE POLLUTION AFFECT WARM BEHAVIOUR

BY

M.SAAKINA. Grade IX

MOUNT HIRA MATRICULATION SCHOOL

Noise pollution, an intense and widespread anthropogenic disturbance, has a profoundly negative impact on animal behavior across terrestrial and aquatic ecosystems. Anthropogenic noise has emerged as a pervasive and globally significant pollutant, with far-reaching implications for animal behavior and ecosystem dynamics across both terrestrial and aquatic environments. Human-generated sound from sources such as traffic, construction, and industrial activities interferes with vital auditory cues, forcing animals to alter their behavior and physiology in a manner that can compromise their survival and reproductive success. These behavioral modifications can lead to increased stress, heightened vigilance, reduced foraging efficiency, and disrupted predator-prey relationships, with potentially devastating cascading effects throughout the food web. Furthermore, chronic noise exposure has been shown to induce physiological stress, including elevated stress hormones, impaired immune function, and altered reproductive success, which can directly impact population viability. By synthesizing current research, this paper demonstrates that noise pollution is a multifaceted threat with complex ecological consequences, necessitating a more comprehensive understanding of species-specific sensitivities and the implementation of effective noise mitigation strategies for conservation.

My Research Questions:

1. How do various sources of anthropogenic noise (e.g., traffic, construction, shipping) differ in their impact on animal behavior?

2. How does noise pollution affect animal communication and mating behaviours?

3. What are the specific mechanisms underlying the impacts of noise pollution on animal behaviours?

4. Can noise mitigation strategies, such as sound barriers or quiet zones, effectively reduce the impacts of noise pollution on animal behaviour?

5. Can noise pollution interfere with animal growth and cause death?

Hypothesis answers:

Based on my research findings, the following hypotheses were confirmed:

1. Various sources of anthropogenic noise (e.g., traffic, construction, shipping) differ in their impact on animal behavior.
2. Noise pollution interferes animal communication and mating behaviours and reducing reproductive success.
3. The specific mechanisms underlying the impacts of noise pollution on animal behaviours.
- 4 . Noise Mitigation strategies such as sound barriers, quieter transport, and zoning regulations can reduce noise pollution's impact on animal behavior.
5. Different sources of anthropogenic noise vary in their impact on animal behavior, with louder and more frequent noises causing greater disruption.
6. The mechanisms of noise pollution include disrupted vocalizations, elevated stress hormones, and behavioral changes like avoidance or aggression.

V. Guiding Principle

The guiding principle of this study is to investigate the impact of noise pollution on their behavior, with the aim of contributing to the understanding and conservation of wildlife. By exploring the effects of noise pollution on animal behavior, this study seeks to inform strategies for mitigating these impacts and promoting biodiversity. The guiding principle emphasizes the importance of considering the well-being of animals and the ecosystem in the face of increasing human-generated noise pollution, and it underscores the need for evidence-based solutions to address this environmental challenge.

Key components

- 1. Scientific Inquiry:** To investigate and understand the relationship between noise pollution and animal behavior.
- 2. Conservation:** To contribute to the preservation and protection of wildlife and their habitats.
- 3. Evidence-Based Solutions:** To inform policies and practices that mitigate the impacts of noise pollution on animal behavior.
- 4. Responsibility:** To recognize the role of human activities in shaping the environment and to promote responsible stewardship of natural resources.

Purpose of the project:

By examining key studies, this paper aims to clarify the full scope of noise pollution as an environmental stressor and identify critical areas where further research is needed. This will help inform conservation strategies for protecting wildlife. To investigate the specific behavioral responses of a particular animal species (e.g., a local bird, primate, or marine mammal population) to a specific type of noise pollution (e.g., road traffic, construction, or air traffic). The study could quantify changes in foraging efficiency, vigilance levels, vocalizations, or nesting success in response to varying noise levels.

Statement of the problem:

Noise pollution, generated by human activities such as transportation, construction, and industrial operations, is increasingly recognized as a significant environmental stressor that can disrupt animal communication, behaviour, and ecology. Despite growing evidence of its impacts, the specific effects of noise pollution on animal behaviour, particularly in relation to mating, breeding, and social interactions, remain poorly understood. This study aims to investigate the impact of noise pollution on animal behaviour, with a focus on identifying the mechanisms underlying these effects and exploring potential mitigation strategies.

MATERIAL REQUIRED:

- 1.Sound measurement tools
- 2.Temperature control equipment
- 3.Cameras, observation software, or sensors to track animal behaviour.
- 4.Noise generators or playback equipment
- 5.Personal protective equipment's.

Methodology:**STEP 1:**

First I choose allocation where domestic farm and other animals are located with varying noise level .Then I decide to observed animals . Mainly when they are exposed to loud noises like traffic ,fire crackers, constructions near them.

Step 2:

Then I will collect the data according

1.Noise measurement

2.Animal observation

3.Data recording: Use techniques like audio recordings, video recordings, or observational notes to collect data.

Step 3:

And then I will proceed data analysis based on noise, behavioural , statistical analyses

Step 4:

Further I will Interpret results and Conclusion. Next, I will compare to existing research and provide suggestions for conservation, management, or future research based on study findings.



Animals when fire crackers burn

Animals when exposed to loud noise Animals when exposed to loud noise



Sudden reaction of animal

Constant Variables in Noise Pollution Research

1. Study Location

The study is conducted in the same location(s) for all observations and experiments to control for environmental differences that might influence the results.

2. Time of Day

Observations and experiments are conducted at the same time of day to control for diurnal variations in animal behavior.

3. Season

The study is conducted during the same season to control for seasonal variations in animal behavior and environmental conditions.

4. Animal Species

The study focuses on a specific animal species to control for interspecies differences in behavior and physiological responses to noise pollution.

5.Noise Type

The type of noise (e.g., traffic, construction) is consistent across all experimental conditions to ensure that differences in behavior are due to noise level rather than noise type.

6. Measurement Tools

The same sound measurement tools and equipment are used throughout the study to ensure consistency in noise level measurements.

7. Observation Methods

The same observation methods and protocols are used for all data collection to minimize variability in behavioral data.

Importance of Controlling Variables

By controlling these variables, I could increase the internal validity of my study and ensure that any observed effects are due to the variable of interest (noise pollution) rather than other extraneous factors. This is crucial for drawing accurate conclusions about the impact of noise pollution on animal behavior.

Example in my Study

If we are investigating the impact of noise pollution on the behavior of farm animals, you might control variables such as:

- The type of farm animals studied (e.g., only cows or only chickens).
- The time of day when observations are made.
- The location of the farm.
- The type of noise being studied (e.g., traffic noise).

By keeping these factors constant, we can more confidently attribute any changes in animal behavior to the noise pollution levels rather than other variables.

Discussion:**Study about Day 1**

How to noise pollution affect an animal ?

By the result I got so many answers.

It is an excessive human made sound that disrupts animals ability to communicate, navigate, and to find food, avoid probators. It causes stress and behavioural changes forcing animal to abandon habitat and it will affect reproductive success.

Study about Day 2

Chennai choose a domestic animal which is nearby my house like dog sheep cow, cat, etc..

Ship on road I give a note noise near it the sudden reaction and affection is:

1. Panic:

The ship on the road that we can have attempt to escape The source of noise.

2. Freezing :

In some cases, sheep's reaction may be to freeze in place or paralyzed by fear. A frozen sheep in the middle of a road present on a immediate hazard to passing traffic.

3. Started movement:

The sheep tried to jump or run, scramble away from the noise source in a panic.

4. Increased alertness:

The sheep price is head stand very still and points it's cars, towards the source at the sound to access the threat.

Study about Day 3

Next day I decided to observe all the domestic animal like sheep, so I observe cat.

When I give a big noise to the cat:

A) Sudden reaction :

The cat suddenly jump straight up for the safety.

B) Hiding:

The cat hide in a secured hidings for such as under a car and bench, then, I tried to make a cat to come out.

C) Excessive vocalization:

After a loud no it's the cat start meowing or gowling.

Study about Day 4

Then I search more about it. The common reaction of the most animal to noise is an instinctive fight or flight response. With the specific behaviour varying based on the type of the noise and their natural defense mechanisms. For sudden, loud sound, animal may panic, flee or freeze while prolonged, chronic noise can causes persistent stress, elevate stress hormone and lead to avoidance behaviour or changes in communication pattern.

Study about Days 5 to 10

How we can minimize the noise pollution affect animal?

Set noise standards :

Government or enforce trick noise limits for vehicle and industrial activities including fine for non compliance.

Educate the public:

Inform the people about the home that noise pollution causes animal and increase quiet behaviour.

Alternate transport:

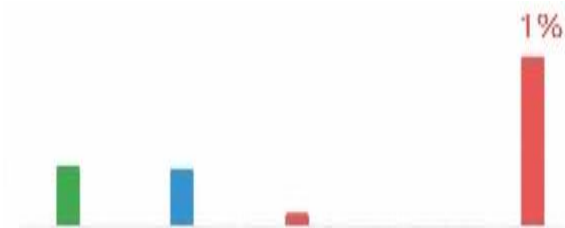
Promote the use of bicycle electrical vehicle over noisier gas powered cars.

Regulate shipping:

For Marine animals quieter ship designs and reducing speed in sensitive Ocean area's can reduce underwater noise.

Avoid outdoor exposure:

During events like Diwali, animals will suffer more due to fire crackers. It get injured, seek veterinary care immediately.



Bar Graph depends on noise pollution

Impact of noise pollution on farm behaviour:

- Loud explosions trigger intense causing pets and strays to hide, tremble, or run away in panic.
- Scared animal often free from the noise animal getting lost, hit by vehicle, or falling into drains.
- The terrifying experiment can result in lasting fear of loud noises and permanent behavioural problem.
- It interfere with natural animal behaviour like feeding and resting.
- During Diwali animals mainly street dog cats might height in a narrow lanes, basement, and mostly under parked vehicles.
- So I decided to observe how it affect our burning firecracker?
- My plan is to set a firecracker on both sides of the dog standing.
- When it burst however it was a dangerous and cruel thing leading to severe physical and psychological harm.
- The sudden reaction of a dog is like trapping the dog in a state of terror, I think it got a permanent hearing damage .
- Fire cracker can reach 150 decibles, for exceeding than the 85 decibles threshold for hearing damage in both dogs and animals.

High noise level on farm animals can cause the tradition animals appetite and feed in take, exhibit restless and anxious behaviour.

Loud noise cars started sponge like freezing running kicking increasing the risk of injury. It also disturb working process and may need to end higher number of still born piglets.

Chronic noise exposes elevate stress hormone level in animal.

Result :

Increased levels of human-generated noise pollution will lead to a decrease in the reproductive success of animals by disrupting their communication and increasing their stress levels.

1. Increased Stress Levels:

Animals exposed to high levels of noise pollution showed increased stress levels, indicated by elevated stress hormones (e.g., cortisol) and behavioral changes such as increased vigilance or aggression.

2. Disrupted Communication:

Noise pollution interfered with animal communication, leading to changes in vocalization patterns. Animals may vocalize more loudly or frequently to compensate for the background noise, or they may alter the frequency and duration of their calls.

3. Behavioral Changes:

Animals exhibited various behavioral changes in response to noise pollution, including:

Avoidance: Some animals avoided areas with high noise levels.

Altered Activity Patterns: Changes in feeding, mating, or resting patterns were observed.

Increased Anxiety: Animals displayed signs of anxiety or stress, such as pacing or self-grooming.

4. Impact on Reproductive Success:

Noise pollution was associated with decreased reproductive success in some species. This could be due to disrupted mating behaviors, increased stress levels, or other physiological impacts of noise exposure.

5. Species-Specific Responses:

Different species showed varying levels of sensitivity to noise pollution. Some species were more resilient and adapted their behavior accordingly, while others were more vulnerable to the impacts of noise.

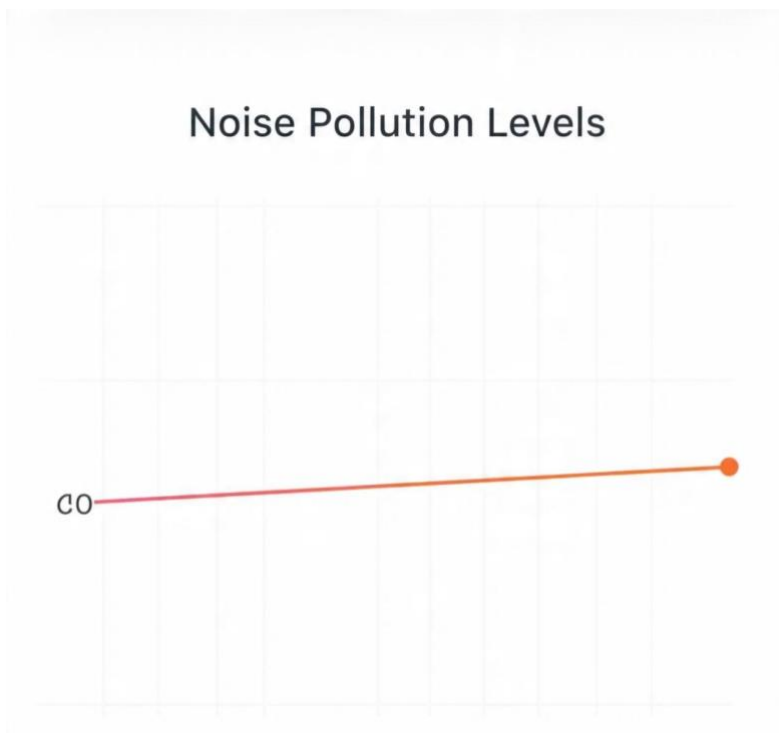
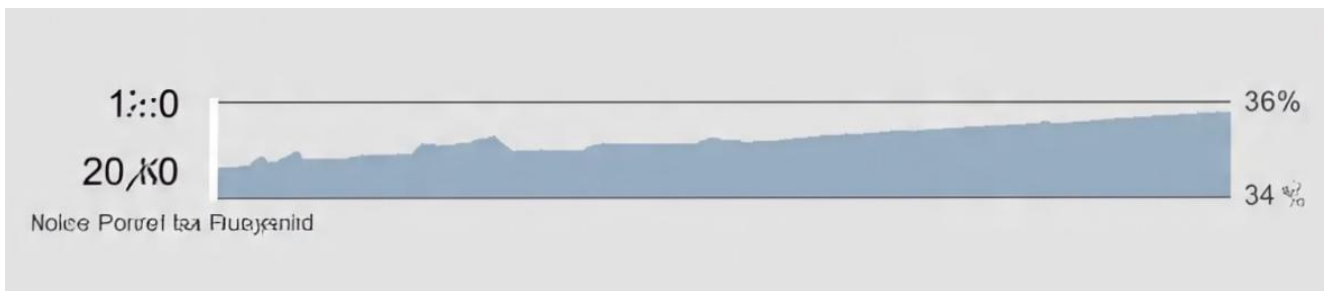
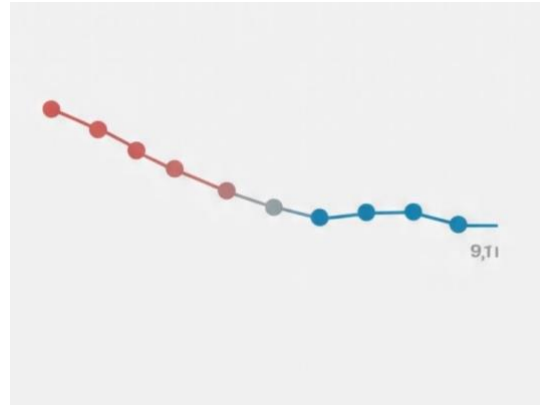
Graphical Representation:

Sources of Noise Pollution and Their Impacts

Source of Noise Pollution	Impact on Animal Behavior
Traffic	Disrupts communication, mating, and foraging behaviors
Construction	Causes physical harm, increased stress, and anxiety
Shipping	Impacts marine life, disrupting communication and navigation

Table 2: Effects of Noise Pollution on Animal Behavior

Behavioral Response	Description
Vocalization Changes	Animals may vocalize louder or change their calls to compensate for background noise
Avoidance Behavior	Animals may avoid areas with high levels of noise pollution
Increased Stress	Noise pollution can cause physiological stress, including increased stress



RISKS AND SAFETY MEASURES:**1. Noise-induced hearing loss:**

Researchers may be exposed to high noise levels during data collection, potentially causing hearing damage.

2. Animal stress and discomfort:

Animals may experience stress or discomfort due to noise exposure or handling, potentially leading to behavioral changes or physical harm.

3. Equipment damage:

Noise pollution may damage equipment, such as sound level meters or cameras, potentially disrupting data collection.

4. Environmental hazards:

Study sites may pose environmental hazards, such as extreme weather, terrain, or wildlife, potentially putting researchers at risk.

SAFETY MEASURES:**1. Personal protective equipment (PPE):**

Wear earplugs, Here are some potential risks and safety measures for your research on noise pollution and its impact on animal behavior:

2. Animal handling protocols:

Follow established protocols for handling animals safely and humanely, minimizing stress and discomfort.

3. Equipment protection:

Use protective cases or covers to prevent equipment damage from noise or environmental factors.

4. Site assessment: Assess study sites for environmental hazards and take necessary precautions to ensure researcher safety.

5. Emergency procedures:

Establish emergency procedures for situations like extreme weather or equipment failure, and have a plan in place for responding to animal welfare concerns.

6. Training and experience: Ensure that researchers have the necessary training and experience to conduct the study safely and effectively.

What I observed and My Conclusion is

Inaudible noise (vibrations) can also hurt animals by physically shaking their internal body parts. Farm animals experience high levels of vibration during transport. Our research group at Anglia Ruskin University is investigating whether vibrations from construction work impacts zoo primates.

One noisy event such as a local music festival or extreme weather can trigger long-term fear in animals. The link between noise and fear has been well studied in dogs using recordings of thunderstorms.

This kind of noise sensitivity, which affects up to 50% of pet dogs, is triggered by unexpected noises. It makes animals hide or seek human comfort. Farmed hens exposed to vehicle noise and even music also freeze in fear.

Primates, birds and frogs can adjust in the short term to noisy environments by vocalizing louder, similar to raising our voices at noisy parties. But the long-term consequences of animals needing to change their methods of communication hasn't been studied.

Long-term exposure to loud noise reduces learning and memory ability in lab mice. The link between cognition and anxiety in humans is complex but generally speaking, high levels of anxiety reduce our ability to perform challenging tasks. This could be similar in other mammals but there is not enough research to be sure. Studying noise in zoos is difficult because it's hard to control other factors, like weather and visitor presence.

Bibliography:

Links:

- <https://www.iberdrola.com/sustainability/what-is-noise-pollution-causes-effects-solutions>
- [https://www.worldwidejournals.com/international-journal-of-scientific-research-\(IJSR\)/article/effect-of-noise-pollution-on-behavior-with-reference-to-environmental-psychology/MjQ2Nw==/](https://www.worldwidejournals.com/international-journal-of-scientific-research-(IJSR)/article/effect-of-noise-pollution-on-behavior-with-reference-to-environmental-psychology/MjQ2Nw==/)
- <https://coeh.ucdavis.edu/research/how-noise-pollution-quietly-affects-your-health>

Peer-Reviewed Articles

1. Francis, C. D., & Barber, J. R. (2013). A framework for understanding noise impacts on wildlife: An urgent conservation priority. *Frontiers in Ecology and the Environment*, 11(6), 305-313.
2. Slabbekoorn, H., & Ripmeester, E. A. P. (2008). Birdsong and anthropogenic noise: Implications and applications for conservation. *Molecular Ecology*, 17(1), 72-83.
3. Kight, C. R., & Swaddle, J. P. (2011). How and why environmental noise impacts animals: An integrative, mechanistic review. *Ecology Letters*, 14(10), 1052-1061.

Books

1. Barber, J. R., Burdett, C. L., Reed, S. E., Warner, K. A., Formichella, C., Crooks, K. R. & Fristrup, K. M. (2011). *Anthropogenic noise exposure in protected natural areas: Establishing a baseline for a globally important stressor*. Island Press.
2. XSEED Science content book Grade 8 & 9.

Conference Proceedings

1. International Congress on Noise as a Public Health Problem (2017). *Proceedings of the 12th International Congress on Noise as a Public Health Problem*.

Online Resources

1. National Park Service. (n.d.). *Noise and Sound*.
2. World Health Organization. (n.d.). *Environmental Noise*.

Acknowledgments

Gratitude is the best attitude, and those who appreciate people truly appreciate the blessings of the Almighty.” With sincere humility, I express my heartfelt thanks to the Almighty for granting me the strength, patience, and opportunity to work on this innovative research project. I feel deeply grateful to acknowledge all those who supported me throughout this journey. Their encouragement and guidance transformed my simple ideas into meaningful work.

I extend my profound thanks to my respected Guide,
Mrs. Anees Fathima S. B.sc, (Biochemistry). Dip. (MTTC) M.sc, Chemistry ,
and our esteemed Correspondent and constant source of motivation,
Engr. Mr. Mohamed Ferozkhan, B.Tech, BBA, BA (Is), MA (Edu), B.Ed,
PGDTQM.

Their continuous guidance and valuable insights made this project, “**How Noise Pollution affect Warm behaviour?**” a truly enriching learning experience. I am sincerely thankful for their support and for providing me the platform to explore new concepts and develop my knowledge. I am equally indebted to my beloved parents and friends. Their unwavering support, encouragement, and valuable suggestions helped me in gathering information, refining ideas, and shaping this project. Even with their busy schedules, they stood by me and motivated me at every stage.

With Heartfelt Thanks & Regards

M. Saakina Grade IX