ERASURE IN ENVIRONMENTAL SCIENCE BOOKS: AN ECOLINGUISTIC ANALYSIS

BY

WAGMA FAROOQ

NATIONAL UNIVERSITY OF MODERN LANGUAGES

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Erasure in Environmental Science Books: An Ecolinguistic Analysis

By

WAGMA FAROOQ

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English Linguistics
Name of Discipline

Dr. Hazrat Umar
Name of Research Supervisor

_____
Signature of Research Supervisor

Dr. Muhammad Uzair
Name of Dean (FAH)

_____
Signature of Dean (FAH)

Prof. Dr. Muhammad Safeer Awan
Name of Pro-Rector Academics

_____
Signature of Pro-Rector Academics

_____
Date

AUTHOR'S DECLARATION

I Wagma Farooq

Daughter of Muhammad Farooq

Registration # NUML-F19-10119

Discipline English Linguistics

Candidate of **Master of Philosophy** at the National University of Modern Languages do hereby declare that the thesis **Erasure in Environmental Science Books: An Ecolinguistic Analysis** submitted by me in partial fulfillment of MPhil degree, is my original work, and has not been submitted or published earlier. I also solemnly declare that it shall not, in future, be submitted by me for obtaining any other degree from this or any other university or institution.

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ABSTRACT

Title: Erasure in Environmental Science Books: An Ecolinguistic Analysis

This study analyzes the use of the strategy of erasure in three environmental science books. These environmental science books draw on various linguistic resources to construct erasure of the ecosystem and animals from consciousness. Stibbe's (2015) theoretical framework has been used as a lens to study erasure in the texts. He asserts that the natural world is marginalized in texts through the use of certain linguistic strategies; these strategies run throughout the whole discourse to construct the erasure of the ecosystem. Stibbe mentions nine linguistic strategies for the construction of erasure in environmental discourses. These strategies are passive voice, nominalisation, co-hyponymy, hyponymy, metaphor, metonymy, construction of noun phrases, transitivity patterns and massification. The researcher has looked for the aforementioned linguistic strategies in the discourses to see how the erasure of the ecosystem has been constructed. Through the analysis of these linguistic strategies, she has identified erasure of the ecosystem at three levels: complete omission (void), partial omission (trace) and misrepresentation of the reality (mask). It is argued that all these strategies are repeatedly used in environmental texts to construct erasure at the three levels-void, mask and trace. The frequency of the occurrence of these devices varies across the books. The study suggests a new way to look at the language of ecological discourses and proposes further studies on how the use of euphemistic language in these discourses can negatively influence readers.

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ACKNOWLEDGEMENTS

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DEDICATION

This thesis is dedicated to my mother and sisters, whose endless support and help in taking care of my son led to the completion of the study. Without their support, I might have never been able to materialize it.

CHAPTER 1

INTRODUCTION

Environmental deterioration is a grave issue of the present time that requires dire individual and collective action. Educational discourse about the issue is pivotal in raising awareness about environmental hazards. Mliless et al. (2018) define environmental education (EE) succinctly, "… EE prepares environmentally conscious students with environmental values that permit control and restraint of behavior towards the degradation of nature" (p.103). Investigating the language of educational discourse through the lens of ecolinguistics has become a growing need of the day. Analyzing the ideology of a text shows whether the ideology encourages people to preserve the environment or destroy it. Ecolinguists judge the ideology of discourses against their own ideologies (Stibbe, 2015). The ideologies of a text are judged through the linguistic patterns that run throughout the text. One such linguistic strategy is erasure- the absence or marginalization of participants or events from a text.

1.1 Environmental Studies

As the name suggests, environmental studies study the environment, and the elements present within it. These elements constitute the living components such as animals, birds, fish and plants and the non-living components such as landmasses, water bodies and air. The New Zealand Environment Act of 1986 defines environment as consisting of:

a) ecosystems and their constituent parts;

b) all natural and physical resources;

c) the social, economic, aesthetic and cultural conditions that affect the environment or are affected by changes to the environment (Ministry for the Environment, 2021).

Wright and Boorse (2017) propose that environmental science is the interaction and the interrelation between humans and the earth. By earth, all the living and non-living aspects of the environment are meant, excluding humans. It is studied how

humans and their activities affect the environment to curb the ecologically derogatory activities of humans. Another definition of environmental science is, “Environmental science is a group of sciences that attempt to explain how life on the Earth is sustained, what leads to environmental problems, and how these problems can be solved” (Botkin & Keller, 2011, p. vi).

1.2 Environmental Education

Environmental education has been introduced in the curriculum of secondary and higher education worldwide to address environmental issues and create awareness about them and their consequences for the environment. Environmental education is also called ecological or home education (Al- Jamal, 2014). Environmental education is defined as students’ consciousness and concern towards environmental problems (UNESCO, 1976).

EE plays a significant role in instilling environmental consciousness in students and preparing them to develop skills and abilities that would aid in rebuilding the damaged environment. Mliless (2018) argues that countries have taken up the task of incorporating education on the environment in the curriculum. These steps have been taken as an outcome of the United Nations Conference on the Human Environment initiative, which laid in its principles that EE must be incorporated within education to make students aware of the challenges of the environment (UN, 1972, p. 5). Later, in June 1992, the United Nations Conference on Environment and Development held in Rio furthered that EE should be integrated into textbooks to sensitize students towards environmental challenges. In the same vein, the Second International Conference on Education and Environment Training held in Moscow in 1987 maintains that EE falls under sustainable development since it is an efficient educational tool for the betterment of the environment and society. Similarly, in the National Environment Policy 2005 of Pakistan, certain guidelines for integrating environmental issues in education are laid out. It mandates that environmental education be incorporated into all levels of syllabi from the primary level to the university level; environmental education and training institutes should be established, and the establishment of environmental clubs be encouraged in all educational institutions. Likewise, the National Education Policy of Pakistan 2009 provided educational policy action by stating that “[e]nvironmental Education shall be made an integral part of early

education" (Ministry of Education, 2009, p. 45). EE concepts like energy, greenhouse effect, pollution, recycling, and ecosystem are incorporated in the science curriculum of the primary and secondary classes worldwide. Also, Islamic studies, Urdu, English and social studies books carry chapters on the environment (Ijaz, 2015). Moreover, Pakistan has also introduced a four-year Bachelor's degree in Environmental Education, which is offered by several universities all over Pakistan. However, environmental science texts are also critiqued for their language, which does not sensitize students towards their role in degrading the ecosystem.

Researchers have critiqued environmental sciences' textbooks on their inability to promote students to take actions against the pressing issue of environmental degradation. Ghouati (2012) contends that the inclusion of EE in the Algerian textbooks is not properly structured, which did not give due worth to its content. Learning activities focus more on giving information than helping the learners develop attitudes and skills that would lead to positive environmental behaviors and actions (El Moussaouy, Abderbi, & Daoudi, 2014). In the same context, Zerrouqi et al. (2016) conducted a study and analyzed that Moroccan earth science textbooks did not properly and sufficiently portray pollution. The focus is on regional pollution, while little heed is paid to global pollution.

For the last five years, climate change has become a pressing issue with innumerable consequences for Pakistan. Rasul et al. (2012) put forth, "Pakistan is one of the most vulnerable countries to the consequences of the climatic change because of its diverse geographical and climatic features" **(**Foreword**).** Pakistan is one of the most affected countries from climate change as Pakistan's annual mean temperature has risen by 0.5 $°C$ over the last 50 years (Chaudhry, 2017). This has increased extreme weather events such as floods, droughts, glacial melting, cyclones, forest fires and heat waves. These weather events have proved perilous to both life and property and have also hampered the country's economic growth. To address the growing environmental issues in Pakistan and worldwide, environmental education has become a compulsory part of the curriculum in Pakistan. EE sheds light on the environmentally harmful activities of humans and what needs to be done to curb them (Nkwetisama, 2011). However, certain loopholes have been highlighted by Stibbe in his 2015 publication in the language of the environmental science discourses, whereby students are not sensitized towards their destructible role in the ecosystem.

1.3 Ecolinguistics

Ecolinguistics is a flourishing field, which studies the interrelationship between language and the ecosystem. Haugen (1972, p. 325) defines "ecology of language" and "language ecology" as "the study of interactions between any given language and its environment." The terms "ecolinguistics" and "language and ecology" appeared for the first time in this book. Since then, the field has been flourishing, incorporating studies on the interdependent relations between language and ecology.

Language penetrates every aspect of life and, thus, can be analyzed from different vantage points. One of these standpoints is ecolinguistics, the "study of language according to the environment it is used in" (Derni, 2008, p. 22). The environment includes all living and non-living elements of nature: mountains, oceans, plants, crops, water and human beings.

Ecolinguistics is a combination of two dissimilar concepts- ecology and language. Stibbe (2014) claims that there is no disconnection between the two concepts; ecology is the interaction of humans with other living organisms and the natural environment. Central to the existence of humans is language since it is through language that humans interact with each other and the ecosystem; therefore, language and ecosystem are not unconnected disciplines. It is through the lens of language that humans understand the world. Language influences the way we think about the world, and consequently, we act accordingly. Therefore, "language can inspire us to protect or destroy the ecosystems that life depends on" (Wu, 2018, p. 646). The role of ecolinguistics is evident here. It is the study of linguistic patterns within discourses that may lead to ecological destruction or protection. Ecologically destructive language is critiqued, while the language used for ecological protection is encouraged and promoted.

Wu (2018) puts forth that ecolinguistics focuses on discourses that influence the way humans interact with the ecosystem. Such discourses include themes of "environmentalism, ecology, and biological conservation." However, these discourses are not the only focal point of ecolinguistics; they also include analysing ecologically destructive discourses like "animal industry handbooks, lifestyle magazines and

economic textbooks" (p. 648). Although there is no mention of environment and nature in these discourses, they are still studied from an ecolinguistics perspective because this absence of the environment makes them ecologically destructive. With respect to this, Stibbe (2014) mentions that ecolinguistics primarily focuses on the effect of discourses on the environment, such as discourses on "consumerism, advertising or economic growth" even though they do not specifically and explicitly talk about the ecosystem or the environment (p. 2). The paradigm of ecolinguistics is thus applied to the pressing issues of "environmental justice, water scarcity, energy security, and, in general, the gradual destruction of the ecological systems that support life" (Stibbe, 2014, p. 2).

One of the tasks of ecolinguists is to analyze how the natural world has been misrepresented as an inanimate object devoid of life and consciousness. Animals are shown as objects, excluding the elements of life and consciousness out of them. This type of objectification is employed in scientific discourses on animal experimentation where animals are mere specimens for experimentation; thus, they are worthy of exploitation. Such ecologically destructive discourses are the main focus of ecolinguistics; the language in such discourses is analyzed to see how a destructive ideology has been upheld. Likewise, Fill (2009) proposes that the strategy of distancing is used in certain discourses whereby animals are portrayed as inanimate objects, thus distancing them from the living and conscious human. Distancing aids in furthering ecologically destructive activities like poaching whereby humans do not feel any moral obligation towards these "inanimate objects". The strategies that achieve objectification and distancing have been termed "euphemizing strategies" (Fill, 2009, p. 430).

The values and culture of a society are shaped by the dominant discourses and the ideologies they uphold. Institutions like the government, media, army, industries and academia produce these dominant discourses. These dominant discourses construct a society and its ideologies. Usually, discourses are ecologically destructive, and it has been so much embedded in our systems that we tend to believe that this is how reality is. Such discourses become a part of the mainstream way of living and thinking (Stibbe, 2012). Thus, a paradigm, such as ecolinguistics, is imperative to deconstruct the ecologically destructive ideologies and construct ecologically harmonious ideologies where humans and the natural world can co-exist in harmony.

Ecolinguits identify ecologically destructive discourses and look for and present alternatives whereby "counter" discourses are presented that build a reconnection with the natural world. Counter discourses are still representations but vivid ones (Stibbe, 2012). In his own words, Stibbe (2012) remarks, "Although alternative discourses are still representations, they could provide "an image of a profound reality" (in Baudrillard's terms) rather than a "simulacrum," and encourage readers to interact more directly with the natural world simply by encouraging them to lift their eyes from the page and view the world in a new way" (p. 4). Where it is possible to erase the natural world and animals from discourses, it is also possible to reintroduce them in discourses and bring them to the forefront.

1.4 Erasure in Ecolinguistics

Erasure, as Stibbe (2015) defines, "is a story in people's mind that an area of life is unimportant or unworthy of consideration" (p. 146). It is done through the systematic suppression, backgrounding or marginalization of a participant, an event or an area of life throughout the discourse. In ecolinguistic analysis, it is seen how the ecosystem is erased or marginalized in texts, which creates alienation from it. Stibbe (2015) declares that erasure is analyzed within the sentences of a text, and it is seen how something, which is existent in reality, has been eliminated. Erasure is achieved by using certain linguistic devices and strategies that exclude, background or distort the reality in the texts (Stibbe, 2015). However, it is to be borne in mind that these linguistic devices run throughout the text, thereby constructing erasure.

Stibbe (2014) adds that erasure is intrinsic to discourses, i.e. discourses will always be partial and, thus, will bring certain aspects into the limelight and sideline the others. It is through the concept of re-minding that erasure becomes meaningful. Re-minding is a process in which it is analyzed that a certain aspect has been excluded from the text and that it is imperative to bring it back. Thus, erasure and re-minding go hand in hand and can only attain full meaning when studied together.

There are three types of erasure patterns prevalent in discourses (Stibbe, 2015). The first is 'the void', which is the complete erasure of an entity or an event from a text. The second type is a very important and prevalent form of erasure-the mask. In

this type of erasure, the true nature of an entity is erased, and a distorted version of it is represented in discourses. Concerning the third type of erasure, Stibbe (2014) declares, "When discourses include mention of 'something important' but still manage to erase it by representing it in a vague, weak or abstract way, then this is the third type of erasure, which we will call 'the trace' " (p. 4).

The erasure of an entity or an event takes place at the lowest level of a text, which is the sentential and the clausal level. Through the use of varied linguistic strategies, something of importance is erased from individual sentences and clauses. Building up, the entity is then erased from multiple sentences, which leads to erasure at the level of the whole text or discourse. It is this level that is of concern since discourses leave an impact on readers (Stibbe, 2014). Erasure at the individual clausal or sentential level does not impact the readers; it is erasure patterns at the level of discourse that affect the readers. Stibbe (2015) has set out nine linguistic devices that construct erasure in discourses: passive voice, nominalisation, hyponymy, co-hyponymy, transitivity, massification, metaphors, metonymy, and construction of noun phrases.

In an ecolinguistics analysis, as in critical discourse analysis, linguistic devices are not analyzed in isolation; rather, it is seen how linguistic devices "*cluster together* to model the world in particular ways" (Stibbe, 2012, p. 5). In this context, Stibbe (2012) analyzes animal's industry discourses and points out a number of linguistic strategies used that systematically erase animals. He purports, "…animal industry discourses use the pronoun *it* to refer to animals, use expressions that represent animals as machines, use the passive to hide the agent of the killing, and use a range of other features that combine to model a world where animals are constructed as objects" (p. 5). Therefore, it is the combination of all these strategies that erase the natural world and animals from discourses.

Stibbe (2012) puts forth that slowly animals are disappearing from discourses and hence from our consciousness. He argues, "When animals are erased, what we are left with are signs: words, pictures, toys, specimens, beeps on radio receiver" (p. 2). Animals become what Baudrillard (1994) has termed "simulacra" – a duplicate without an original, implying that the original animal eventually fades away and what we are left with in our consciousness is only a distorted imitation of the true animal.

In the same context, Glenn (2004) declares that the representation of animals in advertisements is two-fold: firstly, the "speaking animals" seem to sell the products that their bodies make in brutal conditions and secondly, the victim animals are represented as non-living and are thus veiled.

The euphemistic use of language also serves to hide the reality of the natural world. Smith-Harris (2004, p. 15) adds that instead of using refined expressions like "euthanizing companion animals" and "eating pate´" if more realistic expressions like "killing cats and dogs by lethal injection because no one wanted them" and "eating the swollen liver of a force-fed goose" were used, it would become easier to sympathize with the animals.

1.5 The Statement of Problem

In the past few decades, the ever-increasing technological advancements have led to an acceleration in ecological destruction. However, it has become a neglected subject, which in turn has led to alienation from the environment. To counter this approach, textbooks on environmental issues have become a compulsory part of the curriculum at the undergraduate level. The objective of these textbooks is to make students aware and sensitize them towards these issues. However, these textbooks euphemize language in a way that students are not sensitized towards their role in environmental degeneracy. One of the ways to euphemize language is through erasure. The linguistic strategies employed to erase the environment from these textbooks have not been explored yet. The current study has thus analyzed the linguistic strategies that construct the erasure of the ecological world from these books.

1.6. Research Objectives

1. To investigate the presence or absence of erasure and Stibbe's categories of erasure (void, mask and trace) present within the texts.
2. To examine Stibbe's linguistic strategies of erasure in the selected books.

1.7. Research Questions

1. How far is erasure used within the environmental science books?
2. What linguistic strategies are used for erasure in the given texts?

1.8. Significance of the Study

The current study has provided an understanding of the language strategies used by authors in ecological texts. It will make the readers aware of the phenomenon of euphemizing or hedging of language to override explicitly. By doing so, the readers can construe the implied meanings of such texts and create a sensitivity towards the issue being discussed.

Moreover, such a study may aid authors in realizing the extent to which their euphemized language may negatively influence readers. Such a language is unfitting for the grave issues of climate change and ecological degradation. Shedding light on this aspect may help in dysphemizing the language of these books in the future.

In addition, the study has analyzed the environmental texts through the lens of Stibbe's erasure model (2015). The model, in its entirety, has not been previously employed by any researcher on such texts. Thus, the study will suggest a new approach to researchers to explore language in such texts.

1.9. Delimitations of the Study

Three environmental science books recommended by HEC for the environmental science undergrad program have been chosen to analyse erasure. The books have been recommended for the course of *Introduction to Environmental Science* in the first semester of the environmental science undergrad program. A total of four books have been recommended by HEC. The books are as follows:

1. *Environmental science: Earth as a living planet.* (Botkin & Keller, 2011)
2. *Environmental science: Towards a sustainable future.* (Wright & Boorse, 2017)
3. *Environmental science: Working with the Earth.* (Miller, 2006)
4. *Environmental Science: Systems and solutions.* (McKinney, et al. 2013)

The first three books have been chosen for analysis by the researcher. The number of books has been delimited to three due to space and time constraints. Erasure has only been explored in the language of the books through the linguistic strategies given in the framework of Stibbe (2015). Only textual analysis has been carried out due to space constraints. Lastly, the researcher has employed only the ecolinguistic model of erasure of Stibbe on these textbooks to explore it in detail.

1.10. Organization of the Study

The chapter breakdown of the thesis is as follows:

Chapter 1: Introduction

The first chapter is that of introduction, which has dealt with the introduction of my research topic, explained key words and has given a brief summary of how research has been carried out. It has taken into consideration the basic theories, concepts and also highlighted the key themes. It also constitutes a statement of the problem, which is the heart of any thesis. It also postulates research questions, delimitations, significance and rationale of this study.

Chapter 2: Literature Review

This chapter has incorporated the literature review of the current research study. It has examined and critically read different approaches, theories and studies conducted relevant to my topic. It has also included the works already done related to my research study. It has specifically examined studies that are somewhat similar to my research study to fill a gap and ensure that the topic I have selected is not explored before.

Chapter 3: Research Methodology

Chapter three consists of the research methodology. It is also considered as the research strategy which elicits phases and techniques of my research. This research has underpinned a critical framework of my research study. It has elaborated concepts, argued the theory and the different variables and assumptions.

Chapter 4: Analysis

This chapter has included the analysis of the textual data in the light of the theoretical framework.

Chapter 5: Conclusion

Chapter five has discussed the conclusion and results obtained from the research. It has also briefly summarized the whole study and discussed the findings of the study.

CHAPTER 2

REVIEW OF LITERATURE

2.1 Introduction

Ecolinguistics-the study of the interrelationship of language and ecosystem- is the analysis of the linguistic patterns within a discourse to explore how they may lead to ecological destruction or protection. Stibbe (2015) maintains that these discourses provide the "stories we live by" (p. 1), whereby stories refer to the values and perceptions we hold about the world. The text of the discourses can be linguistically analyzed to find out how and what ideologies are embedded within it. These ideologies can then be "questioned from an ecological perspective" (Stibbe, 2015, p. 2). The two ideologies prevalent within the discourse of ecolinguistics are constructive ideology and destructive ideology, i.e. whether a certain text contributes to the preservation of the ecosystem or its degradation. Destructive ideologies could be constructed through the utilization of erasure, which is the marginalization or othering of the natural world in discourses. Such sidelining of nature removes it from the consciousness of the reader. Therefore, this section has dealt with the concepts related to ecolinguistics, the importance of environmental education, the loopholes found in it, and how language has been euphemized in them through erasure.

2.2 Climate Change

Climate change has become a pressing issue with innumerable consequences for humans and other living organisms. It has severely affected all vital sectors of life, including water, health, agriculture and the socio-economic sectors. Rasul et al. (2012) state that "anthropogenic activities" like industrialization and infrastructure have led to an increased emission of "Green House Gases (GHGs)" which has drastically altered the climate of the world (p. 1). They further add that a 0.76 ℃ increase in global temperature was recorded in the last century, while in the 21st century, a 0.6 ℃ rise in temperature has been witnessed in only the first decade.

Developing and under-developed countries are expected to be more affected by climate change and global warming than developed countries. Such a claim stands valid if the socio-economic conditions of a state are considered; due to meagre resources and lack of information, the poor communities suffer the most from the warming trends (IPCC, 2007**).** Pakistan's vulnerability to climate change is evident from this fact since its community is largely poor. Rasul et al. (2012) put forth that Pakistan's vulnerability to climate change also lies in the fact that Pakistan's climate is generally warm; its water bodies are fed by the Himalayan glaciers, which are receding due to global warming; it has an agrarian economy hence it is fragile to climatic variations, and its land is either arid or semi-arid. Pakistan is one of the most affected countries of climate change as its annual mean temperature has risen by 0.5 ℃ over the last 50 years (Chaudhry, 2017). This has increased extreme weather events such as floods, glacial melting, droughts, forest fires and heat waves. These weather events have proved perilous to both life and property and have also hampered the country's economic growth.

The increase in these events at an alarming rate is an eye-opener for the world. NASA's 2021 report on global warming explicitly renders humans responsible for the warming trends of the globe. It presents that temperatures increase due to human activities, specifically emissions of greenhouse gases, like carbon dioxide and methane. Anthropogenic activities include collective as well as individual actions that are environmentally destructive. Rasul et al. (2012) shed light on the fact that anthropogenic reasons have largely outweighed natural reasons for climatic variations. Some of these activities include urbanization, use of aerosols, infrastructure, overuse of land and emission of greenhouse gases. Thus, it is imperative to shed light on these reasons and make the masses aware of the consequences of their actions.

2.3 Environmental Education (EE)

Environmental education was not a part of the education curriculum until the 1960s. Prior to that, it was a short course studied in the programs of forestry and natural resources (Press, 1998). The advent of novel and grave environmental issues and the growing concern for the well-being of the environment led to the introduction of environmental science as a proper subject and a full-fledged program in education.

At this stage, it is imperative to outline the objectives of EE, ranging from the knowledge of the phenomenon to the knowledge of how to act responsibly. According to UNESCO-PNUE (1977) the objectives of EE are as follows:

- *Help groups and individuals acquire varied experiences as well as acquaintances of the environment and related problems.*
- *Help groups and individuals to acquire values, feelings of interest for the environment and motivation required to actively improve and protect the environment.*
- *Help groups and individuals acquire necessary skills for identification and solution to environmental problems.*
- *Give groups and individuals the opportunity to actively contribute to the solution of environmental problems.* (p. 26-27)

Gough and Gough (2010) put forward that environmental education, in the 1960s, was only concerned with a limited number of subjects, including air and water pollution, world population, depletion of natural resources and environmental deterioration. A shift has been witnessed in its emphasis from the "biophysical environment to the total environment-natural and built, technological and social (economic, political, technological, cultural-historical, moral, aesthetic)- to the three pillars of sustainable development – environment, society and economy" (Gough & Gough, 2010, p. 1).

However, the main agenda of the discipline remains the same, which is to make the citizens aware about the environmental issues, the role of individuals in furthering the destruction of the environment and the development of skills and abilities necessary to practically work for the well-being and sustainability of the environment. With the increase in the environmental crisis, environmental education has been made an obligatory part of curriculum. Environmental based education is adopted to instill within the young minds the consequences of their actions on the ecosystem and how through calculated measures and steps these consequences could be curbed. It not only informs the readers of the issues prevailing within the ecosystem but also educates them on the steps that need to be taken to eradicate these issues. Many researchers have used the term ecological education instead of environmental education; both the terms carry the same meaning. The United Nations Conference on

Human Environment declared that environmental education should be inserted in the education system to encourage the young students towards the protection of the environment (United Nations, 1972, p. 5).

Further**,** the Environment Protection Agency (EPA) of US puts forth that EE enables students to probe into environmental issues, develop skills for problem solving and take actions to address the issues. Several components of EE include:

- Awareness about environmental concerns
- Knowledge of these environmental challenges
- Feelings of concern for the environment
- Skills to address these challenges
- Participation in activities that may restore the environment. (EPA, n.d)

2.4 Language and Ecosystem

The interconnectedness of language and ecosystem is termed as ecolinguistics- the study of the interrelationship between language and the physical environment. Fill et al. (2001) trace the history of the concept of ecolinguistics back to Edward Sapir, who in his 1912 work, "Language and Environment", writes, "It is the vocabulary of a language that most clearly reflects the physical and social environment of its speakers." The term 'environment' signifies the social environment since the concept of ecological environment did not yet exist. The history of ecolinguistics goes even further back to Von Humboldt's (1767-1835) whose work on the interrelationship between language and the world is considered as the stepping-stone for ecolinguistics. He thus became known as the "predecessor of ecolinguistics" (Chen, 2016, p. 109), whose work was later assimilated into the "linguistic relativity hypothesis" by linguists such as Edward Sapir (1884-1939) and Benjamin Whorf (1897-1941). However, the emergence of the term "ecolinguistics" marked its official beginning with Haugen.

Ecolinguistics emerged in the field of linguistics in the 1990s; however, the idea already took birth in 1972 in the work of Haugen, "The Ecology of Language", which opened the forum for discussion on the interactions between language and the environment (LeVasseur, 2014). LeVasseur terms Haugen's approach to ecolinguistics as the "Hugenian tradition" of ecolinguistics, which suggests that language is embedded in a larger environment. The environment consists of the

natural ecosystem, other languages spoken in society, the social environment and the psychological environment of the speaker; these aspects interact with one another at multiple levels (LeVasseur, 2014, p. 22). However, this approach is very extensive and non-specific whereby a specific connection between language and the ecosystem has not been established. Michael Halliday initiates the narrowed down approach through which language is studied only in the context of its physical and natural environment in a paper he read at the World Conference of Applied Linguistics in 1990. Thus, Halliday launched the discipline of ecolinguistics as Fill (2009) argues, "Halliday thus pioneered the study of the connexion between language and environmental problems…" (p. 419).

It was by the 1990s that the field began expanding and started being recognized as a separate paradigm of linguistics. Chen (2016) argues that this decade saw the emergence of ecolinguistics as a result of the pivotal speech of Halliday "New Ways of Meaning". Central to his speech was the idea of the interconnection between language and environmental issues. Thus, the speech of Halliday narrowed down the scope of the discipline specifying it only to the relationship of language and the ecological problems.

With the advent of the 21st century, an expansion has been seen in the discipline of ecolinguistics. Full length books have been published in the area including Stibbe's 2015 publication, *Ecolinguistics: Language, ecology and the stories we live by* and Fill et al 2001 publication, *The ecolinguistic reader: Language, ecology and environment*. Moreover, in 2004 an ecolinguistic research forum took birth encouraging more research in the area.

Ecolinguistics is the study of language in relation to ecology. The term ecology, coined by Ernst Haeckel around 1865, is the study of the relationship between different organisms and their natural environment (Fill, 2009). Adding on, Fill (2009) mentions that ecology has become a distinctive and separate branch of biology in which the relationship between animals and plants is the central theme.

According to Stibbe (2014), novel disciplines emerge when something important is removed or erased by the already existing disciplines. In this regard, he mentions William Labov, who introduced the discipline of sociolinguistics by claiming that

linguistics of his time had erased the component of society from language. He wanted to incorporate social aspects into language, which leads to a better understanding of language since linguistic variations can only be understood with reference to social variations. This also led to a new approach to language; language could be applied to any social issue of grave importance like racism.

Ecolinguistics takes a step further; it widens the scope of the paradigm of sociolinguistics. It not only looks at society rather goes beyond that. Stibbe (2014) declares that ecolinguistics looks at humans and their relationship with other species and the physical environment since life is largely dependent upon these ecological relationships (2014). Anthropogenic activities have largely hampered the ecosystem and its ecological relationships hence posing a threat to human life and the existence of other species. Such a paradigm is thus imperative in these pressing times to make the human race aware and sensitize it towards its catastrophic actions.

Ecological discourses are judged from the ecological perspective of the analyst, which is termed as ecosophy- "Each ecolinguist will have their own set of philosophical principles they use to judge stories against, reflecting their own values and priorities, but all will have in common a consideration of the interrelationships of humans with other organisms and the physical environment" (Stibbe, 2015, p.12). Ecosophy is an abbreviation for "ecological philosophy". Naees (1995) goes on to describe ecosophy as "a philosophy of ecological harmony" (p. 8). Therefore, discourses are judged against the ecosophy of the analyst and it is seen whether a certain discourse is ecologically constructive or destructive.

In order to analyze ecological themes in ELT textbooks, Al- Jamal and Al-Omari conducted a study in 2014. They believe ELT textbooks should not only focus on language proficiency but on developing skills among students to protect the ecosystem. 10^{th} grade Jordanian textbooks from the year 2013/2014 were analyzed in light of four ecological themes: ecological sensitivity, awareness of ecological problems, ecological knowledge, ecological skills and ecological contribution. The study found that content on ecological awareness fell to 34.57%, on knowledge 19.75%, on skills 33.33% and on contribution 12.35%. It was concluded that global ecological themes were scarce in the books despite their significance in our world. Thus, the study highlighted the inadequacy of ecological themes in EFL textbooks

and provided tentative measures that teachers could adopt to impart more ecological knowledge and skills to students. The study is critical since it sheds light on the negligence of academia towards such a significant subject.

2.5 The 'eco' of ecolinguistics

Stibbe (2015) declares that in the past humanities subjects have celebrated the domination of humans over nature. Central to these subjects are "rationality, language, a sense of history, religion, culture and literature", which distinguish the human race from other animal organisms (p. 7). However, as ecological problems took a rise in the past century, scholars felt the need to incorporate nature as the focal point in these areas of study, thus an "ecological turn" (Stibbe, 2015, p. 7) took place in humanities.

The 'eco' of ecolinguistics simply refers to ecology. In its literal sense, ecology means the relationship of an organism with its environment and other organisms. Stibbe (2015), however defines it in a broader way i.e., the relationship of one thing with the other. In a narrow sense, it implies relation to the environment. Steffensen and Fill (2014, p. 7) differentiate between four types of ecological interactions. The first type has been termed as 'symbolic ecology' whereby different languages commune with each other in a given space and time. The second type is the 'sociocultural ecology', which is the interconnection between societies and cultures. Thirdly, there is the 'cognitive ecology', which studies the cognition of organisms and their adaptation to the environment. The last type is the 'natural ecology', which is the interrelation of a language with its environment. The last approach could be rightly called the ecolinguistics approach. However, as Stibbe (2015) puts it natural ecology is not devoid of the human; it is not only the interaction of animals and plants with the environment rather the interaction of humans with their environment and other organisms. It is imperative to note here that discourses solely based on animals and their interaction with other animal species and the physical environment are not subjects of ecolinguistics analysis since the presence of humans is critical for such an analysis.

2.6 Ecolinguistic Stories

Stibbe (2015) presents ways in which ecological stories are presented. These

stories have been categorized into nine types: ideology, framing, metaphor, evaluation, identity, conviction, erasure and salience.

2.6.1 Ideologies and Discourses

Stibbe (2015) defines ideology as a belief system that a community shares about the world. These ideologies are broadcasted in discourses through the linguistic patterns that run through them. Writers manipulate linguistic strategies in a way that their preferred ideology is foregrounded and all the other narratives are marginalized or back grounded. Stibbe (2015) goes on to add that in the ecolinguistics analysis of a text, it cannot be determined whether an ideology is ecologically destructive or beneficial rather ecolinguists judge the ideology of a text against their own ecosophies and determine the nature of the discourse.

Ecosophy, as the term demonstrates, is a combination of ecology and philosophy. It refers to the philosophy working behind the analysis of a text from an ecolinguistic point of view. When analyzing a text, an ecolinguist has certain beliefs and values against which he/she analyzes the text. However, all the ecolinguists have the same foundational consideration i.e. the interaction of humans with the ecosystem (Stibbe, 2015). These philosophical values are termed as ecosophy. The two prevailing ecological philosophies are anthropocentrism (human is central) and ecocentrism (centrality of all beings). The ecosophy of the present research study lies in the principle of ecocentrism whereby humans are not the center of the universe. The environment and all the other organisms living within it including plants, animals, forests, rivers, mountains etc. are as worthy as humans and need to be protected.

2.6.2 Framing

Framing is the process whereby one area of life is used to structure another area of life. A story is brought to mind by certain catchwords. When people hear the word ‘reporting’, the story of a news reporter reporting news on a news channel comes to mind. In this regard, ecolinguists see how the ecosystem is framed within a discourse. One such example is the work of Blackmore and Holmes (2013) who analyzed that for nature protection, the frame of transaction was used. Such a frame promotes a consumerist approach that leads to environmental degeneracy.

2.6.3 Metaphors

Coming to the third type of story, metaphors literally mean describing something as something else. Martin (2014, p. 78) declares about metaphors that they "imply an identity between otherwise different things." Nerlich et al. (2002) looks into the construction of foot and mouth disease (FMD) and describes how words like 'battle', 'enemy' and 'combat' are used for it, creating the metaphor of war. This type of metaphorical construction results in the killing of animals, thus the metaphor has severe consequences for animal welfare. Thus, metaphorical constructions could either lead to environmental protection or degeneracy.

Lakoff and Johnson (1999) describe metaphor as a mapping from a "source domain" to a "target domain" (p. 58). The target domain is the area that is discussed in the discourse while the source domain is the area that has been drawn for comparison.

Johnson (1983) and Martin (2014) use the terms "metaphorical reasoning" and "analogical reasoning" respectively to describe how metaphors create reasoning patterns. Analogical reasoning presents how a particular area shares features with another area such that they should be handled and managed similarly. Metaphorical reasoning means drawing conclusions about the target area based on concepts of the source domain. In this regard, Stibbe (2015) gives an example of metaphorical reasoning from an article published in 2004 in "Scientific American" and written by climate scientist Jim Hason titled "Defusing the Global Warming Time Bomb." In this example, an analogy has been drawn between the target domain global warming and the source domain the time bomb. The source frame, which is the time bomb, consists of certain elements: "a bomb, defusing it, a method to defuse the bomb, a potential explosion and victims" (p. 66). In Hanson's article, for global warming the method of defusing the bomb is to lower the carbon emissions, the explosion maps to the flooding of coastlines, the victims are the people affected by it and the person defusing it left hidden. By doing so, the bomb sets up metaphorical reasoning leading to the following conclusions:

> There is limited time for *unspecified people* to *reverse the growth of air pollutants* and *keep carbon emission levels* in order to stop *global warming*,

> otherwise *coastlines will be inundated* and *a large proportion of the world's people* will be harmed. (Stibbe 2015, p. 67)

2.6.4 Evaluations and Appraisal Patterns

Evaluations are described as "stories in people's mind about whether an area of life is good or bad" while appraisal patterns are the linguistic patterns that are employed in discourses to portray something as good or bad (Stibbe, 2015, p. 84). Appraisal patterns are significant in ecolinguistics because of their influence on people and their perception of something as positive or negative.

In this context, Martin and White (2005) discuss appraising items, which are linguistic patterns or features that appraise something as positive or negative. Stibbe (2015) goes on to add that there are explicit appraisal items such as calling something as *nice, bad, pleasant* or *unpleasant* etc. There are also implicit appraisal items such as metaphorical expressions that carry positive or negative connotations about an area of life. One such example is describing shopping as an obsession. This word triggers a negative appraisal whereby shopping is evaluated as something negative which in turn influences the behavior of individuals.

2.6.5 Identity

Identity refers to the values that a person holds dear; these values make up his/her identity. Giddens (1991) declares that one's identity is not evident through one's actions rather through the narrative that one holds onto and encourages. Only a change in the narrative of the environment can bring about a change in behavior towards it. Eisenstein (2011) maintains in this regard, "An actual transformation in the way we experience being is necessary... a collapse of the Old Story of Self and Story of the World, and the birth of a new one" (p. 153). Thus, a change in people's values and identity of themselves and the world can bring a change in their behaviors towards the environment.

The mainstream and traditional society creates the identity of a business tycoon or a CEO as a hero thereby encouraging behaviors that are ecologically destructive. These identities are driven by self-interest, financial ambitions and greed, thus prompting moneymaking behaviors at the cost of the environment. Crompton and

Kasser (2009) contend that it is imperative to change these characteristics of society that support environmentally problematic aspects and promote those aspects of identity that are environmentally advantageous.

2.6.6 Convictions and Facticity Patterns

The stories in the mind of people about the truthfulness or falseness of a statement are termed as 'convictions'. Representing these stories as true, certain, false or uncertain is achieved by facticity patterns, which are linguistic devices that run across a discourse. Descriptions are placed on a spectrum of facticity from being true to false with ranges of uncertainty in between (Stibbe, 2015). A statement like, *Humans may be responsible for global warming,* has a reduced level of facticity due to the modal verb 'may be'. This produces an uncertain conviction in the minds of the readers.

One way to increase the facticity of statements is through the use of "repertoire of empiricism" (Potter, 1996, p. 150). In this type of language, conclusions are drawn as though arriving directly from scientific or empirical data. One such example is *The data shows that…*; these type of statements have the highest facticity since results drawn from facts cannot be negated or challenged.

Adding on Stibbe (2015) declares that critical discourse analysis provides certain linguistic features or strategies that construct facticity (p. 130).

- Modal verbs (such as may, must) show how probable a statement is.
- Mention of expert authority (E.g. The mention of the Ministry of climate Change in a statement about global warming strengthens the claims made.)
- Use of quantifiers affects the facticity of descriptions (E.g. *A few* reduces the facticity while *many* strengthens it.)
- Use of hedges such as 'A thinks'- it creates the effect that the statement is not based on empirical data rather an opinion.
- Presuppositions, which presuppose that a certain piece of information is already known or accepted, thus strengthening the facticity of the statement.

In climate change discourses, the authors make use of linguistic strategies that increase the facticity of their descriptions of climate change and global warming. Use

of expressions like ‘there is evidence’, mentioning expert authority to back claims and use of terms like ‘scientist and thoughtful people’ for the environmentalists substantially increase the facticity of the discourses. However, in anti-climate change discourses one strategy among many is the use of terms like ‘political movement, a flourishing business or a hoax’ for climate change, thus reducing its facticity. Such patterns within a discourse create convictions in the minds of the audience regarding climate change, which ultimately affect their behavior towards the issue.

2.6.7 Erasure

The absence or marginalization of participants or events from a text is called erasure. Erasure covers the terms “suppression, back grounding, exclusion, abstraction...” (Stibbe, 2015, p. 146). Schleppegrell (1997) studied how human agents have been erased from environmental discourse through nominalisation. This leads to alienation from the environment and the problems humans are causing hence readers are not sensitized towards their role in environmental destruction. Fairclough (2003) declares that through the use of abstract language, participants are excluded or back grounded, thus concealing important information (2003). These linguistic patterns run throughout the text like appraisal patterns but instead of appraising something as good or bad, these linguistic patterns appraise it as insignificant or unworthy of attention (Stibbe, 2015).

In ecolinguistics, erasure can occur in many ways. Everett and Neu (2000) show how people have been erased from the discourse of ecological modernization whereby responsibility is not put on them for their actions. They critique that these discourses only mention the use of technological innovations to curb ecological issues and not a change in human activities. More specifically Schleppegrell (1997) highlighted how human agents have been erased through the linguistic strategy of nominalisation.

Moving on, Kahn (2001) draws attention to the erasure of animals from wildlife biology. She highlights how language represents animals as lower forms of life that can be experimented upon and controlled. It erases the element of life and consciousness from animals and objectifies them as subjects of experimentation.

In ecosystem assessment reports, Stibbe (2015) analyzes language and saw how it contributes to back grounding the ecosystem. Erasure occurs when hypernyms

replace the names of the specific species; ‘organisms’, ‘mammals’, ‘amphibians’ etc. are used instead of the name of the species. Furthermore, animals are backgrounded in these reports by mentioning their habitats i.e. “aquatic habitat” or “urban greenspace amenity” (p. 157). Such a representation erases the species, whether animals or plants, and focuses upon their places of dwelling. Another way of doing so is by referring to the animals and plants by their functions in the ecosystem, for instance, “dispersers”, “pollinating insects” etc. (p. 158).

2.6.8 Salience and Reminding

To bring back to attention what has been erased in a discourse is called reminding. It is, however quite distinct from salience, which is the creation of a story as important and worthy in the minds of people through salience linguistic features or visual patterns. If the salience patterns are constant and widespread in a discourse, that area of life is made salient within the minds of the readers or more widely in a culture (Stibbe, 2015).

Stibbe (2015) argues that the field of ecolinguistics is in itself a form of reminding since it brings to attention the ecosystem and how it has been erased from discourses. It studies abstraction in the description of the ecosystem in discourses, which makes it less salient. Wendell Berry (as cited in Foltz, 2013) analyses the abstraction of animals in discourses. He mentions that the abstract term like “organisms” is “wrong language” which must be substituted with less abstract terms (p. 21).

The embodied cognitive theory (Lakoff & Wehling, 2012) suggests that terms that relate to bodily experiences produce more vivid imagery in the minds of the readers. They describe it as follows:

> The word environment is an abstract category. There is no one clear image that comes to mind when hearing it. Contrast this with the words forest, soil, water, air and sky. They bring clear imagery to mind. We have all seen the sky, touched water, breathed air and walked in forests. (p. 42)

Furthermore, they add that there is a particular level of concreteness in a language, which is the ‘basic level’- the most imaginable level (Lakoff & Wehling,

2012, p. 41). Words like ‘tulip’ and ‘daisy’ are basic level representations and, therefore they call for vivid imagery. Such representation is thus the most salient one. In contrast to basic level representation, words like ‘plants’, ‘flora and fauna’ and ‘living things’ are most abstract and, thus harder to imagine.

2.7 Erasure in Linguistics

The concept of erasure has been explored in postcolonial studies; terms like silencing, marginalizing and othering have been used for it. Roche (2019) asserts that erasure is most prevalent in discourses on imperialism and colonialism to silence or marginalize members of the minority communities and the native communities. The silencing of these people renders them unworthy of attention leading to their “institutionalized exclusion and material deprivation and, ultimately, to their social elimination.” He further argues that erasure is not a passive process rather an active one of denying life to some and bestowing it to others (Roche, 2019, p. 489).

Erasure is thus an active process of marginalizing or othering a particular section of society. Irvine and Gal (2000) declare about erasure, “Facts that are inconsistent with the ideological scheme either go unnoticed or get explained away” (p. 38). *A passage to India* by EM Foster perfectly portrays erasure whereby the indigenous Indian community has been generalized as uncivilized people, who must be tamed and educated by the colonizers. Foster erases the heterogeneity of the locals and renders them as a homogenous group. Such a representation is fitting for the scheme of the novel, which is to justify the colonization of the Indians by the mighty British. Shear et al. (2015) claim that the whitewashing of history leads to continued colonization of the indigenous people, thus further marginalizing and othering them.

In this regard, Namaste (2000) takes a look at the erasure of transsexual people in the mainstream media. The media represents transsexuality in a way that it is impossible. Transsexual people are not shown as conscious beings who have the elements of life and soul in them rather as beings who are lower than life. He goes on to declare,

> Finally, and most powerfully, “erasure” can refer specifically to the very act of nullifying transsexuality – a process whereby transsexuality is rendered impossible. As Ros and Gobeil elucidate, the use of “men” and “women”

> undermines the very possibility of a TS/TG [transsexual/transgender] position. Within this site, transsexuals cannot exist at all. (Namaste, 2000, p. 52)

2.8 Erasure in Ecolinguistics

Stibbe (2015) proposes that in ecolinguistics analysis language is analyzed with a focus on disseminating *the stories we live by*, "the mental models that influence behavior and lie at the heart of ecological challenges" (2015, p. 2). In the same vein, Kingsnorth and Hine (2009) assert that anthropocentricism is the most dangerous story we live by-"the story of human centrality, of a species destined to be lord of all it surveys, unconfined by the limits that apply to other, lesser creatures."

Ecolinguistic analysis aims at revealing the linguistic strategies that run through the text and form a particular ideology. One of the strategies is erasure, which reveals whether the ecosystem is salient or not in a discourse and whether it has been foregrounded or backgrounded. It is observed whether the ecosystem and the natural world have been given due consideration or not. Erasure of the ecosystem from discourses is detrimental to its well-being because "We can be ethical only in relation to something we can see, feel, understand, love or otherwise have faith in" (Leopold, 1979, p. 214, as cited in Stibbe, 2017, p. 506). When the natural world is erased from discourses, we cannot see it and relate to it, hence, we start believing that it is inferior and worthless.

Erasure is a concept used in social sciences whereby something important is deliberately backgrounded or not given due consideration in a discourse (Stibbe, 2014). In texts either something is completely erased or it is backgrounded. Erasure is achieved in degrees whereby some linguistic strategies completely veil an important entity or event thereby creating a void while others represent it vaguely or obscurely. Baudrillard (1994, p. 6) proposes that the depiction of an entity can be placed on a scale ranging from "the reflection of profound reality", through the 'masking' of reality, to "no relation to any reality whatsoever." Stibbe (2015) puts forth three stages of erasure-void, when something of importance is completely erased, mask, when a distorted version of reality is portrayed and trace, when an entity is present but only in faint traces. To achieve erasure in discourses, Stibbe (2015) gives nine linguistic strategies: passive voice, nominalisation, hyponymy, co-hyponymy, transitivity, massification, construction of noun phrases, metaphors and metonymy.

Environmental/ecological themes are also embedded in children's stories. Adugna (2015) sees how ecological crises have been inculcated in Ethiopian children's literature. An ecocritical approach has been adopted to analyze more than 50 ecological texts in 15 children's literature books published in Amharic. It has analyzed the value that has been ascribed to the ecosystem in these books. It was concluded that little heed was paid to ecological concerns while anthropocentrism held the central stage and little emphasis was put on the idea of "essential unity of life" (p. 48). Also, little focus is paid to the role of children in protecting the ecosystem. Where a loving and caring relationship between animals and humans was shown, it was "infested with patriarchal ideology" (p. 50). The study sheds light on a different approach towards the study of environmental texts, which is the ecocritical approach, thus suggesting new ways to study environmental texts.

"Disappearance of Nile: storytelling and environmental awareness" by Ramadan (2020) is also an ecolinguistic study of children's literature whereby a specific Arabic story "Disappearance of Nile" written and illustrated by Rania Hussein Amin, 2007, has been analyzed linguistically and visually. An ecolinguistic approach has been adopted to show how storytelling aids in increasing environmental awareness among children. For the images, the paper has employed the multimodal approach of Kress and Van Leeuwen (2006). With the help of language and images, the storyteller has told the story of the disappearance of the Nile with urbanization and human activities. Through the lens of "grammar of visuals" by Kress and Leeuwen, it is shown how in images the Nile used to be closer and the focal point in the times of the Pharaohs, whereas now it is distant, dull and in the background. Towards the end of the book, there is a moral i.e. the readers of the story are now the guardians of the River Nile. In this way, children have been sensitized towards the issue of the pollution and disappearance of the Nile and they have been put in a position to act responsibly for its protection. The study employs an all-encompassing approach since it deals with both the language and the images of the book.

A corpus based study conducted by Rapo (2020) explored how natural disasters and climate change are portrayed in UK news reports through the lens of ecolinguistics. The study has shed light on the types of lexicons used in news reporting and how these linguistic choices portray wildfires. Three words have been

extracted from the corpus, which are *fire* (452 times occurrence), *climate* (179) and *animal* (61). They have been chosen for their relation to each other; climate causes fire, which affects animals. Rapo used the erasure model of Stibbe (2015) to see what has been left out in the reports. While analyzing 'fire', it was found that the aftermath of getting the fire under control was left out (the void) and the activities of the firefighters to extinguish the fire were backgrounded (the trace). With the word 'climate', the role of humans in causing climate change was left out. Moreover, climate change was masked as the cause of all issues including the wildfire. Lastly, coming to the word 'animal', the species and names of the specific animals that were affected were not mentioned by using expressions like "half a billion animals" (p. 25). Also, there is a trace of empathy for animals in the discussion. The study is, thus a step forward in understanding news reporting on climate change and how erasure is constructed in discourses.

Concluding, Stibbe (2014, p. 5) puts forth all the relevant elements of erasure that are considered when studying it:

- An area of social life such as economics or environmentalism,
- A discourse, which is a typical way of speaking about the world in that area which encodes a particular worldview
- 'Something important', which is entirely missing from the worldview, or present only as a faint trace, or present in a distorted version, and
- An actor who declares that 'something important' has been erased and insists that it should be brought back into the discourse.

2.9 Linguistic devices of erasure

For the construction of erasure in a text, Stibbe (2015) enlists a number of linguistic strategies that are employed in texts. These include passive voice, metonymy, nominalisation, hyponymy, massification, construction of noun phrases, metaphors and transitivity patterns. It is to be borne in mind that these linguistic strategies are not found remotely in a few sentences in the text; rather they run in a pattern throughout the text, thus constructing erasure at the level of the discourse.

2.9.1 Passive Voice

A general norm witnessed in discourses on environment and the ecosystem is the use of passive voice in order to avert responsibility from the human actor. The terms agency and passive voice are usually used interchangeably since their meanings overlap. The Longman Dictionary of Language Teaching and Applied Linguistics define agency as, "a philosophical term referring to the capacity for human beings to make choices and take responsibility for their decisions and actions" (Richards & Schmidt, 2010, p. 18)**.** Hence, the absence of agency or use of passive voice denies responsibility for the actions of the humans.

Kahn (1992) claims that in passive constructions, the doer has been concealed and replaced by the action or the deed, which has been achieved without any human input. To vividly portray how this is achieved, Kahn quotes an article from the Wildlife Society Bulletin, which details experiments carried out on small mammals.

"Methods- Striped skunks, raccoons, and opossums were live-trapped in east central Texas and housed outdoors in individual cages."

"… Upon death, coyotes were skinned, eviscerated, and myectomized…"

As is evident from the examples, the actor has been systematically removed from the scientific discourse. The reader learns what is being done to the mammals but he has been denied the information of who does it. Through the use of such euphemistic language, scientists avert critique and responsibility for their actions.

Ecolinguistic analysis has also been applied to other types of media including science experiment reports, climate assessment reports, news reports etc. Analyzing passive constructions and euphemism in science experiment reports, Kahn (1992) in Fill et al. (2001) saw that its language was laden with passives whereby the actor was absent replacing it with the action isolated from human input. He declares, "It is indeed a passive, soulless voice... perfectly reflective of a mode of thinking that proceeds outside the moral realm of active responsibility" (p. 242). Moreover, he sheds light on another technique to euphemize language called "doublespeak" (p. 243). Animals are not caged, poisoned or killed rather they are "test animals which are housed, dosed and processed" (p. 243). With the use of such a language, the speakers conceal the actual truth of the experiments by making something negative

and unethical appear as positive and ethical.

In this context, Mliless and Larouz (2018) have explored how language has been euphemized in the environmental texts in Moroccan English language teaching textbooks. 14 environmental texts were selected and euphemism, agency and passives were analyzed in them through content analysis. It was concluded that the aforementioned linguistic devices were prevalent in the texts whereby meanings in the text were cloaked and the role of humans in environmental degeneracy was veiled. Such an approach is helpful in unveiling the linguistic strategies used by authors to erase vital messages. It is rather analogous to the use of euphemistic language by politicians and government officials, who state facts in a soulless, passive voice, therefore not taking any moral responsibility for their actions.

2.9.2 Nominalisation

"The expression of grammatical agency can be avoided by several means in English, including through passivization, use of ergative verbs, and nominalizations" (Schleppegrell, 1997, p. 51). Thus, nominalisation is one of the strategies to eliminate the actor or agent from sentences thereby leaving the deed isolated and agentless. It is the process of conversion of a verb into a noun. Such a conversion leaves no space for the agent, thus the agent is effectively concealed. Halliday and Martin (1993) maintain that the agent is veiled in nominalisation by emphasizing on the action rather than the actor/agent. Verbs like 'to produce' or 'to destroy' are converted into the nominal forms 'production' and 'destruction'; where verb forms need an agent in active clauses, these nominalised forms overcome this requirement.

In this context, Schleppegrell (1997) carried out a study that analysed the loss of agency in discourses on biodiversity, which were used as teaching material by teachers. To highlight nominalisation, he quotes a paragraph from the text.

> Human-induced changes in the environment, such as pollution, habitat degradation, and the introduction of exotic species, push the limits of nature's resilience and may lead to irreversible environmental damage and biodiversity loss on human time scales. (p. 54)

Terms like *pollution, habitat degradation, introduction of exotic species* and *biodiversity loss* are nominalized forms of the verbs 'to pollute', 'to degrade', 'to

introduce' and 'to lose'. Such nominalized forms suppress the requirement of agency, thus the actors carrying out the deed cannot be identified by the readers. Such type of language does not induce sensitivity on the part of the readers for their role in environmental degeneracy.

2.9.3 Metaphors

In simple terms, metaphors establish a connection between two dissimilar entities for the sake of symbolism. The Big Encyclopedic Dictionary entry on "Linguistics" (1998) describes the term metaphor in this way, "In a broader sense, the term "metaphor" is applied to any kind of use of words in indirect value." Between the two entities that are involved in the process of comparison, there is one feature that is remotely similar on which the analogy is constructed.

Stibbe (2015) details the role of metaphors in the construction of the ecological world. He specifically sheds light on how metaphors are employed in language to objectify the natural world. One example of such destructive metaphors is:

- If the sow is considered a pig manufacturing unit then improved management at farrowing on through weaning will result in more pigs weaned (US Department of Agriculture, in Singer 1990, p. 126, as cited in Stibbe, 2015, p. 153).

In this extract, an analogy has been built between pigs and manufacturing machines, thus implying that pigs are nothing more than machines that breed. It erases the quality of life from them and objectifies them as manufacturing units. This is thus a strategy to mask pigs as objects and represent a distorted version of reality.

2.9.4 Metonymy

Metonymy as defined by dictionary.com is "the substitution of a word referring to an attribute for the thing that is meant, as for example, the use of *the crown* to refer to a monarch." Some other examples include the use of heads for people and using the word pen to refer to knowledge.

Elaborating on the use of metonymy for the ecosystem, Stibbe (2015) illustrates how it is employed to objectify the ecosystem. In this regard, he puts forth the

following examples:

- In Georgia, USDA-Georgia has assisted in modernizing the red meat slaughtering industry and in establishing new plants (AG2: 48, as cited in Stibbe, 2015, p. 153)

In this example, *red meat* is used to refer to animals such as cow and goat. Thus, the animal, which is a living and conscious being, has been metonymically substituted with the product its body makes.

- In North America, seven-week-old chickens are classified as broilers or fryers and fourteen-week-old chickens are classified as roasters (AG3: 11, as cited in Stibbe, 2015, p. 153).

Moving on, in the second example, chickens have been referred to as broilers, fryers and roasters. Animals are also metonymically referred to by the functions they carry out in the ecosystem. Stibbe (2015) puts forth the following examples to illustrate this strategy; "pollinators", "primary producers", "pollinating insects" etc. have been used to refer to insects (pp. 157-158).

2.9.5 Massification

Massification is a process whereby countable nouns are converted into uncountable or mass nouns, thus leaving a faint trace of what is being declares about. By this process, animals and plants become material stuff. For the ecosystem and the living species within it, authors tend to use mass nouns, which erase the specific individual entity that is being discussed.

The Sociolinguini Blog titled, "I spy…2017: The year of the chicken?" looks for the linguistic strategies that erase the ecosystem. One of strategies employed is massification; it is illustrated in these examples, "52 billion chickens, the world's biomass" and "94 billion tonnes of chicken meat." Stibbe (2015) adds more instances to such use of language- terms like "natural capital", "maintaining ecosystem capital stocks" and "wood biomass" represent animals and plants as mass nouns, thus they become "mere tonnages of stuff" (p. 157).

2.9.6 Transitivity Patterns

Transitivity patterns are the processes working in a clause and the relationship between the participants in these processes. Halliday, in his 2004 publication, outlines three components of a transitivity process in a clause:

a. A process unfolding through time

b. The participants involved in the process

c. Circumstances associated with the process (p. 175)

He goes on to add that there are six types of transitivity patterns within clauses: material, mental, relational, verbal, existential and behavioral.

Material processes are processes of doing, consisting of an actor, process and goal or object. Mental processes are processes of sensing, consisting of a senser, process and the phenomenon or the affected. For example, in the clause *I hate you,* I is the senser, hate is the process and you is the affected or the phenomenon. Thirdly, relational processes are processes of being. They express that something is. For example, *John is the leader.* Additionally, behavioral clauses are "processes of (typically human) physiological and psychological behavior, like breathing, coughing, smiling, dreaming and staring" (Halliday, 2004, p. 248). Verbal processes are processes of saying, which involve a sayer, a process and a receiver. For example, *Sarah told me to talk slowly*- Sarah is the sayer, told is the process and me is the receiver. Lastly, existential clauses are clauses representing that something happens, occurs or exists. For instance, *There seems to be a problem;* it shows that a problem exists.

Of consideration in ecolinguistics are the material and mental clauses. Stibbe (2015) declares that in ecosystem and environmental discourses, the position of actor and senser are almost always occupied by the humans while the object or the affected is the ecosystem. This, in one way, objectifies the animals and plants since they never appear as active beings, which carry out activities rather as beings to which something is done. Rarely, they might appear in the position of an actor but never in the position of a senser, thus denying them the ability to think, sense or feel. Stibbe (2015) brings

out certain instances in agribusiness documents where animals and plants are shown as only the objects or the affected. Some examples are, “companies buy… birds”, “purchase birds”, “are packed in plastic bags”, “are sold” etc. (p. 154).

To study how animals were represented in books and what percentage of them performed activities, a study was conducted by Jacobs (2016) who examined 22 EAL (English as an Additional Language) course books to explore what types of animals were presented in the books and what percentage of them performed activities. A descriptive quantitative approach was adopted and it was found that mostly animals were shown as wild (35.98%) and as utilities for human consumption (28.15%). Animals whom humans attempted to protect were shown only as 7.39% and extinct animals as 0.65%. Moreover, animals appeared as focal points in activities in 7.94% of the cases and out of 351 activities, animals were the focus in 22.51%. This clearly demonstrates how animals have been erased from the role of an actor and mostly take up the position of an affected. Animals shown in the light of wildness and as human commodities promote their image as inanimate and unfriendly. This desensitizes the students towards the ecosystem.

2.9.7 Construction of Noun Phrases

A noun phrase consists of a head noun accompanied by modifiers. The head noun could be a noun or a pronoun. As per the definition of the British council, a noun phrase consists of two types of modifiers: premodifiers and postmodifiers. Premodifiers are words or groups of words that come before the head noun while postmodifiers are placed after the noun in the noun phrase. Premodifiers consists of:

- Determiners: **The** book is on **the** shelf.
- Quantifiers: There are **a lot of** houses there.
- Numbers: I own **two** cars.
- Adjectives: She likes **old** buildings.

Postmodifiers can be:

- Prepositional clauses: A girl **with an umbrella**
- -ing phrases: The dog **standing there**
- Relative clauses: The doctor **we visited yesterday**

- To infinitives: I do not have an orange dress **to wear.**
- That clauses: We got the idea **that…**

Of concern in the erasure of the ecosystem are the premodifiers in the noun phrases. Stibbe (2015) argues that in the discourse of ecological economics, the noun phrases are constructed in such a way that the head nouns are always the economic terms while the ecological terms take the position of the premodifiers. In this context, he puts forth the following examples: "biological stock", "ecosystem services" and so on to highlight that the ecological terms are subservient to the economic terms (p. 152). This type of representation portrays that the ecosystem is secondary to the economic/material world. It thus erases the importance of the ecological world by pushing it to the periphery.

Gong (2019) illustrates the use of this strategy with the collocation "fish resource" (p. 46). This type of construction not only sidelines the ecological world but also places it together with the economic world, thus treating the natural world as a stock of resources. It distorts the reality of the natural world and represents it as mere objects of human consumption.

2.9.8 Hyponymy

Defining the concept of hyponymy, Al-shemmery and Alshemmery (2017) state, "A hyponym is a word or phrase whose meaning is included within that of another world, its hyponym or hypernym…" The hypernym can also be called a superordinate. Thus, a hyponym has a "type-of relationship" with its superordinate (p. 4). Lyons (1997) adds that hyponymy only applies to lexemes of the same word class. Further elaborating on the concept, Todd (1995) suggests that hyponymy relations are relations of complementarity and incompatibility. He illustrated it by giving the example of rose, daisy and daffodil. The relation of complementarity is about classification whereby rose, daisy and daffodil are all kinds of flower. The relation of incompatibility is based on contrast whereby rose, daisy and daffodil are all different from each other within the category of flower (p. 85).

In ecological discourses, hyponymy is evident when the name of the specific species is replaced with more abstract and general superordinate terms. Some general superordinate terms include *mammals, reptiles, animals, organisms, living beings* etc.

Stibbe (2015) adds that even higher up the ladder are terms like “biodiversity”, “components of biodiversity”, “assemblages of species”, “ecological complexes” and “ecosystem” (p. 156). In this type of erasure, the specific names of the species of animals and plants are backgrounded. Such superordinate terms are so abstract that it is hard for the reader to imagine them or relate with them. Stibbe (2015) further suggests that usually animals and plants are mentioned in discourses by mentioning their dwelling places such as “urban greenspace amenity”, “aquatic habitat” etc. (p. 157). This further backgrounds them leaving a faint trace in the minds of the readers.

2.9.9 Co-hyponymy

Co-hyponymy is a term used to refer to hyponyms that fall under the same hypernym. Co-hyponyms are thus lexical items that have a symmetric relationship with each other. For example, rose and daisy are both co-hyponyms of each other since they fall within the same hypernym i.e. flower. These co-hyponyms share certain characteristic qualities as they both belong to the same semantic field.

Co-hyponymy constructs erasure in ecological discourses by placing the living species against the economic world, thus attributing them with economic qualities. In this regard, Stibbe (2015, pp. 156-157) puts forth that expressions like “extraction of timber, fish, water and other resources” and “terrestrial, marine and freshwater resources” place the living species equivalent to resources- an economic concept. This erases the quality of life from them and portrays them as though they are devoid of life and a soul. Such co-hyponym expressions imply that these living, conscious beings are nothing but commodities that should be consumed by humans and their importance lies only in this aspect.

There are however glaring gaps in the studies since environmental science textbooks have not yet been analyzed from an ecolinguistics perspective. Moreover, the model of erasure proposed by Stibbe (2015), though has been applied to other media and genres, has not yet been applied to textbooks. The study has thus attempted to fill the void.

CHAPTER 3

RESEARCH METHODOLOGY

3.1 Research Method

The researcher has used a qualitative approach to study the linguistic strategies used in the selected textbooks of environmental sciences to accomplish erasure. The model used as a lens was that of Stibbe given in his book, *Ecolinguistics: Language, ecology and the stories we live by* (2015). It is exploratory research focusing on the language of the textbooks. Within erasure, it has been seen whether all of its aspects, including the void, the mask and the trace, are found or not. The linguistic strategies for erasure highlighted in the model are passives, metonymy, nominalisation, hyponymy, co-hyponymy, massification, construction of noun phrases, metaphors and transitivity patterns. Through these devices, it has been explored whether erasure has been constructed or not.

3.2 Erasure

As Stibbe (2015) puts forward, erasure "is a story in people's mind that an area of life is unimportant or unworthy of consideration" (p. 146). Certain linguistic devices proposed by Stibbe (2015) and analyzed in the study include passives, metonymy, nominalisation, hyponymy, co-hyponymy, massification, construction of noun phrases, metaphors and transitivity patterns; they are employed to achieve erasure in ecolinguistic texts.

Analysis has been done at three levels depending upon the extent of erasure present within the texts: the void (complete deletion), the mask (distortion of reality) and the trace (backgrounding). Within these broader categories fall certain linguistic devices that achieve these levels of erasure.

- The Void: Passive voice and nominalisation
- The Mask: Metonymy, metaphor, co-hyponym, construction of noun phrases and transitivity patterns.
- The Trace: Massification and hyponymy

3.2.1 The Void

Void is constructed through the linguistic strategies of passive voice and nominalisation that delete the agent from ecologically harmful actions; thus, this rids the human of any responsibility for his actions; the deed becomes isolated and agentless.

3.2.2 The Mask

Linguistic devices like metonymy, metaphors, co-hyponymy, construction of noun phrases and transitivity patterns contribute to the construction of mask, thereby masking the reality of the natural world. This strategy masks the living things as objects leaving no trace of life in them.

3.2.3 The Trace

The linguistic strategies of massification and hyponymy are employed to construct the ecosystem in traces, invoking a less vivid image in the readers' minds, thus leaving a trace of the species being declared about.

In the present study, sentences have been grouped into the three categories of erasure (void, mask, trace) depending on the degree of erasure present within them. These linguistic units have then been analyzed for the strategies aforementioned, and it has been seen how erasure has been used in them and its effect on the message.

3.3 Sample

The four year BS program of undergrad environmental science has a variety of compulsory courses on environmental science, which are taught in 4 years in 8 semesters. The courses are as follows: *Introduction to Environmental Science, Introduction to Earth Sciences, Environmental Physics, Environmental Chemistry, Fundamentals of Ecology, Environmental Microbiology, Environmental Pollution, Climatology, Applied Ecology, Environmental toxicology, Environmental Profile of Pakistan, Population and Environment, Analytical Techniques in Environmental Science, Environmental Economics, GIS and Remote Sensing, Environmental Management Systems, Biodiversity & Conservation, Environmental Monitoring, Climate Change, Environmental Impact Assessment, Natural Resource Management,*

Research Methods in Environmental Science, Environmental Governance, Public Health and Environment, Pollution Control Technologies.

The course *Introduction to Environmental Science* is taught in the first semester of the program, and for the course, HEC recommends four environmental science books. They are as follows:

1. *Environmental science: Earth as a living planet.* (Botkin & Keller, 2011)
2. *Environmental science: Towards a sustainable future.* (Wright & Boorse, 2017)
3. *Environmental science: Working with the Earth.* (Miller, 2006)
4. *Environmental Science: Systems and solutions.* (McKinney, et al. 2013)

From the books mentioned above, only three books have been selected for analysis due to time and space constraints. Moreover, it was seen that a saturation of data had reached. Hence, to avoid repetition of the same data, the fourth book was not chosen. They are as follows:

1. *Environmental science: Earth as a living planet.* (Botkin & Keller, 2011)
2. *Environmental science: Towards a sustainable future.* (Wright & Boorse, 2017)
3. *Environmental science: Working with the Earth.* (Miller, 2006)

Although authored by foreign authors, these books have relevance in the Pakistani context as they are taught in Pakistan, and Pakistani students are exposed to their contents. For the study, distinctive units have been analyzed.

The researcher has employed the purposive sampling technique for the selection of chapters from the books. Specific units that fulfil the criteria of the research objectives and have abundant instances of erasure strategies have been selected. The selected units are as follows:

1. *Environmental science: Earth as a living planet.*
    - Chapter 1 – *Key themes in environmental sciences* (p. 1-21)
    - Chapter 7 – *Dollars and environmental sense: Economics of environmental issues* (p. 127-142)
    - Chapter 9 – *Ecological restoration* (p. 169- 184)
    - Chapter 13 – *Wildlife, fisheries, and endangered species* (p. 257- 285)

2. *Environmental science: Towards a sustainable future*
    - Chapter 1 – *Science and environment* (p. 2- 22)
    - Chapter 6 – *Wild species and biodiversity* (p.126-154)
    - Chapter 7 – *The value, use, and restoration of ecosystems* (p.155-182)
3. *Environmental science: Working with the Earth.*
    - Chapter 1 – *Environmental problems, their causes and sustainability* (p.5-18)
    - Chapter 6 – *Community ecology, population ecology, and sustainability* (p. 108- 127)
    - Chapter 8 – *Sustaining biodiversity: The ecosystem approach* (p. 154-182)
    - Chapter 9 – *Sustaining biodiversity: The species approach* (p. 183-205)

After the selection of the aforementioned chapters, paragraphs where erasure was found were selected**.** A total of 485 paragraphs where erasure was present were found in the books: *Environmental science: Earth as a living planet* – 128 paragraphs, *Environmental science: Towards a sustainable future* – 187 paragraphs and *Environmental science: Working with the Earth* – 170 paragraphs. Thereafter, from the selected paragraphs purposive sampling was done to select paragraphs that had manifold instances of erasure strategies given in the model. A total of 274 paragraphs were drawn forth through this technique: *Environmental science: Earth as a living planet* – 85, *Environmental science: Towards a sustainable future* – 103 paragraphs and *Environmental science: Working with the Earth* – 86 paragraphs. Thereby, the selected 274 paragraphs have been subject to analysis by the researcher.

CHAPTER 4

DATA ANALYSIS

4.1 Introduction

For the construction of erasure in a text, Stibbe (2015) enlists a number of linguistic strategies employed in texts. These include passive voice, metonymy, nominalisation, hyponymy, co-hyponymy, massification, construction of noun phrases, metaphors and transitivity patterns. This section has dealt with the textual analysis of the selected textbooks. It consists of analysis at three levels depending upon the extent of erasure present within the texts: the void (complete deletion), the mask (distortion of reality) and the trace (backgrounding) as given in the framework of erasure by Stibbe (2015). Within these broader categories fall certain linguistic devices that achieve these levels of erasure. The categorization of these strategies within the three broad categories of void, mask and trace has been done by the researcher herself.

- The Void: Passive voice and nominalisation
- The Mask: Metonymy, metaphor, co-hyponym, construction of noun phrases and transitivity patterns.
- The Trace: Massification and hyponymy

4.2 The Void

Void is the complete omission of an entity or an event from the discourse. It is "where 'something important' is completely excluded from a text" (Stibbe, 2015, p.149). With the help of the linguistic strategies of passive voice and nominalisation, it will be seen how the human agent has been completely excluded from discourses. The human agent, responsible for the destruction of the natural world, is systematically removed from environmental science discourse to rid the human race of any responsibility.

4.2.1 Passive Voice

Passive voice is a strategy whereby an action or verb is emphasised rather than the subject. The doer of the action is omitted, and the deed is shed light upon instead.

4.2.1.1 Passive Voice in Environmental Science: Earth as a Living Planet

The instances of passive voice within this textbook are manifold. Some instances have been listed below:

1.1. "*…20 lions killed, 17 were speared and 3 were poisoned…"* (p. 4)

1.2. *"As urban areas expand, wetlands are filled in, forests cut down, and soils covered over with pavement and buildings."* (p.11)

1.3. *" In the 19th century, burning wood in fireplaces was the major source of heating in the United States…"* (p.131)

1.4. *"Recreation is a problem of the commons- overcrowding of national parks, wilderness areas, and other nature-recreation areas."* (p.131)

1.5. *"Both overfishing and pollution have been blamed for the alarming decline in groundfish…"* (p.139)

1.6. *"Unfortunately, in the past century, much of the Everglades has been drained for agriculture and urban development…"* (p.170)

1.7. *"Thousands of streams have been degraded by urbanization, agriculture, timber harvesting, and channelization…"* (p.173)

1.8. *"Turning the meandering river into a straight canal degraded the river ecosystem and greatly reduced the wetlands and populations of birds, mammals, and fish."* (p. 174)

1.9. *"Extensive browsing dramatically reduces the abundance of riparian plants, damaging the stream environment…"* (p. 176)

1.10. *"Studies suggest that species diversity of tallgrass prairie has declined as a result of land-use changes that have led to the loss or fragmentation of habitat."* (p. 177)

1.11. *"The grizzly became endangered as a result of hunting and habitat destruction."* (p. 258)

1.12. *"In part, bisons are ranched because people like them."* (p. 259)

1.13. *"In 1870, about 2 million buffalo were killed."* (p.264)

1.14. *"In sum, fish are an important food and world harvests of fish are large, but the fish population on which the harvests depend are generally declining, easily exploited, and difficult to restore."* (p.271)

1.15. *"... and the whales were brought on board and processed there by newly invented furnaces and boilers for extracting whale oil at sea."* (p.277)

1.16. *"... and some of the animals were trapped and drowned."* (p.279)

1.17. *"The development of agriculture and the rise of civilization led to rapid deforestation and other habitat changes."* (p.279)

Stibbe (2015) argues that in discourses a certain event or entity is not explicitly declared unimportant or unworthy of attention, rather it is done implicitly by not mentioning the entity or mentioning it in such a way that it is backgrounded (2015). For this purpose, passivization is used implying that the doer of the deed is not important. As is evident from the aforementioned phrases, clauses and sentences, there is no mention of the agent/actor who is responsible for carrying out the actions. It does not put responsibility on the human race who is responsible for destroying the ecosystem for its own benefit. For instance, it has been said in example 1.3 that burning fossil fuels leads to a change in climate but the actor burning the fossils has been omitted to background him and his role. Likewise, in other instances too the action has been given due heed, however the actor has been repeatedly omitted. In example 1.5 it is argued that groundfish are declining alarmingly but we have not been told who is responsible for it and who should be blamed for it. Is the groundfish declining because of fish hunters? Or is it the consumers (common people like us) whose demand for groundfish has increased dramatically? Or is it the industries that harvest these fish to extract a specific product from their bodies? Not putting the blame on the actor leads to such ambiguities within the minds of the readers and he starts believing that it is some unknown person responsible for the deed. Thus, as readers, we cannot ascertain who committed the act and so are not sensitized towards our own role in these detrimental actions that harm the ecosystem. It is not enough to highlight the detrimental actions that degrade the ecosystem and the living organisms, the actor is as important and should be thrown light upon.

Active constructions could aid in shedding light on the doer of the ecologically harmful actions, which will, in turn, familiarise the reader with his/her detrimental

role in the ecosystem. Throwing light on this information will help curb such harmful activities.

4.2.1.2 Passive Voice in Environmental Science: Towards a Sustainable Future

Likewise, in this text, passive voice for the construction of the erasure of the human agent has been used abundantly.

2.1. *" More than 60% of the classes of ecosystems goods and services assessed by the team were being degraded or used unsustainably."* (p.5)

2.2. *"Even when species are protected by law, many are hunted, killed, and marketed illegally."* (p.8)

2.3. *"unique, wild areas of the United Arguees were disappearing."* (p.9)

2.4. *" In the late 19th century, the indiscriminate killing of birds and other animals and the closing of the western frontier sparked a reaction."* (p.10)

2.5. *"The air in and around cities was becoming murky and irritating to people's eyes and respiratory systems. Rivers and beaches were increasingly fouled with raw sewage, garbage, and chemical wastes from industries, sewers, and dumps. Conspicuous declines occurred in many bird populations…"* (p.10)

2.6. *"These rivers may be highly polluted, heavily divided by dams, and crowded with fishers."* (p.126)

2.7. *"In time, many living species were exploited to extinction, and others disappeared as their habitats were destroyed."* (p.128)

2.8. *"Global forest cover has been reduced by 40% already and the decline continues."* (p.135)

2.9. *"The species is endangered because its habitat has been greatly fragmented…"* (p.136)

2.10. *"…and sometimes the stream is straightened out…such alterations inevitably reduce the diversity of fish and invertebrates that live in the stream."* (p.137)

2.11. *"Shrimps, fish, crabs, and other commercially valuable sea life are either killed or forced to migrate away."* (p.139)

2.12. *"Forests and woodlands are overcut for firewood, grasslands are overgrazed, game species are overhunted, fisheries are exploited, and croplands are overcultivated."* (p.140)

2.13. *"Each year, 35,000 elephants are killed."* (p.150)

2.14. *"One example of the tragedy of the commons was extinction of the passenger pigeon, caused by the unregulated hunting of wild flocks of birds."* (p.163)

2.15. *"In the United States, 80% of the native grasslands have been converted to agriculture and other purposes."* (p.168)

2.16. *"Since 1983, half of the world's 18 million hectares (45 million acres) of mangroves have been cut down."* (p.171)

2.17. *"The ecosystem was degraded by the channelization of rivers and streams, the excessive withdrawal of water, and pollution."* (p.177)

2.18. *"Around him lay acres of degraded farmland, its sandy soil depleted by years of unrelenting use…"* (p.178)

Stibbe (2015) puts forward that "erasure is intrinsic to the very nature of discourses" (p. 146), thereby some areas of life are bound to be excluded from texts. It is the duty of the analyst to shed light on the areas that have been excluded from discourses and declare them important. One such important area excluded from ecological discourses is the human agent. Although the selected book time and again emphasizes that ecosystem conditions are worsening because of a number of harmful activities but the agent behind these activities has been backgrounded. Animals are killed but who kills them? As a reader, I would believe that only the industrialists, the hunters or the poachers are responsible for these actions, I am not made aware of my part so I am not sensitized towards my derogatory role.

The author of the book repeatedly sheds light on the fact that the ecosystem is being degraded but nobody can ascertain the agent behind it. In example 2.1, I cannot ascertain that due to the wastage of paper, (an ecosystem good), I may be causing a decline in the goods. Overuse of resources is a crime carried out by every individual, however the responsibility has not been placed on us instead an ambiguous statement excluding the doer has been used. Likewise, from example 2.16, the readers cannot put themselves responsible for the deforestation of the magroves even though the

deed is committed at individual level. Cutting down trees, clearing the land and building property on it is every individual's doing. However, from the mentioned statement it appears as if only the construction companies could be blamed for it, thus averting the responsibility from us. The air in the cities has become polluted, as mentioned in example 2.5, but who has caused the pollution has been veiled. Likewise, in example 2.8, we have been made aware that forest cover is reducing but who is reducing it has not been shed light upon.

4.2.1.3 Passive Voice in Environmental Science: Working with the Earth

The authors make profound use of passive voice as a linguistic strategy to erase the agent causing destruction to the natural world.

3.1. *"To provide wood and paper and crops such as coffee, for example, we can promote the planting of tree and coffee plantations in areas that have been already cleared or degraded."* (p.8)

3.2. *"One cause of environmental degradation is the overuse of common-property or free-access resource"* (p.10)

3.3. *"Examples are pesticides sprayed into the air or blown by the wind into the atmosphere, and runoff of fertilizers and pesticides from farmlands and suburban lawns and gardens into streams and lakes."* (p.12)

3.4. *"A fourth factor is severe respiratory disease and premature death from inhaling indoor air pollutants produced by burning wood or coal for heat and cooking in open fires or in poorly vented stoves."* (p.14)

3.5. *"Since 1980, populations of hundreds of the world's estimated 5,280 amphibian species have been vanishing or declining in almost every part of the world, even in protected wildlife reserves and parks."* (p.111)

3.6. *"Sharks are caught mostly for their fins and then thrown back alive…"* (p.111)

3.7. *"Sharks are also killed for their lives, meat…hides…and jaws."* (p.113)

3.8. *"This development begins in an area where the natural community of organisms has been disturbed, removed, or destroyed, but the soil or bottom sediment remains."* (p.119)

3.9. *"Some species are overharvested."* (p.124)

3.10. *"Illegal hunting or poaching endangers wildlife species with economically valuable parts such as elephant tusks, rhinoceros horns, and tiger skins."* (p.124)

3.11. *"Our inputs of carbon dioxide into the carbon cycle have been increasing sharply (Figure 3-26, p. 56)— mostly from burning fossil fuels and from clearing and burning forests and grasslands."* (p.124)

3.12. *"Cutting down large areas of forests reduces biodiversity eliminates the ecological services forests pro- vide, and can contribute to regional and global climate change."* (p.155)

3.13. *"Three-fourths of the world's 200 commercially valuable marine fish species are either overfished or fished to their estimated sustainable yield."* (p.156)

3.14. *"40% of US commercial fish stocks are depleted or overfished."* (p.156)

3.15. *"Large areas of ecologically and economically important tropical forests are being cleared and degraded at a fast rate."* (p.169)

3.16. *"By 2005, an estimated 16-47% has been deforested or degraded and converted mostly to tropical grassland (savanna)."* (p.169)

3.17. *"This less famous forest once covered about 12% of Brazil's land area. Now 93% of it has been cleared…"* (p.169)

3.18. *"Island species- many of them endemic species found nowhere else on earth-are especially vulnerable to extinction when their habitats are destroyed, degraded, or fragmented."* (p.190)

3.19. *"Some protected species are illegally killed for their valuable parts or are sold live to collectors."* (p.195)

From the examples given above, it is evident that passive voice is primarily employed to erase the agent from the picture hence a void is created and the message of the destruction of the ecosystem is left incomplete; "something important, something that we should be giving attention to, has been ignored, sidelined or overlooked within a text or discourse" (Stibbe, 2015, p. 146). In example 3.2, we have been told that resources are being overused and exploited but the actor behind it,

which is the common man, has been veiled. Similarly, in example 3.5, we have been enlightened that amphibian species are diminishing but the "diminisher" has been concealed. We have been sensitized towards the overuse and exploitation of the environment but not towards the actors responsible for it.

4.2.2 Nominalisation

Discourses usually employ the strategy of nominalisation whereby a noun is produced from another part of speech i.e "to destroy" becomes "destruction"; a verb is converted into a noun with the use of -ion. Such constructions delete the actor from the picture putting emphasis on the action. This strategy is also used within environmental discourses; the actor is omitted through the use of such constructions, thus creating a void.

4.2.2.1 Nominalisation in Environmental Science: Earth as a living planet

Considering the selected textbook, some examples have been shed light upon.

1.1. *"…conversion of some corn production to biofuels…"* (p.6)

1.2 *"…emissions of modern chemicals…"* (p.10)

1.3. *"…depletion of resources…"* (p.17)

1.4. *"…degradation of the commons."* (p.131)

1.5. *"major resource deterioration"* (p.131)

1.6. *"production of nickel…has serious environmental effects."* (p.134)

1.7. *"degradation of the environment"* (p.134)

1.8. *"Ecosystems of all types have undergone degradation…widespread loss and degradation…"* (p.173)

1.9. *"Thousands of streams have been degraded by urbanization, agriculture, timber harvesting, and channelization…"* (p.173)

1.10. *"Such a shift in the age structure of a harvested population is an early sign of overexploitation."* (p.264)

1.11. *"Exploitation of a new fishery…"* (p.269)

"Nominalisations can be particularly powerful devices of erasure" (Stibbe, 2015, p. 147); a noun does not require an agent grammatically so through the play of grammar the agent is erased from discourses.

The aforementioned examples reveal that in order to veil the human agent from the picture, the nominalised form of verbs have been used. This rids the humans from any responsibility of their actions; to a reader the doer of the deeds becomes an abstract entity who they do not know. Terms like *emissions, depletion*, and *degradation* have been employed instead of the verb forms, 'to emit', 'to deplete' and 'to degrade'. Thus, the readers cannot ascertain who caused the emissions, depletion and degradation; therefore, they are not sensitized towards their role in these destructive activities. Such constructions also rid the author of any responsibility since grammatically, he is not required to put an agent with the nominalised forms.

In order to familiarize the readers with the doer of the deed, the active verbal form of constructions could be used as an alternate to the nominalised forms; thereby, it would be grammatically imperative for the authors to mention the agent. Verbal constructions in their active form (A destroys B) are the key to imparting complete information regarding the destruction of the ecosystem.

4.2.2.2 Nominalisation in Environmental Science: Towards a sustainable future

Within this textbook, many instances of nominalisation to delete the human agent have been noticed. Some of them are mentioned below.

2.1. *"degradation and overexploitation of ecosystem resources"* (p.5)

2.2. *"Environmental degradation, resource misuse, and disastrous events…"* (p.9)

2.3. *"heavy exploitation of natural resources"* (p.11)

2.4. *"destruction of the environment"* (p.18)

2.5. *"environmental degradation"* (p.19)

2.6. *"degradation of ecosystems, atmospheric changes, losses of species, and depletion of water resources."* (p.20)

2.7. *"…the exploitation of oceanic fisheries…"* (p.20)

2.8. *"widespread degradation of essential ecosystems"* (p.21)

2.9. *"…the highest rate of deforestation."* (p.135)

2.10. *"habitat destruction"* (p.135)

2.11. *"destruction of the trees"* (p.135)

2.12. *"Severe deforestation in Haiti"* (p.136)

2.13. *"…coral reef degradation, nutrient pollution, and habitat fragmentation…"* (p.151)

2.14. *"…coral reefs…habitat degradation."* (p.156)

2.15. *"…collection of wild species of plants and animals for cultivation and domestication."* (p.160)

2.16. *"the exploitation of common-pool resources"* (p.162)

2.17. *"Exploitation of the resource…"* (p.163)

2.18. *"Cattle production is the largest cause of deforestation in the Amazon region."* (p.166)

2.19. *"Plowing, overgrazing and over-irrigation cause erosion and salinization."* (p.168)

2.20. *"Grasslands around the world have experienced similar degradation."* (p.168)

2.21. *"destruction of prairies, bison, and birds"* (p.174)

2.22. "*...problems of pollution and habitat destruction…"* (p.175)

2.23. "deforestation, overgrazing, desertification, and the eutrophication of lakes" (p.177)

2.24. *"Overconsumption of water from the Rio Grande causes stretches of the river to periodically run dry."* (p.179)

2.25. "…exploitation of a commons…" (p.181)

With the use of words like *loss, conversion* and *degradation* the verb forms 'to loose', 'to convert' and 'to degrade' have been nominalised. This produces a void by omitting the human agent from the discourse. Stibbe (2015) contends that the underlying structures 'A destroys B' and 'A pollutes B' are summed up into single

nouns like destruction and pollution leading to the erasure of the actor A. Hence, nominalised forms grammatically do no require an agent, thus these forms rid the authors of any moral obligation to include the agents.

4.2.2.3 Nominalisation in Environmental Science: Working with the Earth

Akin to the previous textbooks, this textbook also makes abundant use of the strategy of nominalisation to construct erasure of the human agent.

3.1. *"natural capital degradation"* (p.6)

3.2 *"Examples of such degradation include urbanization of productive land, excessive topsoil erosion, pollution, deforestation…groundwater depletion, overgrazing of grasslands by livestock, and reduction in the earth's forms of wildlife (biodiversity) by elimination of habitats and species."* (p.10)

3.3. *"degradation of renewable free-access resources"* (p.10)

3.4. *"Natural capital degradation"* (p.13)

3.5. *"environmental degradation"* (p.15)

3.6. *"…the resulting pollution and environmental degradation"* (p.15)

3.7. *"degradation of renewable resources"* (p.15**)**

3.8. *"…high levels of pollution and environmental degradation…"* (p.15)

3.9. *"resource use, pollution, and environmental degradation"* (p.16)

3.10. *"resource depletion and degradation"* (p.17)

3.11. *"habitat fragmentation"* (p.109)

3.12. *"environmental disruption"* (p.111)

3.13. *"Habitat loss and fragmentation (especially from draining and filling of inland wetlands, deforestation, and development."* (p.111)

3.14. *"…environmental changes such as loss or fragmentation of their habitats and introduction of chemical pesticides."* (p.111)

3.15. *"Natural capital degradation"* (p.155)

3.16. *"world's ocean…open-access resource, subject to overexploitation…"* (p.180)

3.17. *"…the greatest threat to wild species is habitat loss…degradation, and fragmentation."* (p.190)

3.18. *"Deforestation…destruction of coral reefs and wetlands…and pollution of streams, lakes, and oceans."* (p.190)

Throughout the textbook the abundant use of this strategy highlights that nominalisation is a norm and is not considered problematic. This sheds light on the fact that even environmental discourses do not do justice to the ecosystem and its problems since the culprit is systematically veiled.

4.3 The Mask

The second category of erasure, which is the mask, deals with the representation of reality in a distorted way. Although the entity or reality is not completely omitted, as in the void, it is rather replaced with a molded version of itself. The most prominent type of mask is objectification which is rampant throughout the environmental discourses. As Stibbe (2015) maintains, mask is not the complete absence of an entity rather the entity is present but in a distorted way. A number of linguistic strategies are employed to construct this type of erasure including metonymy, metaphor, co-hyponymy, transitivity patterns and the construction of noun phrases.

4.3.1 Co-hyponymy

Co-hyponyms are lexical items that fall under the same hypernym or superordinate. For example, rose and daisy both fall within the hypernym of flower and are thus called co-hyponyms. They belong to the same semantic field and share certain characteristic qualities or attributes.

4.3.1.1 Co-hyponymy in Environmental Science: Earth as a Living Planet

Co-hyponymy has been used quite often in environmental discourses. Some of the examples from the selected textbook have been enlisted below.

1.1. *"Lions are a tourist attraction at Amboseli National Reserve in southern Kenya, and are a valuable resource."* (p.1)

1.2. *"environmental resources"* (p.6)

1.3. *"natural resources"* (p.7)

1.4. *"Sustainability of resources, such as species of fish from the ocean, a kind of tree from a forest, coal from mines…"* (p.8)

1.5. *"renewable environmental resources"* (p.8)

1.6. *"…renewable resources – such as water, forests, grasslands, agricultural lands, and fisheries"* (p.9)

1.7. *"noncommercial species"* (p.15)

1.8. *"environmental economics"* (p.127)

1.9. *"renewable resources-forest, fisheries, recreational lands, and so forth"* (p.129)

1.10. *"biological resources"* (p.132)

1.11. *"forest resources"* (p.134)

1.12. *"tangible natural resources"* (p.134)

1.13. *"environmental assets"* (p.136)

1.14. *"…and thus the fish and mammals that live in them are common resources"* (p.139)

1.15. *"America's living resources"* (p.260)

1.16. *"commercial fisheries"* (p.265)

1.17. *"living resources"* (p.267)

1.18. *"commercially valuable species"* (p.267)

1.19. *"wild biological resources"* (p.269)

1.20. *"commercial and recreational ocean salmon"* (p.270)

Oftentimes, nature has been placed as a co-hyponym of economical terms like *resources*-animals, plants and fish have been called resources- thus extracting life and consciousness out of them. This masks the true image of the living organisms and presents a distorted reality whereby they are equated with non-living entities. From example 1.1, we can ascertain that lions are valuable because they are a tourist attraction and a source of income, thus paralleling lions, a living and conscious

species, with resources and money. The word *resource* reoccurs with animal and plant species throughout the book, therefore suggesting that this is a normal and acceptable trend.

In examples 1.7, 1.16 and 1.18, living species are put as co-hyponyms of the economic term *commercial*, thereby implying that these living organisms are only important if they have a commercial value. The species are only *valuable* if they can generate profit. In the last example, it is evident that salmon has been objectified as a commodity that has a commercial and recreational value. About such construction Stibbe (2015) puts forth, "This erases the distinctiveness of living beings – draining the life out of them by including them in a list of resources along with inanimate objects" (p. 157). Therefore, these representations systematically erase the element of life from the living organisms and turn them into commodities for human use.

To counter the objectifying of animals and nature, co-hyponym constructions could be avoided in discourses. Expressions like *living resources* and *environmental assets* could be substituted with 'living species' and 'environmental living and non-living things', removing the connotation that the living world is nothing but a commercial resource for humans.

4.3.1.2 Co-hyponymy in Environmental Science: Towards a Sustainable Future

Some instances of co-hyponym within the textbook have been highlighted below.

2.1. *"ecosystem services"* (p.3)

2.2. *"ecosystem capital"* (p.4)

2.3. *"stock of ecosystem capital"* (p.4)

2.4. *"ecosystems also provide a flow of services that support human life and economic well-being."* (p.4)

2.5. *"Natural and managed ecosystems support human life and economies with a range of goods and services."* (p.4)

2.6. *"…we exploit these systems for goods"* (p.4)

2.7. *"ecosystem services and resources such as groundwater, soil, wildfish, and forestry products."* (p.5)

2.8. *"Ecosystem goods and services"* (p.5)

2.9. *"services obtained from the regulation of ecosystem processes"* (p.6)

2.10. *"ecosystem and their services"* (p.11)

2.11. *"natural resources"* (p.12)

2.12. *"ecosystem capital"* (p.127)

2.13. *"biological wealth"* (p.127)

2.14. *"wild and natural living resources"* (p.129)

2.15. "forest products" (p.129)

2.16. *"wild-caught fish or forest products"* (p.144)

2.17. *"wildlife resources"* (p.144)

2.18. *"trade in wildlife and wildlife parts"* (p.150)

2.19. *"wildlife trade"* (p.150)

2.20. *"wildlife resources"* (p.152)

2.21. *"natural capital"* (p.153)

2.22. *"ecosystem capital"* (p.156)

2.23. *"natural capital wealth of nations"* (p.156)

2.24. *"The world economy and human well-being directly depend on the exploitation of the natural goods that can be extracted from ecosystems."* (p.156)

2.25. *"fisheries products"* (p.158)

2.26. *"natural products"* (p.159)

2.27. *"wild income"* (p.159)

2.28. *"natural resources such as fish and forest products"* (p.160)

2.29. *"living resource"* (p.161)

2.30. *"forest goods"* (p.164)

2.31. *"ecosystem services"* (p.169)

2.32. *"resources of the high seas"* (p.173)

2.33. *"forests…natural resource"* (p.176)

2.34. *"natural services and products"* (p.176)

Time and again ecosystem species have been placed as co-hyponyms of *resources, systems, services* and *supplies* whereby representing them in economic terms as objects that are used by humans for their benefit. With the frequent use of environmental terms alongside economic terms, the idea that nature should only be valued if it has an economic value is ingrained within the minds of the readers. Such an ideology is highly detrimental for the ecosystem since it encourages the conservation and protection of only those species and living things that have a commercial value to us. In examples 2.2, 2.3, 2.12, 2.13, 2.21, 2.22, 2.23 and 2.27, ecosystem and nature have been placed against the terms 'capital' and 'wealth', which are monetary terms, thus placing a monetary value on the ecosystem. Similarly, in example 2.16, fish and forest have been put together with the term 'product' – a non-living commodity that is of use to humans- thus forests and fish are nothing more than mere goods whose value lie in their usefulness to humans. Such representations mask the real, living, conscious beings as mere products that have a monetary value for humans. Stibbe (2015) propounds that putting animals parallel to resources gives off the impression that these animals should be exploited for human use and if not then they are wasted.

4.3.1.3 Co-hyponymy in Environmental Science: Working with the Earth

This strategy has been abundantly employed in this textbook, thus erasing the characteristic of life from living species.

3.1. *"natural capital"* (p.6)

3.2. *"earth's natural capital"* (p.6)

3.3. *"natural capital and the natural or biological income"* (p.6)

3.4. *"biological income"* (p.6)

3.5. *"natural services"* (p.7)

3.6. *"natural resources"* (p.8)

3.7. *"natural income"* (p.8)

3.8. *"forest and wildlife resources"* (p.17)

3.9. *"commercially important species"* (p.113)

3.10. *"earth's natural capital"* (p.124)

3.11. biological income" (p.126)

3.12. *"natural capital"* (p.155)

3.13. *"environmental economists"* (p.159)

3.14. *"tropical forest resources"* (p.170)

3.15. *"natural products"* (p.172)

3.16. *"wildlife products"* (p.198)

The aforementioned examples reveal that time and again living species of the ecosystem have been placed with non-living things, thus extracting the quality of life out of them. The term *capital* not only removes the characteristic of life from living species but also converts them into mass nouns. Moreover, terms like *income* correlate living species with economic concepts even though there is no relation between environment and economics. Environment is an all-encompassing word, which includes all the living species including humans that have a value of their own regardless of their usefulness to other species; this is called the intrinsic value of the species which is not based upon their utility. The natural world has been denied this intrinsic value by ascribing them value in terms of their benefit to humans.

In phrases like *"environmental economists"* (example 2.13), an analogy is built between environment and economics even though they are entirely different paradigms with values poles apart. Such analogies start building up the idea that living species should only be valued if they have an economic value. They imply that living things are goods that have no life or consciousness and, thus no intrinsic value.

4.3.2 Metonymy

Metonymy is a process whereby the name of a thing is replaced with its adjunct, attribute or part. Animals are usually replaced with the name of their body parts that

are consumed by humans. For instance, "red meat" metonymically refers to the product that cow bodies are used to make (Stibbe, 2015, p. 153). They are thus masked or objectified as products leaving no trace of life in them.

4.3.2.1 Metonymy in Environmental Science: Earth as a Living Planet

From the representative sample, the selected examples have been enlisted below:

1.1. *"whale oil"* (p.132)

1.2. *"whale meat"* (p.133)

1.3. *"Baleen and whale oil"* (p.133)

1.4. *"red meat"* (p.139)

1.5. *"…bison meat…bison hair"* (p.259)

1.6. *"bison meat"* (p.260)

1.7. *"whale oil"* (p.278)

1.8. *"…elephant ivory and rhinoceros horns."* (p.279)

Such representations make us believe that these living species are mere products that have no life and value of their own, thus masking their reality. This confuses the conscious and living organisms with the products their bodies make after death (Stibbe, 2015). In the first two examples, it is evident that whales are metonymically referred to as *whale meat* and *whale oil*, thus replacing whales with the product that their bodies make. It implies that whales are valued for their utility to humans; they are not shown as alive, conscious beings rather as products, thus masking them as commodities. In example 1.4, we see that *"red meat"* has been metonymically used to refer to the meat of cattle. The author did not see it fit to use "cows" or "buffaloes" instead he substituted the living being with the products that their bodies make. Likewise, in example 1.5, bison has been substituted with *"bison meat"* and *"bison hair"* that are the metonymical representations of their body parts, which are of utility to humans. Likewise, in the last example, elephants and rhinoceros have been metonymically referred to as *"elephant tusks"* and *"rhinoceros horns"*, thus mentioning the body parts that are of utility to humans.

To do away with the problem of metonymy in environmental discourses, their use needs to be shunned since such constructions cannot be substituted with any alternate constructions.

4.3.2.2 Metonymy in Environmental Science: Towards a Sustainable Future

The instances of metonymy from the selected book have been given below:

2.1. *"…furs from wild animals…"* (p.140)

2.2. *" "luxuries", including polar bear rugs, ivory-handled knives, and reptile-skin handbags."* (p.140)

2.3. *"Rhino horn is prized in traditional Asian medicine and as ornamentation."* (p.140)

2.4. *"bush meat"* (p.159)

2.5. *" "fashionable" meat"* (p.159)

2.6. *"primate meat"* (p.159)

2.7. *"bush meat"* (p.181)

Recurrently, there are many instances of metonymical representation of animals. In example 2.1, animal fur has been mentioned which is a commodity and a status symbol. Likewise, in example 2.2, there is mention of other luxuries made of animal body parts including rugs, knives and handbags. Rugs are made from the skin of polar bears, knives are made of ivory tusks and handbags are made of reptile skin. Likewise, in example 2.3, rhinoceros have been mentioned by mentioning their horns that are a valuable asset for medicine and ornamentation. Similarly, in example 2.5, *"bush meat",* which is orangutan's meat, has been called *"fashionable meat"* since it is a status symbol. These body parts have been highlighted instead of the live organisms, thus implying that they are valuable for the products they make. It masks their reality as a human utility. Such representations build up the belief that animals are not living beings that have consciousness and intelligence hence "removing them from the sphere of moral consideration" (Stibbe, 2015, p. 154).

4.3.2.3 Metonymy in Environmental Science: Working with the Earth

Examples of metonymy from the selected book are as follows:

3.1. *"alligator meat and hides"* (p.108)

3.2. *"shark fins"* (p.113)

3.3. *"rhino horns, elephant tusks, and furs."* (p.172)

3.4. *"bushmeat"* (p.196)

3.5. *"tiger fur sells for $100,000 in Tokyo. With the body parts of a single tiger worth $5,000-$20,000...* (p.196)

3.6. *"...farms in Florida raise alligators for their meat and hides."* (p.202)

Many animal species are hunted or poached for their skins or other body parts for consumption or decoration. The skin of many animals including snakes and reptiles is considered a luxury and is sold at exorbitant prices. Thus, these commodities are a big business. Here, again, the author has implicitly mentioned the animals by mentioning their body parts that make these commodities: *alligator meat* is the food of the rich, alligator skin products are a luxury and *elephant tusks* and *rhino horns* are used to make ornaments and decorations. In example 3.2, sharks are cherished for their fins that are considered a luxury and a commodity. Example 3.5 reveals that animal parts are highly prized in the markets especially rare animal's parts, which even furthers their killing. Such metonymical representations reveal that the entire organism is not of importance instead the body parts that make up products are of importance. This distorts the reality of the living organisms and puts them forth as non-living products.

4.3.3 Transitivity Patterns

Transitivity patterns refer to how meanings are represented in clauses. A clause has three components:

1. The process (verbal group)
2. The participants in the process (nominal group)
3. The circumstances associated with the process (adverbial group and prepositional phrases) (Halliday, 2000, p. 107)

In terms of erasure, Stibbe (2015) only emphasized on two types of transitivity patterns: material processes and mental processes. Also, he only analysed the nominal group/component of the clauses whereby the subject and the object of the clauses are delienated and it is seen how they construct the erasure of the ecosystem species.

Material processes are processes of doing, consisting of an actor, process and a goal/object/affected while mental processes are processes of sensing. These processes have two participants called senser, who sees and senses and an affected, which is sensed. In ecological discourses, the natural world is usually placed in the slot of the object to which something is being done while the human is the actor. This denies the animals the ability to act and participate in their ecosystem.

4.3.3.1 Transitivity Patterns in Environmental Science: Earth as a Living Planet

Many instances of animals and generally the ecosystem being placed in the position of the affected have been found in the selected textbook.

1.1. *"…where people from around the world can experience Africa and wild animals, such as lions and elephants."* (p. 2)

1.2. *"Tourists want to see wild lions…"* (p.3)

1.4. *"…selling a cow…"* (p.131)

1.5. *"viewing wildlife"* (p.131)

1.6. *"Harvest all the whales…"* (p.132)

1.7. *"…those who hunted bowhead whales…"* (p.132)

1.8. *"…they will harvest all the whales"* (p.132)

1.9. *"We…harvesting a resource"* (p.133)

1.10. *"whale-watching tourist boats"* (p.134)

1.11. *"Tourists from all over the world come to the Everglades to see its unusual landscape and wildlife."* (p.170)

1.12. *"…watching grizzlies from a safe distance has become a popular recreation."* (p.258)

1.13. *"…conservation and management of wildlife and fisheries, and therefore to endangered species…"* (p.260)

1.14. *"For a species that we intend to harvest…for a species that we wish to conserve…"* (p.261)

1.15. *"…managing a deer herd for recreational hunting."* (p.262)

1.16. *"Ecotourists value nature, including its endangered species…"* (p.273)

1.17. *"Many organisms-birds, large land mammals, and flowering plants, as well as many insects and ocean animals- are appreciated for their beauty."* (p. 273)

1.18. *"…whales were brought on board and processed…"* (p.277)

Animals are generally placed in the position of an affected to whom some action is being done. Stibbe (2015) mentions that statements do not explicitly deny animals of life, activity and consciousness, it is done implicitly through transitivity patterns by putting them in the place of object and affected repeatedly.

In the first, third and fourth examples, humans are performing some kind of actions on the animals, thus putting them in the place of objects. Actions like *seeing, selling, viewing, harvesting, hunting, conserving, buying* and *processing* are all done upon animals-the nature and animals are the receivers of the actions. It masks them as living creatures who can carry out activities and have an active role in the ecosystem. In examples 1.1, 1.16 and 1.17, humans are playing the role of a senser whereby they are *experiencing, valuing* and *appreciating* nature and wildlife. These structures again place nature in the position of an object which is sensed by humans. It shows that animals are not capable of sensing, thus, rendering them lifeless and consciousless species.

1.19. *"Elephants topple trees, changing forests to grasslands…"* (p.13)

1.20. *"…both cattle and bison, if too many of them are left too long in too small an area, will cause extensive damage to grasses."* (p.177)

1.21. *"sea lions haul out and sun themselves on boats and pollute the water with their excrement near shore."* (p.279)

1.22. *"…the grizzlies didn't like the cameras and destroyed them."* (p.258)

1.23. *"mountain lions have attacked and even killed people."* (p.279)

Where animals appear in the position of an actor, they are shown to be performing ecologically harmful activities. Such examples manifest that animals have only been put in the place of an actor when they are performing ecologically harmful activities. Hence, their role is reduced to creatures who only damage the ecosystem. Their true characteristics as living beings who act, think, feel and have an active role

in the ecosystem are erased. In the first example, elephants destroy the ecosystem by destroying trees, in the second example cattle overgraze grasslands and damage them and in the third example sea lions pollute water. Moreover, in example 1.22, grizzlies have been shown as destructive entities whereby they destroy equipment and in the next example lions have been put in the place of subject only to show them killing humans. Such constructions represent them as ecologically destructive beings.

To represent animals as living species capable of acting and feeling, they need to be given the actor and the senser's position more frequently. Often, one witnesses an animal crying, proving that they can feel; this aspect needs to be shed light upon as it would aid the reader in relating with the species and nature and feeling remorse for it. It is also imperative that when placed in the actor's position, animals should be shown as carrying out ecologically friendly activities - these beings are certainly more harmonious than the humans representing them.

4.3.3.2 Transitivity Patterns in Environmental Science: Towards a Sustainable Future

From the selected text, some instances of animals appearing in the place of an affected have been enlisted.

2.1. *"the production of crops, livestock, and aquaculture."* (p.5)

2.2. *" We have learned how to domesticate landscapes and ecosystems, converting them into highly productive food-producing systems."* (p.8)

2.3. *"...possible to harvest a certain percentage of trees or fish."* (p.11)

2.4. *"Many species of plants and animals have instrumental value to humans and will tend to be preserved (conserved, that is) so that we can continue to enjoy the benefits derived from them."* (p.128)

2.5. *"Because species are selected from nature for animal husbandry, forestry, and aquaculture…"* (p.129)

2.6. *"bird-watching"* (p.130)

2.7. *"whale-watching boats"* (p.131)

2.8. *"…tourists visit a place in order to observe wild species…"* (p.131)

2.9. *"We use wild species for food, fiber, fuel, and a source of medicines; we value them aesthetically and want recreation in natural habitats. We need biodiversity to maintain healthy ecosystems, which brings a great deal of economic benefits."* (p.142)

2.10. *"…collection of wild species of plants and animals for cultivation or domestication."* (p.160)

2.11. *"harvesting of natural resources such as fish and forest products."* (p.160)

In the above examples, it is evident that animals are always shown to be the receivers of some kinds of actions done by humans and are rarely the doer of an activity. In the second example, the author declares that humans tend to conserve species because of their benefit to humans so to derive continuous benefit from them humans will continue to preserve them. Terms like *harvest, preserved, use* and *collect* are actions done upon animals and nature. Humans also sense animals when they *value* them, which again puts the animals in the place of object. This type of representation masks the true reality of the animals and represents them as beings who are devoid of any life and consciousness. It rids us of any moral obligation towards these beings since they are represented as objects, who have no right to life; "the erasure of animals as living beings in agribusiness discourse has the potential to remove moral consideration of animal welfare" (Stibbe, 2015, p. 154).

2.12. *"Rats also eat crops, destroy property, and cause other harm to humans…"* (p.138)

2.13.*"Wild boar…They are dangerous and tear up soil, rooting up plants."* (p. 138)

2.14. *"…the large number of deer damage the ecosystems they inhabit as well as the other organisms living there."* (p.144)

2.15. *"Many nuisance animals are thriving in highly urbanized areas, creating various health hazards."* (p.145)

In the aforementioned examples, rats and wild boars have been put in the place of subject, however they are shown to be carrying out destructive actions. Rats destroy crops and property, wild boars destroy plants and soil and deer are a threat to the ecosystem and the living organisms residing in it. The last example is an epitome of a destructive construction where animals have been called a *nuisance.* With

urbanization comes the destruction of the habitats of a lot of animal species, therefore habitat destruction forces them to reside in urbanized areas. All these facts have been concealed in the upper statement and only the portion where these animals reside in the urban areas and disturb its citizens have been foregrounded. Such representations make us believe that animals are not amiable creatures, who live in harmony in the ecosystem, rather, if left unsupervised they are a menace to the ecosystem.

4.3.3.3 Transitivity Patterns in Environmental Science: Working with the Earth

Akin to the other texts, this text also makes abundant use of this linguistic strategy. Some instances have been highlighted.

3.1. *"Their children help them…tend crops and livestock…"* (p.14)

3.2. *"Many people – influenced by movies…think of sharks as people-eating monsters."* (p.113)

3.3. *"Wild places are areas where people can experience the beauty of nature and observe natural biological diversity."* (p.175)

3.4. *"Every year, Americans spend more than three times as many hours watching wildlife-doing nature photography and bird watching, for example-as they spend watching movies or argueional sporting events."* (p.189)

3.5. *"…Americans visit these refuges each year to hunt, fish, hike, or watch birds and other wildlife."* (p.202)

Stibbe argues that animals are never in the position of actor or senser- "they are not shown as seeing, hearing, feeling or thinking anything" (Stibbe, 2015, p. 154). The placement of animals in the place of an affected has become so ingrained within our minds that on seeing the above mentioned examples no shortcoming is witnessed. However, as is evident, animals are generally placed in the position of an affected due to which it is hard for us to imagine them as active beings who act and feel like us. The statements aforementioned where humans enjoy nature and observe and value it are positive statements, which encourage the conservation of nature, however this conservation is only done to further human benefits.

2.6. *"Between 1990 and 2003, sharks killed a total of 8 people off U.S coasts and 88 people worldwide…"* (p.113)

Sharks are active creatures of the marine ecosystem, however in the aforementioned example, their activity has been restricted to only killing and causing harm to humans. Whether or not they have an active and important role in the ecosystem the readers will never be aware of it. These types of statements mask the true reality of animals and present them as harmful to the ecosystem and human race; thus convincing us that destroying them is for our defense and safety.

4.3.4 Metaphors

Metaphors literally mean describing something as something else. Metaphors establish a relationship between two different things. In Stibbe's words (2015), metaphors are a type of framing in which a story is used to frame a completely different area of life.

4.3.4.1 Metaphors in Environmental Science: Earth as a Living Planet

Some manifestations of the use of metaphors to frame the ecosystem in a different area of life are highlighted.

1.1. *"Massi are now protecting lions and thus the tourist income…"* (p.4)

1.2. *"…people around the world rank the environment among the most important social and political issues."* (p.5)

1.3. *"…the careful management and wise use of the planet and its resources, analogous to the management of money and good."* (p.9)

1.4. *"noncommercial species"* (p.15)

1.5 *"environmental decisions based on economics?"* (p.127)

1.6. *"environmental economics"* (p.127)

1.7. *"…environmentalism. Its foundation is the "three E's": ecology, engineering, and economics."* (p.129)

1.8. *"This interplay between private good and public good is at the heart of environmental issues."* (p.129)

1.9. *"…beekeeping is a commercial enterprise…"* (p.130)

1.10. *"...personal profit from selling a cow..."* (p.131)

1.11. *"...the whales alive in the ocean, can be thought of as the capital investment of the industry."* (p.132)

1.12. *"...pollution…is a social-economic-environmental trade-off."* (p.138)

1.13. *"...environmentalism as a social and political movement of the 20th century…"* (p.259)

1.14. *"...market for bison meat and other bison products…"* (p.259)

1.15. *"...buffalo hunting was the main economic activity…"* (p.265)

1.16. *"commercially valuable species"* (p.267)

1.17. *"...most wild biological resources really aren't a good business over the long run."* (p.269)

1.18. *"commercial and recreational ocean salmon"* (p.270)

1.19. *"commercial logging"* (p.281)

In order to create and propel a business that depends upon the exploitation of animals, the representation of animals in discourses is done in such a way that they are erased as living beings and represented as economic factors or variables (Stibbe, 2015). In the first example, we can see that the frame of money has been used for lions, thus implying an identity between a living organism and the material world. In the protection of lions, Massi people are indirectly protecting their material benefit. Moving on, in examples 1.2 and 1.13, environment has been placed in the domain of a social and political issue, however environment is neither of the two. Environment has an intrinsic value, which suggests that it should be protected and taken care of irrespective of any social or political gains. In example 1.3, the management of the ecosystem has been made akin to management of money and goods, thus yet again the ecosystem has been put in the frame of economics through the use of metaphors. It can be inferred that the protection of the environment is a material and monetary gain for humans. From examples 1.4, 1.9, 1.10, 1.11, 1.16, 1.18 and 1.19, it can be observed that animal and plant species have been put in the frame of economics by calling them commercially valuable. All these species are valuable because of their value in the economic world. As long as they bring profit and monetary benefits, they

are valuable and must be preserved. Such framing is detrimental for the management of the ecosystem because it encourages the protection of only those species that are beneficial to humans; nonbeneficial species are neglected.

Moving on, in examples 1.5, 1.6 and 1.7, we can see an interconnectedness between the domains of environmentalism and economics. Environmental decisions based on economics is a recipe for disaster because the world of economics is a selfish and ruthless one, where only personal profit and gain are valued. For this personal profit, nature is exploited. Thus, the economic frame is lethal for the environment. In example 1.8, environment has again been placed in the frame of economics whereby it is argue that the only grave environmental issue faced nowadays is of public and private goods. Thus, the management of the environment has been made analogous to the management of goods. If public and private goods are secured and are produced sustainably, we do not need to be concerned about the environment and its wellbeing. In example 1.17, natural resources have been put in the frame of profit making business whereby wild natural resources are not termed as good business as they do not return high profits. Such a comparison instils the idea that money making natural resources are valuable over non-money making resources, thus their conservation is a priority. From these analogies, it is evident that the author wants to further the idea that nature is only valuable if it has an economic value. Otherwise, it is not worthy of protection and safekeeping.

Metaphorical constructions add to the essence of the text, however, constructions that further the destruction of the ecosystem should be curbed. Paralleling the natural world with the economic world is disastrous, hence, such paralleling should be avoided. Nature has an intrinsic value of its own regardless of its monetary value; this concept needs to be upheld in discourses. Avoiding the use of terms like *commercial* and *business* with the natural world would be a step towards the betterment of the ecosystem.

4.3.4.2 Metaphor in Environmental Science: Towards a sustainable future

Some occurrences of metaphor in the selected text have been enlisted below.

2.1. *"interconnectedness of ecological systems and human enterprises."* (p.3)

2.2. *"natural ecosystems (from which we derive many goods and services)…"* (p.3)

2.3. *"these goods and services can be thought of as capital-ecosystem capital."* (p.4)

2.4. *"Ecosystem goods and services were grouped into provisioning services (goods such as food and fuel), regulating services (processes such as flood protection), and cultural services (nonmaterial benefits such as recreation)."* (p.5)

2.5. *"goods obtained from ecosystems"* (p.6)

2.6. *"Oysters are a big business"* (p.13)

2.7. *"biological wealth that makes up most of the ecosystem capital that sustains human life and economic activity with goods and services."* (p.127)

2.8. *"Commercial landings of many species of fish…"* (p.133)

2.9. *"…the global market for timber and other natural resources are powerful forces that will continue to draw down biological wealth on those continents."* (p.135)

2.10. *"Shrimps, fish, crabs, and other commercially valuable sea life…"* (p.139)

2.11. *"…products derived from wild species."* (p.140)

2.12. *"Trade in wild animals can be very profitable…"* (p.141)

2.13. *"imported species"* (p.141)

2.14. *"We need biodiversity to maintain healthy ecosystems, which bring a great deal of economic benefit."* (p.142)

2.15. *"loss of commercially important species"* (p.153)

2.16. *"ecosystem capital…natural capital wealth of nations."* (p.156)

2.17. *"…natural ecosystems are maintained…because that is how they provide the greatest economic value for their owners."* (p.158)

2.18. *"Ocean and coastal ecosystems provide goods and services that enable commerce and enhance human well-being."* (p.168)

2.19. *"The great variety of fish and shellfish that live on reefs are important sources of food and trade for local people."* (p.172)

2.20. *"commercial forestland"* (p.176)

Time and again, the ecosystem and its components have been linked with words like *resources* and *capital*, thus implying an economic identity of the living species.

This creates an impression that these living species do not have any intrinsic value of their own rather they are valued as products that are resourceful to humans. In example 2.1, an interconnection has been built between ecosystem and human enterprise. The management of ecosystem is akin to the management of businesses that return profits. Thus, the management of the ecosystem is an opportunity to cash on.

Moving on, oft-times ecological species have been put in the domain of resources and goods that serve as commodities for humans. These species are products of human consumption and are thus exploited for such gains. Where a species cannot provide material benefits, it is used for recreational benefits (example 2.4) ergo some sort of benefit must be derived from nature and it is for this benefit that it should be protected. Oysters, in example 2.6, have been termed a business, thus putting this species in an economic frame and deriving its value from its economic value to humans.

Moreover, words like *commercial* and *market* have been repeatedly used for nature and its animal and plant species, consequently, putting them in the frame of economics. Another frequent term employed for nature is *trade* (examples 2.12, 2.13 and 2.19), which is an economic concept meaning the selling and buying of goods. Animal and plant species are mere products that are traded off for economic benefits. Phrases like *"ecosystem capital"* and *"natural capital"* are used for finances obtained from natural goods and services and a monetary value is put on them.

4.3.4.3 Metaphors in Environmental Science: Working with the Earth

Akin to the other texts, this textbook also shows instances of the use of metaphors for the ecosystem.

3.1. *"…the natural resources and natural services that keep us and other species alive and support our economies."* (p.6)

3.2. *"…natural capital and the natural or biological income it provides…"* (p.6)

3.3. *"earth's natural capital that supports us and our economies."* (p.6)

3.4. *"…living off such biological income without depleting or degrading the natural capital that provides this income."* (p.8)

3.5. *"...the earth's endowment of natural capital that supplies this biological income."* (p.8)

3.6. *"Nonrenewable resources can be economically depleted..."* (p.12)

3.7. *"commercially important species"* (p.113)

3.8. *"game species"* (p.124)

3.9. *"Illegal hunting or poaching endangers wildlife species with economically valuable parts such as elephant tusks, rhinoceros horns, and tiger skins."* (p.124)

3.10. *"commercially valuable marine fish species"* (p.156)

3.11. *"...forests provide many important ecological and economic services"* (p.159)

3.12. *"commercially important tree species"* (p.160)

3.13. *"Harvesting timber...and fuelwood from forests provide many economic benefits."* (p.163)

3.14. *"...forests are valued mostly for their economic services..."* (p.164)

3.15. *"...monetary value of the ecological services provided by forests"* (p.164)

3.16. *"value of the ecological services and income provided by forests and other parts of nature"* (p.165)

3.17. *"economically valuable medium-size and large trees..."* (p.167)

3.18. *"...recreation, hunting, and fishing in national forests and ten times more money to the national economy and provide seven times more jobs than does extraction of timber and other resources."* (p.168)

3.19. *"...large areas of ecologically and economically important tropical forests..."* (p.169)

3.20. *"...world's 200 commercially valuable marine fish species..."* (p.180)

3.21. *"commercially valuable species"* (p.180)

3.22. *"passenger pigeon hunting became a big business."* (p.183)

3.23. *"…species…their instrumental value based on their usefulness to us in the form of economic and ecological services… For example, some species provide economic value in the form of food crops, fuelwood and lumber, paper, and medicine."* (p.188)

3.24. *"A few wipe out some native species, disrupt ecosystems, and cause large economic losses."* (p.192)

3.25. *"bushmeat trade"* (p.196)

Yet again, living species have been placed against the material world. Such metaphorical constructions appear oft-times in the book. Stibbe (2015) declares that metaphors explicitly objectify animals unlike the other strategies that do so implicitly (2015). Metaphorical expressions explicitly place the natural world against a dissimilar frame/area of life, usually economics. In the first example, it is argue that nature and its services provide humans with capital and support our economies, thus putting nature in the frame of economics. As argue in example 3.18, animal and fish species are a source of income and jobs, thus placing them again in the frame of economics.Time and again, the terms *income* and *capital* have been put against the environment thereby giving it value in terms of money and material benefits.

Game species has been used for animal species that are hunted for sport, thereby, reducing them to nothing but a sport. In the same context, in example 3.22, passenger pigeon hunting has been called a business whereby putting a monetary value on the pigeons and exploiting them for it. In example 3.24, environmental degradation has been paralleled with economic losses, hence, the environment is a big source of income for humans; it is for this purpose that nature is exploited. Even its preservation is primarily for the reason of economic gains.

4.3.5 Construction of Noun Phrases

Within the noun phrases, there is a head noun and an optional modifier called an adjective. Stibbe (2015) maintains that usually the ecological terms fall in the place of the modifiers while economic terms are head nouns, therefore giving a secondary position to the ecosystem while economical concepts are the primary focus.

4.3.5.1 Construction of Noun Phrases in Environmental Science: Earth as a Living Planet

Some examples of such constructions within the selected text are as follows.

1.1. *"environmental resources"* (p.6)

1.2. *"natural resources"* (p.7)

1.3. *"renewable environmental resources"* (p.8)

1.4. *"environmental resources"* (p.16)

1.5. *"natural resources"* (p.18)

1.6. *"environmental economics"* (p.127)

1.7. *"biological resources"* (p.132)

1.8. *"forest resources"* (p.134)

1.9. *"tangible natural resources"* (p.134)

1.10. *"environmental assets"* (p.136)

1.11. *"living resources"* (p.267)

1.12. *"fisheries resources"* (p.267)

1.13. *"wild biological resources"* (p.269)

As is evident, ecological terms like environment and nature are the modifiers while resources, an economic term, is the head noun. "…The economics frame is primary since the economic words form the *head* of noun phrases while the ecological terms are optional *modifiers"* (Stibbe, 2015, p. 152). Such a representation makes the ecosystem subservient to the economic/material world. Thus, it gives more weightage to finances and capital than the ecosystem. Words like *environment, natural, biological, forest, biological* and *living* are all environmental terms but they repeatedly appear in the position of modifiers before the head nouns. The head nouns are economic terms like *resources, economics* and *assets*, which hold the central position in the phrases. From such constructions it is inferred that the economic world is our primary focus and goal and everything else works towards it. Thus, the conservation and preservation of the environment is for the betterment of our economies.

To give primary significance to the natural world, it is crucial to give it the place of the head noun and sideline all the other domains that are dependent upon it. Firstly, the coupling of the natural terms with the economic terms and, secondly, placing nature subservient to the economic world are a cause for disaster. When the use of co-hyponym terms is unavoidable, the author could minimalise its effect by representing nature as primal. Terms like *living resources* and *forest resources* could be substituted with 'resources of the living species' and 'resources of forests', giving the primal position to nature and its species.

4.3.5.2 Construction of Noun Phrases in Environmental Science: Towards a sustainable future

This section will look at the instances where the ecosystem has been placed as a modifier in the noun phrases.

2.1. *"ecosystem services"* (p.3)

2.2. *"ecosystem capital"* (p.4)

2.3. *"Ecosystem goods and services"* (p.5)

2.4. *"ecosystem services and resources"* (p.5)

2.5. *"ecosystem capital"* (p.12)

2.6. *"natural resources"* (p.12)

2.7. *"ecosystem goods and services"* (p.19)

2.8. *"ecosystem capital"* (p.127)

2.9. *"biological wealth"* (p.127)

2.10. *"wild and natural resources"* (p.129)

2.11. *"forest products"* (p.129)

2.12. *"wild-caught fish or forest products"* (p.144)

2.13. *"wildlife resources"* (p.144)

2.14. *"wildlife trade"* (p.150)

2.15. *"wildlife resources"* (p.152)

2.16. *"natural capital"* (p.153)

2.17. *"ecosystem capital"* (p.156)

2.18. *"natural capital"* (p.158)

2.19. *"natural products"* (p.159)

2.20. *"natural resources"* (p.160)

2.21. *"ecosystem products and services"* (p.160)

2.22. *"natural ecosystem resources"* (p.160)

2.23. *"living resource"* (p.161)

2.24. *"forest goods"* (p.164)

2.25. *"forest resources"* (p.166)

2.26. *"ecosystem services"* (p.169)

2.27. *"fish resources"* (p.170)

2.28. *"natural resource"* (p.176)

2.29. *"natural services and products"* (p.176)

These examples reveal that the natural world is brought into an economic frame rather than placing economics within an ecological frame. The head nouns *services, resources, products* and *goods* activate the economic frame and the modifiers such as *ecosystem, natural, biological, wildlife, living* and *forest* activate the ecological frame. However, the ecological frame is secondary and subservient to the primary economic frame. Monetary terms such as *capital* and *wealth* are also used as head nouns thereby activating the economics frame. It implies that money is the ultimate goal and to achieve it nature is exploited. Thus, nature and everything in it are all subservient to money and material gains. Stibbe (2015) argues that treating the natural world in the same way as objects removes the unique elements of life, consciousness and interdependence from it. This is how the reality of the natural world is masked.

4.3.5.3 Construction of Noun Phrases in Environmental Science: Working with the Earth

The instances where such constructions have been used in the selected book have been shed light upon.

3.1. *"natural capital"* (p.6)

3.2. *"earth's natural capital-the natural resources and natural services…"* (p.6)

3.3. *"natural or biological income"* (p.6)

3.4. *"natural services"* (p.6)

3.5. *"natural resources"* (p.8)

3.6. *"natural income"* (p.8)

3.7. *"forest and wildlife resources"* (p.17)

3.8. *"earth's natural capital"* (p.124)

3.9. *"biological income"* (p.126)

3.10. *"natural capital"* (p.155)

3.11. *"environmental economists"* (p.159)

3.12. *"tropical forest resources"* (p.170)

3.13. *"wildlife products"* (p.198)

In such a representation, the living world has been treated in economic terms thereby devoiding it of consciousness and the quality of life. The natural world has been erased and replaced with a distorted version of itself. Such a representation is lethal because it gives off the idea that exploiting a non-living and unconscious being does not need a moral consciousness.

4.4 The Trace

One way through which erasure is constructed is through trace; it is when discourses background the natural world thereby leaving a faint trace of it than a vivid one. The natural world is still present but in traces (Stibbe, 2015). The ecosystem only appears in traces in such discourses, thus, readers are not sensitized towards it and its

problems. The two linguistic strategies that largely construct this type of erasure are massification and hyponymy.

4.4.1 Hyponymy

In hyponymy, hyponyms have a type-of relationship with their hypernyms. A hyponym is a word/phrase whose semantic field is included within that of another word, its hypernym/superordinate or co-hyponym. For example, rose, daisy and tulip are all hyponyms of the hypernym/superordinate flower.

4.4.1.1 Hyponymy in Environmental Science: Earth as a Living Planet

Within environmental discourses, it is seen that specific names of the species of plants and animals are replaced with their superordinate/hypernym thereby leaving a faint image of the species. Some examples from the selected text include:

1.1. *"...and we are eliminating habitats of endangered species and other wildlife"* (p.8)

1.2. *"Sustainability of resources, such as species of fish from the ocean, a kind of tree from a forest…"* (p.8)

1.3. *"environmental resources…benefits for people and other living things on our planet."* (p.8)

1.4. *"rare and endangered species"* (p.11)

1.5. *"marine fish"* (p.15)

1.6. *"damaging exotic species"* (p.17)

1.7. *"bringing fish species to extinction"* (p.129)

1.8. *"wild creatures"* (p.130)

1.9. *"viewing wildlife"* (p.131)

1.10. *"long-lived creatures"* (p.132)

1.11. *"...and thus the fish and mammals that live in them are common resources"* (p.139)

1.12. *"Everglades…it is home to 11,000 species of plants, several hundred species of birds, and numerous species of fish and mammals."* (p.170)

1.13. *"native birds and mammals"* (p.171)

1.14. *"native and endangered species"* (p.171)

1.15. *"invasive exotic species"* (p.171)

1.16. *"endangered and threatened species"* (p.172)

1.17. *"…wetland plants, wading birds, waterfowl, fish and other wildlife."* (p.174)

1.18. *"…used by many species of wildlife, including millions of migratory birds."* (p.176)

1.19. *"damaging fish and aquatic insect habitat"* (p.176)

1.20. *"wildlife, fisheries, and endangered species"* (p.260)

1.21. *"wild population"* (p.264)

1.22. *"handful of species"* (p.264)

1.23. *"animal populations"* (p.264)

1.24. *"marine organisms"* (p.272)

1.25. *"coral-reef species"* (p.272)

1.26. *"marine mammals"* (p.277)

Hyponymy aids in the construction of erasure "when superordinates replace the name of the species"; the species name "badger" vividly represents the species and all the characteristics particular to it while the hypernyms "organism" removes all these features and only conveys the "feature of being alive" (Stibbe, 2015, p. 156). Such examples reveal how the ecosystem has been backgrounded by the use of hypernyms. *Endangered species* and *wildlife* are both very abstract terms that include innumerable species; due to the use of such general umbrella terms one cannot deduce the species that are becoming extinct or are endangered. In the second example while humans have been explicitly and separately mentioned, all the animal and plant species have been grouped together under the hypernym *living things*. It implies that the human race is important and all the other species are secondary and subservient to it. In many

places animal and plant species have been mentioned by mentioning the places where they reside: *marine fish, native species, aquatic insect habitat, marine organisms, coral-reef species* and *wetland plants.* Likewise, in many places *wild species* or *wild organisms* have been used; it refers to a number of species that dwell in the wild but their habitat has been foregrounded while the species living there have been backgrounded- "the imaginable individuals are buried deeply within the abstractions" (Stibbe, 2015, p. 156). Some terms are even more abstract and less imaginable; while the hypernyms fish, animals and mammals may be general but terms like living organisms, living things and *long-lived creatures* are even more unspecific and background all the living organisms that fall within them. Humans are explicitly mentioned, thus foregrounding them while animal and plant species are backgrounded through abstract terms.

To represent nature vividly, hyponym terms should be replaced with the specific name of the species. Expressions like *native birds and mammals* could be alternated with the name of the specific species like 'falcon species', 'dove species' or 'markhor species'. These alternate terms produce a graphic and evocative image in the mind of the readers.

4.4.1.2 Hyponymy in Environmental Science: Towards a sustainable future

The use of hyponymy for nature is rampant in the selected text. Some of the instances have been enlisted below.

2.1. *"bird life"* (p.2)

2.2. *"farm animals"* (p.2)

2.3. *"10,000 populations of vertebrates"* (p.8)

2.4. *"freshwater species"* (p.8)

2.5. *"…loss of many of the wild plants and animal"* (p.8)

2.6. *"…hundred of species of mammals, reptiles, amphibians, fish, birds and butterflies, as well as innumerable plants are exploited…"* (p.8)

2.7. *"wild plants and animal species are declining…"* (p.8)

2.8. *"aquatic species, and other animals…other bird populations"* (p.10)

2.9. *"Trees, fish and other biological species"* (p.10)

2.10. *"freshwater supplies"* (p.11)

2.11. *"exotic species"* (p.20)

2.12. *"threatened large vertebrates"* (p.126)

2.13. *"…plants, animals, and microbes-the wild species…"* (p.127)

2.14. *"shorebirds"* (p.128)

2.15. *"wild species"* (p.128)

2.16. *"all wild things"* (p.132)

2.17. *"20, 897 wild plants and animal species"* (p.133)

2.18. *"endemic aquatic species"* (p.133)

2.19. *"…songbird species…are declining…"* (p.133)

2.20. *"…a running list of threatened species…amphibian species…mammal species…bird species…"* (p.134)

2.21. *"wild birds"* (p.135)

2.22. *"aquaculture species"* (p.138)

2.23. *"…sea-bird species…threatened with extinction…"* (p.138)

2.24. *"native wildlife"* (p.138)

2.25. *"exotic birds"* (p.141)

2.26. *"wild birds"* (p.141)

2.27. *"exotic pets and houseplants is a growing problem."* (p.141)

2.28. *"exotic species"* (p.144)

2.29. *"wild species"* (p.144)

2.30. *"wildlife"* (p.144)

2.31. *"exotic invasive species"* (p.145)

2.32. *"invasive species and native species"* (p.145)

2.33. *" "injurious" species"* (p.146)

2.34. *"rarest species"* (p.146)

2.35. *"terrestrial and freshwater species"* (p.146)

2.36. *"marine and anadromous species"* (p.146)

2.37. *"marine fish"* (p.156)

2.38. *"colonial animals"* (p.156)

2.39. *"marine fish, habitat for wildlife"* (p.171)

2.40. *"wild species"* (p.176)

2.41. *"wildflolwers"* (p.178)

The use of hyponym terms represents animals and plants in very abstract terms so much so that a reader cannot imagine them or relate with them.

In the first example, it has been argue that innumerable animal and plant species have become extinct, however the abstract term *wild plants and animals* does not do justice to these species since as readers we cannot decipher the species being declares about. Had the author instead used the name of a specific species, like the passenger pigeon, the reader would have related with the statement and felt guilty about it. Similarly, in the second example we have been told that species are exploited but we cannot infer which specific species. Other hyponym terms include *biological species, exotic species, wild species, wildlife* and *threatened species.* In other examples, species of plants and animals have been mentioned by the places they inhabit. Some examples of this construction include *freshwater supplies, sea-bird species, native wildlife, houseplants, marine fish, colonial animals, shorebirds, aquaculture species, terrestrial and freshwater species, aquatic species* and *wildflowers.* Stibbe (2015) argues that in such representations we can only see traces of animals and plants since their habitats have been mentioned but not the dwellers of the habitat. In other instances, animals are mentioned by the functions they perform in the ecosystem such as *songbirds.* Such representations do little to invoke a vivid image, thus leaving a faint trace of the species in the minds of the readers.

4.4.1.3 Hyponymy in Environmental Science: Working with the earth

This text also includes rampant use of this strategy for the ecosystem and its living organisms.

3.1. *"extinction of the earth's species"* (p.5)

3.2. *"local forests, grasslands, soil, and wildlife"* (p.5)

3.3. *"living organisms (any unique form of life)"* (p.6)

3.4. *"protecting the earth's life support systems"* (p.6)

3.5. *"diverse natural forests"* (p.8)

3.6. *"diverse mature forests"* (p.8)

3.7. *"wild edible plants"* (p.10)

3.8. *"fish, migratory birds, wildlife species"* (p.10)

3.9. *"reduction in the earth's forms of wildlife (biodiversity)"* (p.10)

3.10. *"most wildlife species"* (p.11)

3.11. *"migratory birds"* (p.11)

3.12. *"…cause harm to people or other organisms"* (p.12)

3.13. *"…threatens the health, survival, or activities of humans or other living organisms"* (p.12)

3.14. *"…degrade life-support systems for humans and other species"* (p.12)

3.15. *"…human generations and other species that support us and for other forms of life"* (p.17)

3.16. *"terrestrial plants and animals"* (p.110)

3.17. *"In some habitats, extinction of certain amphibian species could lead to extinction of other species, such as reptiles, birds, aquatic insects, fish, mammals, and other amphibians…"* (p.112)

3.18. *"marine mammals"* (p.113)

3.19. *"A few big-game hunters have pushed for elimination of predators that prey on game species"* (p.124)

3.20. *"species of terrestrial plants and animals"* (p.169)

3.21. *"herbivorous fish species"* (p.181)

3.22 *"earth's wild plants and animals"* (p.188)

3.23. *"threatened U.S. songbird species"* (p.191)

3.24. *"nonnative species"* (p.192)

Time and again it is evident that the author does not explicitly talk about the specific species that are being affected rather general umbrella terms are used. In the first example, the term *earth's species* includes a very wide range of living organisms so it is perplexing for the readers to imagine a specific species and relate with its extinction. The second and third examples are even more ambiguous whereby every living organism has been included in all-inclusive terms like *earth's life support systems* and *earth's form of wildlife.* Such general terms background all the species that fall within them. In other places, species have been mentioned by their dwelling places such as *terrestrial plants and animals, marine mammals, earth's wild plants and animals* and *nonnative species.* Such representation sheds light on the habitat of the organisms instead of the species living in them. In example 3.8, birds have been specified by the actions they perform in the ecosystem, one of which is migration, thus leaving a faint trace of the specific species of birds. All these strategies whereby an umbrella term is used for specific species leaves a faint trace of the organism being declares about. Stibbe (2015) analyzed five ecosystem assessment reports on the representation of the natural world and found the natural world only in traces; he argue, "For the most part the reports erase the animals, plants, forests, rivers and oceans even though they are what the reports are all about" (p. 158). Likewise, in the current study the selected books are primarily about the natural world and its components, yet, it is the natural world that has been erased in these books.

4.4.2 Massification

Massification is a strategy in which countable nouns are converted into uncountable ones, thus leaving a faint trace of the entity being declares about. Animal and plant species are converted into uncountable nouns in environmental discourses. By this process they become abstract, material stuff.

4.4.2.1 Massification in Environmental Science: Earth as a Living Planet

Massification terms- use of mass nouns for the ecosystem- have been abundantly employed in environmental discourses.

1.1. *"Massi are now protecting lions and thus the tourist income"* (p.4)

1.2. *"...conversion of some corn production to biofuels"* (p.6)

1.3. *"natural capital"* (p.130)

1.4. *"fuelwood"* (p.131)

1.5. "*yield of lumber"* (p.134)

1.6. *"mass of animals"* (p.260)

1.7. "biomass of most major commercial fish" (p.267)

In the first example, lions, a countable noun, has been converted into income which is an uncountable, mass noun. Secondly, corn has been converted into biofuel which is also a material and a mass noun. Moreover, uncountable terms like *capital* and *income* when employed for nature and the animal and plant species within it convert them into mere stuff, which is uncountable. In the fourth example, wood has been turned into fuelwood, which is again an uncountable noun, thus leaving a faint trace of the plants and tree species that constitute the wood. Words like *yield* and *lumber* are also mass nouns used for plants and trees thereby hiding their true identity. In the last two examples, words like *mass* and *biomass* used for animals and fish background them behind the mass terms.

Thus, the animals and plants have been backgrounded by converting them into tons of stuff. The animals and plants are still there but only as a trace. Stibbe (2015) adds, "When trees, plants and animals are represented in mass nouns, they are erased, becoming mere tonnages of stuff" (p. 157). By this process, animals and plants are converted into tons of stuff, ergo, imaginable plants and animals are turned into unimaginable and abstract mass terms.

Such backgrounding of the natural species could be curbed by representing these species as realistically as possible and hence not as tonnes of stuff. The use of mass nouns in relation to the environment should be avoided.

4.4.2.2 Massification in Environmental Science: Towards a sustainable future

Akin to the other texts, instances of the use of this linguistic strategy were found in the selected book as well.

2.1. *"stock of ecosystem capital"* (p.4)

2.2. *"wood fuel"* (p.6)

2.3. *"timber, fiber, and fuel"* (p.8)

2.4. *"The natural world is being degraded, its ecosystem capital eroded."* (p.12)

2.5. *"ecosystem capital"* (p.127)

2.6. *"fuelwood"* (p.129)

2.7. *"natural capital"* (p.153)

Words like *stock, fuel, timber and fiber* are all mass nouns that convert the individual species of animals and plants into uncountable materials. As has already been mentioned, animals, birds and plants are there but they have been backgrounded. In the first example, two mass nouns *stock* and *capital* have been used for the ecosystem and the species within it. Time and again we see the recurrence of the mass noun *capital* with nature and environment, thus hiding the animal and plant species behind such terms.

4.4.2.3 Massification in Environmental Science: Working with the earth

This section will shed light on some examples of massification of the ecosystem in the selected book.

3.1. *"natural capital"* (p.6)

3.2. *"earth's natural capital"* (p.6)

3.3. *"solar capital"* (p.10)

3.4. *"Nonrenewable resources…stock in the earth's crust."* (p.12)

3.5. *"27 tractor-trailer loads of resources"* (p.15)

3.6. *"biological income"* (p.126)

3.7. *"fuelwood"* (p.163)

Terms like *stock, capital, income* and other units of measurement hide the identity of the animals and plants as living, active creatures and convert them into masses, thus leaving a faint trace of them. In example 3.3, the sun, a countable noun, has been converted into a mass noun by calling it *solar capital.* Similar expressions like "forest and living coral reefs are critical components of natural capital' and

"stock of capital" have been studied by Stibbe (2015), who analysed how imaginable forests and reefs are converted into unimaginable mass nouns like *capital*, which is later converted into a more unimaginable expression *stock of capital* (p. 157).

Furthermore, in example 3.5, the phrase *27 tractor-trailer loads* convert nature and the resources found within it into mere stuff and load, which are uncountable, thereby leaving a faint trace of the natural resources. Readers are thus unable to create a vivid image of these organisms, therefore they cannot relate with them. It is due to this reason that massification has been termed as a "strong form of erasure" (Stibbe, 2015, p. 157).

CHAPTER 5

CONCLUSION

This section puts forward the findings, discussion and recommendations derived from the analysis of the environmental discourses.

5.1. Findings and Discussion

The main findings of the study are presented below, leading to a discussion on those findings.

5.1.1. Findings

1. The researcher has found that erasure is highly pervasive in all the selected textbooks.
2. In *Environmental Science: Earth as a living planet,* there are 128 instances of erasure, in *Environmental Science: Towards a sustainable future*, the researcher found 187 paragraphs where erasure was seen and in *Environmental Science: Working with the Earth,* erasure was found in 170 paragraphs.
3. All the erasure categories (void, mask and trace) are found in the books.
4. It has been found that all the nine linguistic strategies given in the framework of Stibbe have been employed in the books. Some strategies like passive voice, co-hyponymy and metaphors are more prevalent than the others.

These findings imply that destructive constructions can be found even within the discourses of environmental sciences where environment and its well-being are the main concerns. Such constructions further the damage to the ecosystem by not being able to sensitize the readers towards the issues of the environment.

5.1.2. Discussion

After giving the findings, the researcher has interpreted the findings with reference to other sources in the given section.

Erasure is a form of backgrounding whereby certain important entities and

events are either completely or partially erased from discourses. In environmental discourses, erasure is highly prevalent; human agents in detrimental ecological activities have been erased, or animal and plant species have been systematically backgrounded. In congruence with the research objectives, it has been explored that the selected discourses had erasure present within them and the instances of erasure are manifold. Secondly, all the linguistic strategies given in the framework of erasure by Stibbe (2015) are found in the texts, some appearing more often than others.

The use of passive structures in environmental texts reveals that the agent is systematically deleted from sentences where he is the cause of environmental issues. This strategy is studied by Kahn (1992), who analyzes an article from the Wildlife Society Bulletin. He uncovers three significant findings: the complete lack of active voice in the scientific discourses on animal experimentation, representation of animals as non-living objects/specimens undergoing experimentation, and the constant use of euphemisms to obscure language. Such findings are in line with the current study's findings whereby passivization and objectification have been abundantly found. The studies differ in the aspect that Kahn studied scientific discourses while the researcher studied environmental science discourses.

Euphemistic language is employed by authors in certain type of discourses to hide the reality of the animals and the gruesome conditions that they are forced to live in. Such euphemistic language is studied by Glenn (2004), whereby he studies the data collected by Dunayer in her book *Animal Equality: Language and Liberation* from factory farm industry literature. The discursive strategy of 'doublespeak' is analyzed by Glenn- doublespeak as Coe (1998) puts it is, "Doublespeak techniques include the abuse of euphemism, nominalization, abstraction, presupposition, jargon, titles, and metaphor and other tropes as well as inflated language, gobbledy- gook, symmetrizing, stipulative definition, and ambiguity (weasel words)" (p. 68). Therefore, he concludes that doublespeak is prominent in such discourses whereby animals are represented as mere objects, resources and commodities for human use. Such representations also tend to hide the gruesome conditions in which animals on factory farms are enslaved. The current study also employed certain discursive strategies to study the objectification of animals and nature; nature has been objectified repeatedly in the environmental science discourses through the use of the

linguistic strategies of metonymy, construction of noun phrases, co-hyponymy and metaphors.

Moving on, Stibbe (2012) examined erasure in UK National Ecosystem Assessment reports. He found innumerable examples of hyponymy whereby general umbrella terms are used for specific species of organisms. Moreover, he examines co-hyponymy whereby animal species are placed as co-hyponyms of inanimate objects, giving them non-living characteristics, thus objectifying them. Further, animals have been mentioned by the places where they live, thus showing them in traces. Moreover, the strategies of massification, metonymy and the faulty construction of noun phrases are all prevalent in the reports. The aforementioned linguistic strategies are pervasive in the data of the selected study- the use of general, umbrella terms for specific species, the mention of species by their dwelling places, converting nature and ecosystem into mass nouns, the use of metonymy, the use of co-hyponymy and noun phrases to objectify nature and animals are all prevalent in the selected study. All the selected books make abundant use of these linguistic strategies to erase the ecosystem.

Loss of agency has been analyzed by Schleppegrell (1997) in pedagogical texts on environmental problems. His findings showed that in academic texts, abstract language is used by the employment of nominalisation in texts, thus deleting the agent who caused the environmental problem- "Environmental problems are presented as pre-packaged nominalizations: habitat loss, introduced species, pollution, and other problems that, presented as nouns, have no agents or actors that are recoverable" (p.64). Such strategies allow the suppression of agency. This study highlights the loss of agency and sees how certain pronouns are used in certain circumstances making the statements vague and abstract. Such findings go parallel with those of the current study, whereby passivization and nominalisation are excessively used in the discourses to suppress the agent. However, the researcher has not analyzed the use of pronouns in the discourse of environmental science. Along with passivization and nominalisation, other linguistic strategies given in the framework of Stibbe (2015) to construct erasure have also been analyzed in the current study, and abundant instances of all the strategies have been found.

Erasure in ecolinguistics discourses is a new trend in linguistics, and many

researchers have undertaken the responsibility of locating problematic and euphemistic language in discourses. One such work is that of Fouad (2019), who investigated the techniques of salience and erasure and their role in revealing the dominant ecological ideologies inherent in the coverage of the swine flu epidemic in selected Egyptian newspaper articles. The researcher employed the theoretical framework of Stibbe (2015) to locate erasure and salience in the texts. His findings concluded that writers used passivization, nominalisation, euphemism and grammatical embedding to construct erasure. Fouad highlights two of the eight models given by Stibbe, whereas in the current study, only one model has been applied since the data of the current study was abundant. The findings of both the studies were similar in the context of erasure as environmental discourses also construct erasure through the use of the aforementioned linguistic devices, however, the study of Fouad only employs three linguistic strategies to look for erasure; meanwhile, the current study has used all the linguistic strategies given in the model of Stibbe (2015).

The analysis of erasure in environmental discourses, whose central theme is to make the readers aware and sensitize them towards the environmental problems and their roles, is significant as it reveals how language is euphemized. Due to the use of such language in the discourses, the end goals of EE are not reached. Foregrounding and shedding light on erasure will bring the problem into the limelight, and alternatives will be suggested.

5.2. Conclusion

The researcher has attempted to counter the problematic and euphemistic use of language in environmental discourses. Such language erases many important aspects of reality; hence the message conveyed is either partial or distorted. The findings brought to the limelight that the discursive strategy of erasure is highly prevalent in environmental discourses. EE aims to bridge the gap between humans and nature and tries to bring humans closer to nature; however, using euphemistic language and presenting a distorted reality of nature and animals widens the gap further. Individuals cannot identify their role in the degradation of the environment, which cannot sensitize them towards their role in the destruction of the planet. Moreover, the representation of animals as mere objects and commodities furthers the prevailing

belief that nature is subservient to humans and humans have the right to exploit it for profit.

Therefore, the researcher thought it vital to bring the issue to the forefront. A rethinking of the language of environmental discourses is required in which the ecosystem and nature are reminded and brought back. Salience needs to be given to nature in texts, primarily in environmental texts, to convey the message of ecosystem restoration and protection effectively.

5.3 Recommendations for future research

The recommendations based on the current study are enlisted below:

- Further study can be conducted on a bigger sample of environmental texts.
- Furthermore, a study on the analysis of images and how they construct erasure can be conducted.
- The influence of environmental discourses on students and whether the text sensitizes them towards their derogatory role in the ecosystem could be explored. It could be seen whether the strategy of erasure and the use of euphemistic language impact the readers and students.
- A study could be carried out where analysis on only the problematic language is not carried out; rather, alternatives are also provided.

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